

FEBRUARY/MARCH 2018 // HELI-EXPO ISSUE // VISIT BOOTH #C3151

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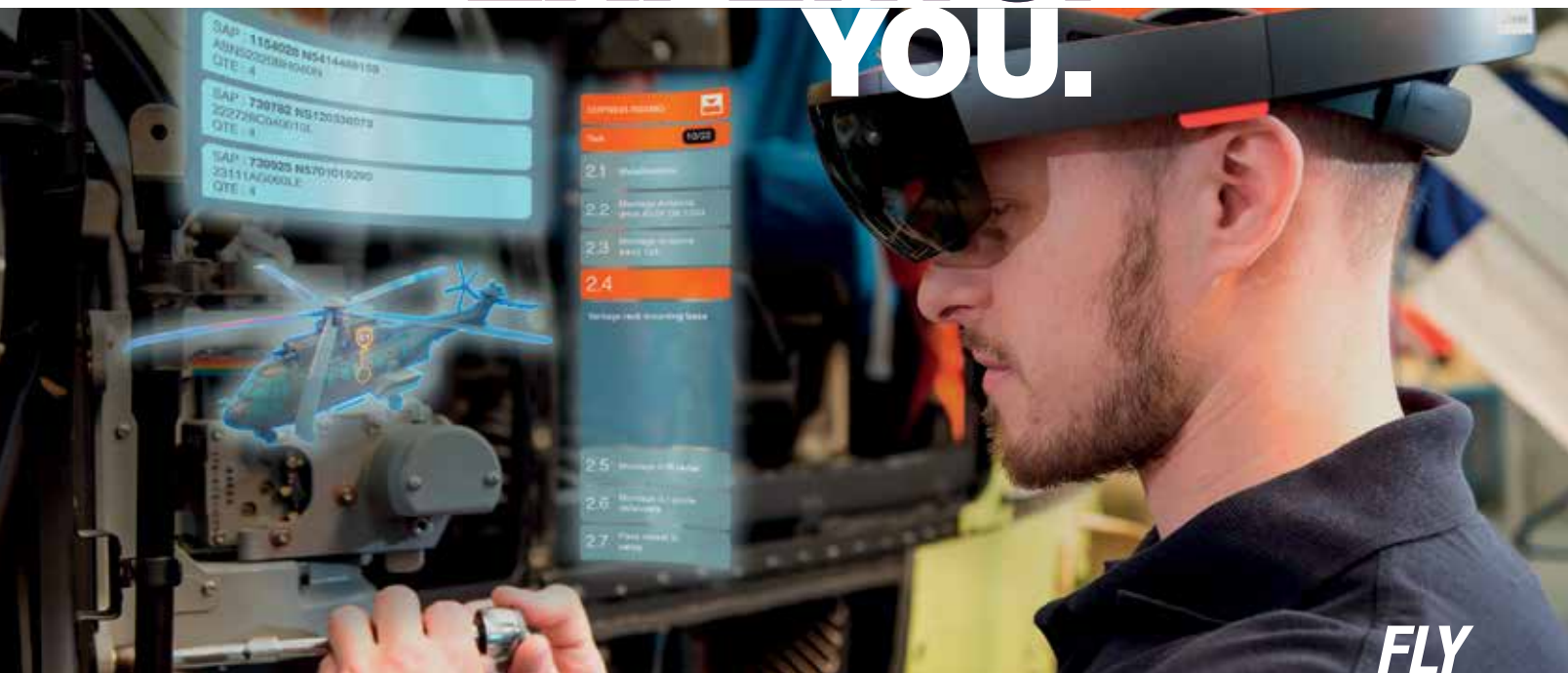
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ON THE COVER

Mount Everest looms behind an Airbus H125, operated by Simrik Air. The Nepal Himalayas present an extreme challenge to visitors — whether on the ground or in the air — and are no place for beginner pilots.

DIRK COLLINS PHOTO

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The Team

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insightmagonline.com

verticalmag.com

skiesmag.com

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500 Trillium Dr., Unit 23, Kitchener, ON N2R 1E5

In the United States:

701 S. Main Street, Fall River, WI 53932



PUBLISHED AND PRODUCED BY: MHM Publishing Inc.

SUBSCRIPTION INQUIRIES CALL TOLL-FREE: 866.834.1114

Vertical Magazine (ISSN 1703-8812) is published six times per year (Dec/Jan, Feb/Mar, Apr/May, Jun/Jul, Aug/Sept, Oct/Nov) by MHM Publishing Inc., paid at Fall River, WI. Postmaster please send address changes to: *Vertical Magazine*, PO Box 8, Fall River, WI, 53932.

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International Serial Number ISSN 1703-8812

Canadian Publication Mail Agreement Number: 40741549

Postmaster: If undeliverable, return mailing label only.

Printed in U.S.A.

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Column

Talking Point // **Maria Langer**



When Sexual Harassment Isn't

“

I didn't think it was professional and since I considered myself a professional, I didn't think it was appropriate where I worked.

All the news about politicians and celebrities misbehaving with women has gotten me thinking about my own experience with a “sexual harassment claim” years ago. I hope men, women, and employers read this to get a perspective that they might find surprising.

I need to preface my account with a few words about me. I was born and raised in the New York metro area and worked in New York City for my first five years out of college. New Yorkers are generally known for having a thick skin and mine is among the thickest. It takes a lot to shock or offend me. I'm not some sort of delicate flower that people need to watch their language around.

All of this has served me well in my three male-dominated careers: finance, tech, and aviation. I've been told that I'm “one of the guys,” which I consider a compliment in the workplace. After all, if I want to be treated — and paid — like my male colleagues, I need downplay gender differences. I get that and wish that more women would.

I've experienced what would be considered today as sexual harassment many times, from sexually themed jokes in the office to a coworker who routinely bragged about the number of women he'd slept with to a boss who made suggestive comments when I was alone with him in his office. I didn't take any of this seriously. If anyone had touched me or acted inappropriately, I would have taken action. But none of it was worth mentioning and, even if it happened today, I wouldn't think twice about it.

In the mid 2000s I was a line pilot for a major helicopter tour operator — one of only three women out of 30 pilots hired that season. I could see early on that one of my co-workers had a behavioral problem. His first outrageous comment occurred during training, when it was just him, another male coworker, and me chatting in a conference room. Back then, a ball player was in the news for rape charges and this idiot proclaimed, “He can rape anyone he wants. He's a great ball player.”

Anyone who is not offended by that assertion is as big a sociopath as this guy was. For the first time, I was actually shocked by something a coworker said at work. But I let it go. And, as the season wore on and he proved repeatedly what a boorish jerk he was, I did my best to ignore him.

But near the end of the season, he went one step too far. Most of the on-duty pilots, including one of the other women and me, were gathered in the pilot lounge on a weather hold. The sociopath asked another pilot if he could try on his Bose headset. He was impressed. He took it off, turned to the guy who owned it, and said, “This is great. How many c***s did you have to suck to get this?”

It not only shocked me that he would say such a thing in the workplace, but it also shocked some of the male pilots in the room. There was some nervous laughter. One of them said his name warningly.

I'd had enough. I was tired of listening to his inappropriate chatter and sick jokes all season. I went to the woman in charge of Human Resources and told her what he said. She was appalled. Then I told her what he'd said months before about rape. She was even more outraged than I had been.

She asked me to write it up and I did, stressing the inappropriateness of his comments in the workplace. Other pilots were asked about it. Eventually, he was punished with what amounted to a slap on the wrist. I didn't really care. My goal wasn't to get him fired; it was to make sure he understood what wasn't acceptable behavior.

I didn't discover until much later that my employer treated my report as a sexual harassment complaint. That is not what I intended. I didn't feel sexually harassed in any way. I felt outraged that a coworker's “locker room talk” included crude, sexually explicit comments in a group setting. I didn't think it was professional and since I considered myself a professional, I didn't think it was appropriate where I worked.

Is this fair? If a man had come forward and reported these incidents, would his complaint be treated as “sexual harassment”? What do you think?

Maybe that's part of the problem? That men accept unprofessional behavior in the workplace and allow it to become the norm?

And is this what prevented me from flying for that company again? In a subsequent discussion with the chief pilot, when I suggested coming back the next season, I was told “it wouldn't be a good idea.”

The lesson I learned here is not a good one: Women should not report any unprofessional behavior by a male coworker. Doing so is likely to get them labeled someone who “doesn't work well with others” and their complaint labeled “sexual harassment.”

I'm fortunate in that I don't need a flying job to move ahead in my career. I built my own helicopter business — one where I don't have to put up with crap dished out by unprofessional colleagues.

But I feel bad for the female helicopter pilots who are expected to keep quiet about such behavior in the workplace if they want to keep their jobs and move ahead.





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Column

Focus on Safety // Geoff Goodyear



Every Dog Has Its Day

“

I think most of us are hardwired to make our own mistakes rather than listen to the wise counsel of those who have learned through experience before us.

Those of us who are able to occasionally challenge gravity do so at a far greater risk than our poor earthbound colleagues typically endure. We all work very hard to manage those risks with such tools as training and study, but a key element to the exercise is experience.

The American humorist Will Rogers teaches us that the world is populated by three different types of people: those that can learn from self-inflicted academic study; those who are able to gain knowledge from observation and being taught; and the rest of us — representing the vast majority of the population — who must pee on the metaphorical electric fence for ourselves to figure it out!

Like most people, I belong firmly in the third category. I think most of us are hardwired to make our own mistakes (like pressing our tongue to a frozen fencepost) rather than listen to the wise counsel of those who have learned through experience before us.

I recall an event from my youth that illustrates how important those lessons that are gleaned from experience can be. My family was in the construction business in central Newfoundland with operations conducted from a sprawling equipment store/gravel pit/ready mix plant/maintenance facility/office that was referred to as “the Yard.” I now consider it a privilege to have grown up among the company’s employees, but at the time, it simply represented my “normal.” In hindsight, I realize they were all amazing characters, working in a frontier environment, who were anything but normal. One such character was a loader operator named Jim.

With only three fingers left on his right hand and an omni-present hard hat that was fixed to his head with a 25-degree list, he presented a rather unique presence. His vocabulary consisted primarily of expletives, and his short temper was accompanied by a razor wit and amazing talent as an operator. While diminutive in build, his character and deportment more than compensated, and Jim “ruled the roost.”

The other character in my recollection was Prince. Not the “Purple Rain” guy, but a junk yard dog (literally), complete with scruffy hair and gnashing teeth. Prince was a rather large German Shepherd who had basically adopted the Yard as his own, patrolled it faithfully at night, was dutifully cared for by one of the staff during the day, and was quite pleasant to be around — unless he was on patrol. Prince did not get the memo about Jim’s status within the company or the ruling of any roost.

While Jim was walking across the Yard to his loader early one morning, Prince had not yet been sequestered to his daytime apartment, and was still roaming the property in search of visitors. Prince spied Jim and instantly began a cheetah-like sprint towards him. Thankfully, Jim saw what was coming and decided it was time to expedite his movement towards his loader. Up to this point in his life, I don’t think Jim had ever had to run, so it was a rather awkward gait that got him to the loader in time.

Prince had lost the 100-yard dash to Jim, and had Prince been gifted with any common sense, he would have left Jim to his daily chores. Instead, Prince decided to stay and voice his displeasure to Jim from outside the loader. Having been made to run for the first time in his life, Jim was in a rather foul mood, and decided he had had enough. He started up his loader, scooped Prince in the bucket, and relocated him to the ready mix aggregate hopper.

Miraculously, neither Prince nor Jim suffered any injury from the event, but both benefited from their respective lessons learned. Henceforth, Jim would always do a forensic reconnaissance of the Yard before setting foot in an open area. And for the rest of his days, Prince gave Jim an extremely wide berth, striking off in the opposite direction whenever he saw him.

Bill Gates once said that “your most unhappy customers are your greatest source of learning.” While I am almost sure that neither Jim nor Prince were Microsoft clients, they both learned a lot from each other.

I know the term “experience” rolls off the tongue easily, but it’s worth considering that to gain that experience, we must flail about until the unfamiliar becomes familiar or, as in this case, you win the safety sprint. During this process, we owe it to ourselves and our siblings in industry to capture, recall and most importantly, recount lessons learned.

Have a safe season, everybody.



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Column

Focus on Training // **Andy Roe**



Training for Severe Weather



Career helicopter pilots encounter very unusual wind situations from time to time. It's part of the job.

Meteorology has always been a tough ground school subject for student pilots to master, but the severe weather occurrences that seem to be more prevalent these days make weather instruction even more of a challenge for both instructors and students.

The risks to flight in severe weather are loss of control and exceeding airframe limitations. Violent weather events in recent years are not more frequent than they have been in the past, but they are often greater in scale when they do occur. Last year, the path of destruction from four powerful hurricanes plowing through the Caribbean and the southeastern U.S. created havoc, and the raging forest fires that devastated California were made more intense by unusually strong Santa Ana outflow winds. These are two examples of the type of extreme weather we can expect to see more of in the future.

Even with thorough flight planning, helicopter pilots should be ready to adapt to changes in flight conditions. Severe weather can heighten the risks unique to rotary-winged flight, such as out-of-wind departures through translation, loss of tail rotor effectiveness, low level terrain related hazards, dynamic rollover, quickly degrading visibility, reduced performance from high density altitudes, rotor downwash hazards, and near-zero visibility on landing. Encountering violent weather could exacerbate these risks with less than ideal results.

The earth's rising temperatures, caused by heat-trapping carbon emissions, are increasing ocean evaporation. This results in higher levels of water vapor in the atmosphere. These conditions promote heavier precipitation, in the form of intense rain and snow storms; violent forest fires seem to be more widespread; ocean levels are rising due to the melting of polar ice; and thunderstorms, hurricanes, typhoons and tornadoes seem now to be more severe. Good helicopter instruction will point out and discuss these atmospheric hazards and emphasize the associated risks, such as greatly reduced performance for aircraft in hotter-than-normal summer temperatures.

Squalls, microbursts, clear air turbulence, frontal passages, strong winds, rapidly deteriorating visibility, and other atmospheric events are always threats to helicopter flight. Thorough flight planning, good decision making about flight acceptance, and the need for reduced power and speed in severe weather are an essential part of good instruction these days.


If you fly along the downwind side of a mountain in strong winds, you run the risk of getting caught up in a lee wave, which could force you down rapidly. You might have found in the past that 500 meters clear of a rock face on the downwind side would keep you away from turbulent air. But now, if strong upper-level winds with associated severe turbulence are forecast, you might want to avoid or be very wary of flight downwind of any abruptly rising terrain. The updrafts on the upwind side could be overpowering as well. Landing is always a good option if you are not confident when encountering intense weather.

The conventional helicopter has two rotors: a main rotor for lift, speed and direction control, and a tail rotor to oppose airframe torque and for direction control below translation. A strong wind from a nearby storm cell could flow into the tail rotor from the critical azimuth area, causing a loss of thrust and a loss of control. A similar wind could upset the main rotors and cause them to exceed their normal flapping angle, resulting in mast bumping or tail boom contact.

Most pilots use forecast icing as the no-go factor for canceling a visual flight rules flight. But these days, severe weather in the forecast might be a flight canceling factor as well. In September 2017, a sudden violent storm swept through Ottawa, Ontario, leaving a path of downed trees, overturned cars and roofless houses. A helicopter working in a remote area experiencing this same type of event would be at risk.

Clear air turbulence occurs when different winds at different speeds collide in open skies devoid of visible moisture. These pockets of unstable air can suddenly force a helicopter flying at low level down towards the ground. Having flown in these conditions myself, I encourage all my students to be vigilant when the helicopter begins moving strangely through the air in an unpredictable wind.

A few years ago, I experienced a strange airflow surrounding a long narrow mountainous island. The commercial flight called for a landing on the shore on both sides at the island's midpoint. Landing on the first side, the wind was probably 25 knots from the east, and the airflow was extremely rough. Skipping over to the other side, I was alarmed to find that the same 25-knot wind was now coming from the west. Leaving the area, I noticed the very rough turbulent airflow on the water where the two winds came together at the far ends of the island. Career helicopter pilots encounter very unusual wind situations from time to time. It's part of the job.

Strange wind events could become even worse in the future. Is all of this severe weather due to global warming and climate change? The vast majority of the scientific community thinks so. If you are an aspiring helicopter pilot, you would do well to take severe weather seriously. The career path you have chosen will put you into changing weather conditions that could be more violent and more intense than the weather experienced by pilots in the generations before you. 



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Column

Focus on Maintenance // John Carinha



The Curse of Convenience

“

Maintenance, repair, and overhaul shops are forced to continually upgrade their test equipment and service department offerings in order to keep up with new product developments.

The spread of “convenience” has no bias, no filters, and pretty much no boundaries. People from all societies and cultures are becoming ever more reliant on an increasing level of convenience within their everyday lives. Gone, for example, are the days where power windows and door locks on an automobile were “options.” They, among others, are now standard items, and have been superseded with ever more bells and whistles; many of which people have not necessarily requested, but we are nevertheless encouraged and convinced to believe we need. With backup cameras and an array of sensors, heaven forbid you should ever need or use your mirrors again. Shoulder checking will soon be a foreign concept to those just now learning to drive.

Our industry is not immune to the convenience factor, and it shows up every day in the latest technological developments across most aircraft systems. Airplanes are kind of like bicycles that way. You can make them lighter, faster, and trick them out with the latest gadgetry, but in the end, their overall makeup is unchanged. Bicycles will always have wheels and pedals, and airplanes will always have wings of a fixed or rotary sort. It’s everything else around these key physical attributes that evolves and leaves some pilots and clients on a never-ending search for the next big thing for their aircraft.

The challenge for the industry lies not in supplying the demand nor even in creating new products, but rather in installing, maintaining, and servicing them. Maintenance, repair, and overhaul shops are forced to continually upgrade their test equipment and service department offerings in order to keep up with new product developments. “Steam-driven” instruments, once a mainstay in most aircraft (and arguably field-adjustable), have already long been replaced with “glass” cockpits and the digital era of design and development in most production aircraft. As these new systems rely heavily on software, a computer and the web are often your best tools when it comes to servicing.

On a routine 24-month transponder and altimeter correlation check on an Airbus AS350 B3, I was met with a cockpit that had been recently upgraded to a full glass instrument panel. During the check, the altimeter reading was found to be out of tolerance. The old mechanical gauges could have their barometer scales adjusted in situ, but now I was left to deal with a remote air data computer (ADC) which required an on-bench calibration. This meant a laptop, some software, and a wiring harness. During this procedure, I kept on getting a failure message indicating that the new calibration did not register. Per the OEM’s instructions, I returned the unit on exchange and was provided a serviceable replacement.

Upon returning to the aircraft convinced the balance of the check would now go swimmingly, I was discouraged to find a failure annunciation appear on the primary flight display soon after applying power to the system. The air data information would not display. As my frustration built, it was obvious the issue would have to be thought out, not seen out; meaning, whatever was amiss was invisible.

Investigating the installation data and consulting the OEM brought light to the situation. At issue was the fact the other system components were operating with software from the time they were installed, some five years earlier, while the replacement ADC had been shipped with the latest software revision. In other words, the two were speaking a different digital language, or at least internal limitations were in place to ensure the disparity in software would not allow the system to appear mistakenly operational.

I brought out the laptop and online software again, and referenced an associated service bulletin from the OEM’s website. I managed to find an unused camera, and borrowed an SD card from it to upload the software to the flight displays. I eagerly went through the upload sequence and was met with yet another failure message. In order to upload the software, a dealer-issued SD unlock card was required — which I did not have. A return trip a couple of days later — with unlock card in hand — resolved the last remaining issue, and the system was serviceable and operational once more. Throughout the entire process I used no more than a simple screwdriver for removing and reinstalling the ADC. Everything else was achieved with software.

Convenience comes at a price, and that price is often overshadowed by the colorful marketing campaigns and endless sales pitches, or is buried in the fine print. When weighing the value-add of upgrades, we must take into consideration the ease of continued support and maintenance, and what that looks like across all working environments.





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Column

Focus on Leadership // **Kim Hutchings**



Ditch Multitasking in 2018

“

If you want to perform more efficiently and be more focused, ditch the idea of multitasking and focus more on mindfulness.

If one of your goals in 2018 is to become a better multitasker, you should definitely reconsider. In today's society, we are busier than ever, and the word “multitasking” is used often when describing how to get everything done in a certain time period. In the past, multitasking was viewed more as something busy moms did to manage their kids and household, or something done by people who were perhaps not focused on the task at hand. It tended to have a more negative connotation, whether it was the busy mom trying to juggle her rambunctious kids, get dinner prepared, clean the house, or chase after the dog — or the busy distracted worker who could not stop what he was doing to actually focus long enough to listen to what someone else was saying.

Nowadays, the ability to multitask is viewed as a positive thing — a superpower. The better you are at it, and the more you can do it, the more of a hero you become to those around you. Multitasking (or the idea of multitasking) is looked at as something to strive for, but things are changing — and they should! If people had a clearer understanding of multitasking and what is really going on with their brain when they're trying to do so, they would see that it is not the superpower they think it is.

When working in high stress and high workload environments such as aviation, it is important to focus on one task at a time. I recently started teaching new long line pilots about the myths of multitasking because, in adding this new element to their work, they are not only required to monitor everything inside and factors outside the cockpit, they now must monitor the line and the load hanging beneath them, too. My lesson starts off with a cartoon of a man on a stage with a guitar saying: “This next song's about multitasking. So sit back, sing along, clap in time, light a candle, make a request, think of a loved one, give them a call, and enjoy.” To sum it up, it is not possible to do everything at once, and the important thing is to focus on one thing at a time.

In their book, *The Multitasking Myth*, Loukia D. Loukopoulos, R. Key Dismukes, and Immanuel Barshi explain that the popular belief of multitasking is the ability to handle more than one task simultaneously — and that there is an often-incorrect assumption about how multiple tasks are accomplished at the same time. What is actually happening is task switching. This means that the brain is switching between tasks at a rapid rate because the “human ability to process more than one stream of information at a time and respond accordingly is severely limited,” they argue.

While we can store unlimited amounts of information in our long-term memory, the information that can be updated and readily available for any given task at hand is limited to a few items, or chunks of information at a time.

The bad news is there are severe limitations when performing task switching. For example, if you are in the middle of performing task A but need to attend to task B, this requires your brain to take in all the information being given for task A and B, recall how to perform task B, perform task B, then remember to return to task A right where you left off.

This may not sound that difficult, but if you are performing something new, or something that requires focus and attention, you cannot switch between tasks as quickly — and there is a chance you will miss a step.

Unfortunately, because the word multitasking is overused, there is a misconception that familiar tasks are automated and therefore require little attention. One example would be talking on the phone and driving a car (this includes using a hands-free device). It doesn't even have to be on the phone, it can be simply talking with someone in the car. Have you ever noticed stopping mid-conversation when someone pulls out in front of you, or slams on their brakes, or you aren't quite sure where to turn, but you know it's coming up? Driving and talking are two of the most common things we do on a daily basis, yet when something unexpected happens while driving, we stop or slow down our talking. Or, it can go the other way, we are too busy talking and nearly rear-end someone or miss our turn. That is because we cannot provide our full attention on two or more things at once.

If you want to perform more efficiently and be more focused, ditch the idea of multitasking and focus more on mindfulness. This is the practice of paying attention, but it also means being able to know where your attention is and where to direct it. This is important when we are performing a routine (yet, important) task and our mind starts to wander or we get interrupted. According to a study completed by researchers at Harvard University, people spend almost 47 percent of their waking hours thinking about things other than what they are doing.

Mindfulness meditation strengthens mental muscles in order to sustain focus and deepen concentration. The practice trains you to bring your attention back to a particular object, time and again. This is especially important for technicians and pilots who may have been interrupted during a critical step in repairs or flight operations. By training in mindfulness, you will be able to more easily return to the point you were at before the interruption, and less likely to forget a step.

Mindfulness is now widely accepted as a practice and is popular in areas such as the corporate world, healthcare, education, and with athletes. There is no reason it should not become as accepted in aviation.





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A Leonardo A109 SP GrandNew operated by SchenkAir gets the thumbs up from a crewmember on a snowy peak in Lika. **Philipp Schwegler Photo**



With maintenance engineers Stu Pope (left) and Joel Roste looking on, pilot Chad Pattenden (with Adam Yaretz in the right seat) lands a Croman Sikorsky S-61 on a barge in Mereworth Sound on Vancouver Island, British Columbia, while on a heli-logging job. **Bill Campbell Photo**



A Maritime Helicopters Bell 206 holds a hover above a frozen landscape in the high Arctic. The Homer, Alaska-based company supports a variety of Arctic industries, often working from the northern Bering Sea to 500 miles north of Point Barrow. **Michael Piper Photo**

A fleet of eight Airbus H125s come into land at the Eulogio Sánchez Airport, also known as Tobalaba Airport, in La Reina, an eastern suburb of Santiago, Chile. Six of the H125s are operated by Ecoptero and two by Suma Air, which were supporting the 2018 Dakar Rally. **Simon Blaise Photo**



After 40 years of service, British Army Air Corps operations of the AgustaWestland Lynx helicopter have come to an end. To mark the occasion, 657 Squadron embarked on a farewell tour of the U.K. from RAF Odiham with a flight of four AH9As. The Lynx has been replaced by the Leonardo AW159 Wildcat. **Duane Hewitt Photo**





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Sikorsky sells S-300 line to Schweizer RSG



There are an estimated 2,900 Schweizer S-300 series aircraft around the globe, according to Sikorsky. Operators are hoping for a renewed focus on support for the type from its new owners. **Mike Reyno Photo**

BY OLIVER JOHNSON & ELAN HEAD

Sikorsky has sold its light product line — including the popular light helicopter S-300 — to Schweizer RSG, a new company affiliated with Rotorcraft Services Group in Fort Worth, Texas, bringing an end to years of uncertainty as to the type's future with the manufacturing giant.

The sale brings hope of improved support for the estimated 2,900 S-300 series aircraft flying around the world, while allowing Sikorsky to focus on its two main product lines in the civilian market — the S-76 and S-92.

"For a number of years, we explored the right business path for production of the light helicopter product line while we fulfilled our order commitments and strengthened our supply chain," said Dana Fiatarone, vice president for commercial systems and services at Sikorsky. "We feel we are now

in the right position to transfer ownership of the S-300 and S-333 as well as the after-market support for both models."

The transaction closed on Jan. 24, and was announced the following day to Sikorsky's employees, customers, and suppliers. The manufacturer said the sale will have "no impact" on its commercial workforce or the facility in Coatesville, Pennsylvania, where the S-300 production line was based.

The sale is immediate, but Fiatarone said there will be some transition services as the line changes ownership.

"We will be supporting Schweizer RSG as they take over the assets and the support of the business," he said. "Importantly for our customers, we did make them aware of the sale and also did let them know we would fulfill our commitments under existing orders.

"So, whether that's aircraft delivery orders or spares orders, Sikorsky is committed

to fulfilling those commitments as RSG transitions into support and service of the aircraft, and for new aircraft and spares orders, they'll work with Schweizer RSG to make those happen."

Sikorsky had purchased the type — originally known as the Hughes 300 — through its acquisition of Schweizer Aircraft Corporation in 2004, and rebranded it the Sikorsky S-300.

While it initially appeared that the new ownership might revitalize the series, those hopes soon diminished, particularly after Sikorsky closed the original Schweizer manufacturing plant in Elmira, New York, in 2010.

The president of Schweizer RSG is David Horton, who served as the president and general manager of Schweizer Aircraft from 2008 to 2010. Horton told *Vertical* that the new company's priority is, "first and foremost, to support the customers that already have the product," with an



immediate focus on strengthening the supply chain.

However, the company has already established a partnership with Aviation Industry Corporation of China (AVIC), which will begin producing the S-300 under license with approval from the Civil Aviation Administration of China.

"In China, I think [the S-300] is going to be a strong player," Horton said, adding that once U.S. customers have renewed confidence in support for the aircraft, Schweizer RSG will work toward setting up an S-300 production line in Fort Worth. He added that the company will also be actively pursuing improvements and upgrades to the aircraft.

According to Horton, Schweizer RSG plans to hold a meeting for S-300 customers at HAI Heli-Expo 2018, Feb. 26 to March 1 in Las Vegas, Nevada, where the company will share further information about its plans and gather feedback from existing customers.

Airbus Helicopters 'stable' as Faury exits

BY THIERRY DUBOIS

Airbus Helicopters CEO Guillaume Faury, who is to become Airbus Commercial Aircraft's president in February, is leaving the company as rotorcraft sales are anticipated to remain stable this year.

"Around 400 deliveries would be a good objective for 2018," he said in a January conference call with media. Last year, Airbus Helicopters delivered 409 helicopters, almost the same number as in 2016 (418). Of 2017's deliveries, 260 units were for the civil and parapublic sectors. For rotary-wing aircraft with six seats or more, Airbus claims to have a 50 percent market share of civil and parapublic deliveries.

Gross orders stood at 350 (net orders were slightly lower, at 335), meaning Faury's January 2017 prediction for the year ahead proved accurate both for orders and deliveries.

"I am very satisfied with the order mix, with a strong performance of heavies and super mediums," Faury said. The Super Puma family, despite a nonexistent oil-and-gas market for heavy helicopters, had "one of its biggest years ever" thanks to military and parapublic sales. The 54 orders included 45 H225s and 10 H215s.

The super-medium H175 "remains our joker in the changing oil-and-gas environment," Faury said, and garnered 19 orders.

In medium helicopters, "this year will be the year of the first commercial contract for the H160," Faury said. The program, which Airbus hopes will restore its "40 percent market share" on the segment, has so far

lacked clear, solid numbers illustrating customer interest.

At the end of 2017, the company's overall backlog stood at 692 helicopters. While the level of orders and deliveries is low, Faury described the environment last year as "stable." He said the level of deliveries was "a testimony of our resilience."

In the emerging "air mobility" segment, 2018 will be the year of the first flight of the CityAirbus demonstrator. The electric four-seater, which features four pairs of propellers for vertical flight, is being developed at Airbus Helicopters' site in Donauwörth, Germany.

The Racer, a compound helicopter demonstrator being built as a follow-on to the X3, is on schedule for a first flight in 2020, according to Faury.

He said he would urge his successor to "keep going on air mobility." The new CEO, whose name is expected to be announced in the coming days, should also "explore new markets," said Faury. He added that he or she should address key technology enablers — "autonomous flight, new architectures and electrification."

In Faury's view, the next CEO should also proceed with digitalization, already well under way on production lines and in services. Described as a "key pillar for the next five years," digitalization is expected to bring new services to customers and the company itself. It will improve fleet availability, Faury said. "The H125 and H130 light singles have a digital future and you will hear more details at Heli-Expo," he added.

Airbus received 19 orders for the H175 in 2017. The company said the super medium aircraft is well suited to a changing oil-and-gas environment. **Anthony Pecchi Photo**



The first prototype of the Bell 525 Relentless crashed on July 6, 2016, halting flight testing on the program for over a year while the investigation into the accident continued. **Sheldon Cohen Photo**

NTSB releases Bell 525 crash report



'Severe vibrations' caused in-flight breakup of Bell 525 prototype during OEI tests

BY OLIVER JOHNSON

Severe vibrations caused the in-flight breakup of the first Bell 525 prototype as it attempted to recover rotor rotation speed following a 185-knot one-engine inoperative (OEI) test, the U.S. National Transportation Safety Board (NTSB) has found in its final report on the accident.

The report also highlighted the role played by "feedback loops" from unintentional control inputs on the collective and attempts at corrective actions from the aircraft's attitude and heading reference system (AHRS) caused by the vibration, which then served to sustain and amplify it.

As the main rotor continued to lose rotation speed, excessive blade flapping caused the main rotor to strike and sever the aircraft's tail boom. Bell test pilots Jason Grogan and

Erik Boyce were killed in the resulting crash.

The accident took place on July 6, 2016, as the aircraft performed the last of a planned sequence of OEI tests at increasing airspeeds in the Arlington Initial Experimental Test Area, about 30 miles south of Arlington Municipal Airport near Italy, Texas.

The test card for the simulated engine failure utilized the aircraft's OEI training mode, which reduced the power output of both engines to represent the maximum power available from one engine.

With the loss of power simulated, the pilot was to monitor the rotor's rotation speed, and delay his response by about one second before recovering from the maneuver by lowering the collective. This would reduce the power required by the rotor, and therefore increase its rotation speed.

The lowest allowable limit for rotation speed was 86 percent — below that, the test would be halted, the crew would recover rotation speed to 103 percent (to have more energy available in the rotor in the event of a single-engine failure), exit OEI training mode, and return to steady level flight.

The OEI tests saw the test team complete simulated engine failures and recoveries

at speeds from 102 to 175 knots true airspeed. The tests slowed the aircraft's rotor speed by five to 13 percent, and to allow it to recover to 97 percent or greater, the crew lowered the collective input to near or below 50 percent. During most of the OEI transitions, the pilot responded by lowering the collective between one and two seconds after the simulated loss of engine power. But with each increase in airspeed, it took the crew longer to recover the aircraft's rotor speed to the target of 103 percent.

The final scheduled OEI test was at 185 knots — the aircraft's never-to-exceed speed at the time of the flight. The crew engaged the OEI training mode, and the rotor speed dropped to about 91 percent within 1.5 seconds, where it was stopped by the pilot's lowering of the collective. The rotor speed began to recover, but about 5.5 seconds into the test, the crew stopped lowering the collective at the 58 percent stick position — and the rotor speed levelled out at 92 percent.

At this point, the main rotor had excited "scissors mode" — where the lead lag motions of the blades act in such a way that adjacent blades move together and

apart in a scissoring motion. This caused a six-hertz vertical vibration of the airframe — which was transmitted to the pilot seats.

About seven seconds after the crew had begun to counter the reducing rotor speed (and 12 seconds into the test), the test flight's structural dynamics engineer noticed increased engine vibrations, and issued the "knock-it-off" call to end the test, which was relayed to the pilots by the test director.

The vibrations had become so severe in the cockpit (peaking at 3 G) that they caused unintentional control inputs on the collective that further amplified the problem — causing, in the NTSB's words, a "biomechanical feedback loop."

Compounding this was the aircraft's attitude and heading reference system, which, in attempting to correct the airframe's vertical vibration with a "cyclic stir" input to the main rotor swashplate, served to exacerbate the rotor blades' scissoring motion — creating a secondary feedback loop.

Eighteen seconds into the test, the rotor speed dropped below 80 percent.

The crew of the test flight's chase helicopter — a Bell 429 flown by two pilots from the program's flight test team — reported hearing the test director call "knock-it-off" about the same time they observed the 525's rotor blades flying high and the rotor looking "wobbly and slow."

They radioed the 525's crew, but they got no response. About 21 seconds into the test, the 525's main rotor severed the tail boom. The chase helicopter crew watched the helicopter's tail and fuselage jack-knife and debris separate from the helicopter.

COMPLETING THE INVESTIGATION

In attempting to understand the crash, the NTSB highlighted the difficulty presented by the lack of data from a flight data recorder (FDR) or cockpit voice recorder (CVR). While the accident aircraft had a combination CVR and FDR (CVFDR), it wasn't recording, and as an experimental helicopter, the 525 wasn't required to be equipped with either.

Production models of the 525 will have a CVR and FDR, and as a result of the crash and investigation, Bell has implemented new procedures to mandate the recording of cockpit audio during all telemetered flight test activities.

While telemetry data was available to the NTSB, the lack of CVR or FDR presented a particular challenge in trying to understand

why the crew stopped their recovery from the initial dropping of the rotor speed.

"A properly functioning CVFDR would have recorded any discussions between the accident pilots that could have offered more information about potential abnormal conditions, distractions, or reasons for their stop in recovery after initiation of the OEI test," the report states. "Additionally, cockpit image recording capability would have recorded any pilot actions and interactions with the aircraft systems including avionics button presses, warning acknowledgements, and any other physical response to the aircraft. Cockpit audio and imagery could have provided insight into when the crewmembers first felt or detected the six-hertz vibration, how they may have verbalized their assessment of an observed anomaly, and whether they attempted any specific corrective action because of the vibration."

The report states that other pilots suggested that the lack of further collective input may have simply been a conservative response due to the high airspeed to avoid recovering too fast and overspeeding the rotor or damaging the transmission.

Bell test pilots and engineers told the NTSB there were two ways the pilots could have exited the low rotor speed condition — and therefore correct the vibration. The first would have been to lower the collective to increase rotor speed; the second, to exit the OEI training mode to increase the power available from the engines.

But in order to perform any corrective action, the pilots would have needed to be aware that the low rotor speed was the problem.

With regards to visual cues, the NTSB found that the crew was unlikely to have been able to read the aircraft's displays due to the extreme vibration levels. A master aural tone would have sounded, but it was associated with 21 other warning messages at the time. The master tone was chosen for the test flight as Bell had not yet developed separate audio files for different systems, and the test team decided a distinct tone for low rotor speed was not immediately needed for flight tests.

"Without an unambiguous cue for low Nr [rotor rotation speed], it was unlikely that the pilots had properly distinguishable awareness of the low Nr condition for them to appropriately respond," the report surmised.

With regards to the second solution — exiting the OEI mode — the NTSB said telemetry data indicated that the crew had not done so, but due to the lack of CVFDR data, could not say why. Post-accident shake tests of the Garmin touch control panel showed it remained intact during the vibration profile, but whether the crew's failure to exit OEI mode was because the vibration physically prevented them from doing so, or simply that they did not try, remains unknown.

However, the NTSB found that Bell had modified the OEI training mode software to

Flight testing resumed on the 525 program on July 7, 2017. Two prototypes are currently being used on the program, with Bell hoping to secure certification of the super medium aircraft from the Federal Aviation Administration by the end of this year. **Bell Helicopter Photo**



prevent it from automatically exiting the OEI mode when rotor speed falls below 90 percent — as it was originally designed to do by the engine manufacturer.

Bell told the NTSB that an automatic disengagement of the OEI mode at 90 percent rotor speed is not low enough to allow for the development and demonstration of OEI recovery across the flight envelope during testing. Further, Bell said a lower value for automatic disengagement was deemed unnecessary due to the “highly controlled test environment.”

ADDRESSING THE CAUSES

In a statement issued following the release of the NTSB’s report, Bell said it had devoted a small team of flight technology engineers, pilots, and flight test specialists to work with the NTSB’s investigators to determine the cause of the breakup.

“Bell and the NTSB have carefully studied the cause of the vibration, which had never been encountered before,” the company said. “The vibration was the result of an unanticipated combination of very high airspeed with a sustained low rotor rpm

condition. The in-depth analysis of the flight data resulted in a thorough understanding of the corrective actions necessary, and appropriate changes to the aircraft have been implemented.”

Among these are changes to address the feedback loops from the pilot control inputs and the aircraft’s AHRS.

In the NTSB’s investigation into the accident, it found Bell had included software filters in the cyclic control laws to reduce certain types of cyclic control inputs by the pilot — but no filter was designed for the collective. In addition, the gain between the pilot’s movement and the collective movement in the vertical axis was never tested on a shake table.

In the aftermath of the accident, Bell has enhanced the filtering system on the pilot’s side-stick controller, so that the vibrations of the pilot stick are not passed onto the rotor system. It has also performed shake tests with pilots using a side-stick collective to determine and incorporate the transfer function from pilots.

The company has also modified the 525’s AHRS software filters to reduce the system’s response to a six-hertz airframe vibration.

“These enhancements are being carefully tested to ensure that our corrective actions have fully addressed the unique problem encountered on July 6, 2016,” Bell said in its statement.

Finally, the NTSB report states that Bell plans to conduct flight testing of an OEI condition between 95- to 100-percent rotor speed, incorporate an automatic termination of OEI training mode if rotor speed falls below a certain limit, and implement a unique low rotor speed aural tone in the 525 test aircraft.

“We remain committed to the 525 program,” a Bell spokesperson told *Vertical* when contacted by email. “The continued work of the program team will result in a reliable, innovative helicopter with advanced rotorcraft safety features when it comes to market.”

The aircraft resumed flight tests on July 7, 2017, and the manufacturer said “a carefully planned approach” is underway to complete the remaining certification flight testing.

The 20,000-pound gross weight 525 will become the first commercial fly-by-wire helicopter when certified. As Bell resumed flight testing with prototypes two and three, it was aiming for certification in 2018.



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Super mediums have proven worth, lessor says

BY THIERRY DUBOIS

Super medium helicopters, represented in operational service by the Airbus Helicopters H175 and the Leonardo AW189, have proven their worth since their inception three years ago, according to a Waypoint Leasing study.

Helicopter manufacturers created the super medium category to bridge a perceived gap, in a booming offshore oil-and-gas market, between 12-seaters and heavy helicopters seating up to 19 on long distances. The first two, the H175 (EC175) and the AW189, were introduced at the worst time – the beginning of a major downturn. They have been delivered at a much slower rate than hoped. Meanwhile, the Bell 525 Relentless is still in development.

Nevertheless, the five dozen super medium rotorcraft in service have proven their lower operating costs make them worth the investment, says Waypoint. A super medium's cost per seat-mile is less than a heavy Sikorsky S-92's at most radiuses of action (RoA), Waypoint reckons.

At an optimal RoA of 140 nautical miles, the super mediums' cost per seat-mile are at their lowest – in the \$3.0 to \$3.5 range. That represents a \$0.5 to \$1.0 advantage over a new-build S-92. While the lower hourly operating costs for super medium aircraft account for some of the advantage, capital costs are an even larger driver, given that a super medium's acquisition cost is about 40 percent less than that of a new-build S-92, Waypoint notes, per OEM list prices.

From 260 nautical miles, the calculation turns in favor of the S-92, designed to combine a greater number of passengers with a longer range.

"On average, 90 percent of offshore beds (and in some cases close to 100 percent) can be served well within the range of all three super mediums operating with a full load of 16 passengers," said Waypoint.

However, the study doesn't mention that the remaining few percent may be a make-or-break criterion for a contract. To try to beat that argument, the manufacturers of the super medium have optional seating layouts. The AW189 is certified to carry 19 passengers, the H175 is planned to be approved for 18 next year, and Bell intends to have the Relentless certified for 19. But those configurations will necessarily have shorter RoAs. "It is not clear how commercially viable such high-density layouts will be; we note that the high-density (15 pax) AW139 layout is a rarity offshore," stated Waypoint.

The recently announced AW189K, which, instead of the baseline GE CT7 engine, is powered by a 28-percent more powerful Safran Aneto, may be an exception, as it will maintain passenger capacity at greater range.

The study notes that the main competitor for a new-build super medium may be a used S-92, due to its reduced capital cost. As a lessor, Waypoint has the S-92, AW189, and H175 types in its portfolio.

Waypoint believes a super medium's cost per seat-mile is less than a Sikorsky S-92's at most radiuses of action, making the lower operating costs worth the investment for many operators.

Anthony Pecchi Photo



RotorBits



Frasca Photo

Frasca launches new training device

Frasca International has launched a new, lower-priced helicopter training device (HTD). The HTD is designed for helicopter air ambulance providers, airborne law enforcement, introductory turbine transition training, and ab-initio flight schools.

The Frasca HTD comes standard with one aircraft configuration kit (Bell 206, 407, Robinson R44, or Airbus AS350); Garmin G500H or analog instrument panel; Garmin GTN 650; collective grip based on aircraft configuration kit (governed or ungoverned piston, modulated, or full authority digital engine control); annunciator panel and circuit breakers required in rotorcraft flight manual procedures; Frasca's helicopter mission training database; single channel visual system; and Frasca's Simplicity touchscreen instructor station.

Air Evac Lifeteam is the launch customer, and took delivery of seven Bell 206 HTDs earlier this year.

Windells & Hillsboro launch aviation program

Windells Academy, the famed action sports boarding school, and Hillsboro Aero Academy (HAA), the largest combined helicopter and airplane pilot training school in the U.S., have partnered to create the first high school boarding program in the U.S. in which students can earn their professional pilot certifications while at the same time working toward their high school diplomas.

Students enrolling in the Windells Academy Aviation Program will have the potential to earn their certificates and ratings to become professional airplane or helicopter pilots and obtain a college degree in aviation through HAA's unique partnerships.

This new program will kick off with the Aviation Discovery Program, a seven-week course providing students with an introduction to multiple areas of aviation, starting June 18, 2018, with the comprehensive boarding school program starting in September 2018.

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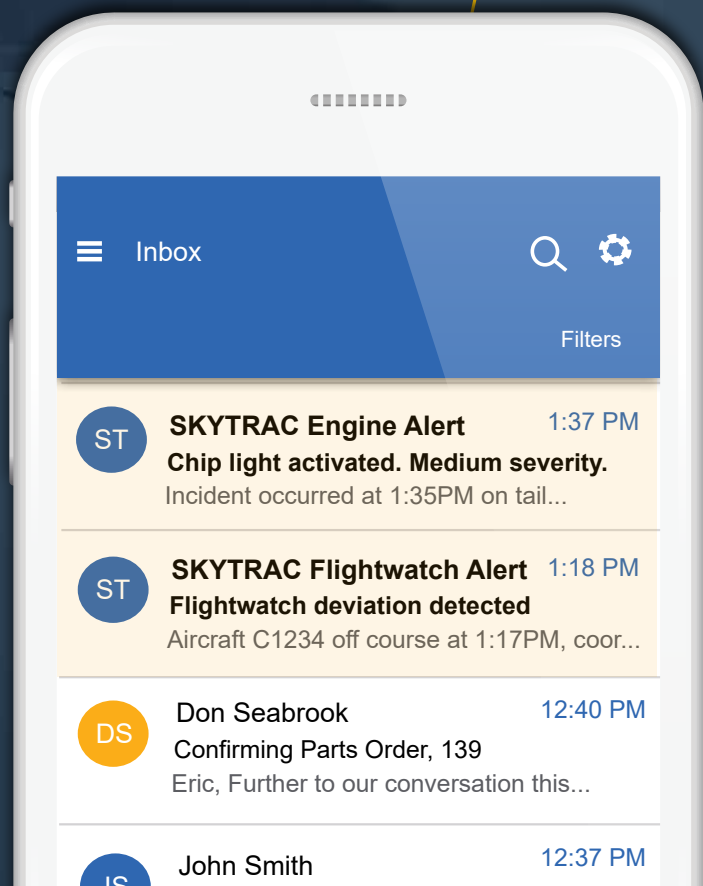
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Robinson delivers first R44 Cadet with floats



The Robinson R44 Cadet, a two-seat version of the R44 Raven I, was certified by the FAA in May 2016. **Skip Robinson Photo**

BY SKIP ROBINSON

Robinson Helicopter Company has completed the first delivery of a float-equipped R44 Cadet two-place helicopter — to an operator in Mexico. The floats provide added flexibility and safety when operating near or over water, and with the aircraft's extended overhaul times, is well suited for tuna and fishing fleet operations.

The Cadet's airframe, rotor system, and powerplant (Lycoming O-540-F-1B5) are the same as used in the R44 Raven I. Where the Cadet differs is the rear seats have been removed for additional cargo space, the maximum gross weight has been reduced to 2,200 pounds (998 kilograms), and the engine power has been derated to 210 horsepower takeoff and 185 horsepower continuous. The lower weight and derated power provide increased performance margins at high altitudes and extend the time between overhaul from 2,200 hours to 2,400 hours.

On May 6, 2016, Robinson Helicopter Company received Federal Aviation Administration certification for the R44 Cadet. Combining the best of the R22 and R44, the modestly priced Cadet (US\$349,000; with floats US\$378,000) is targeted at the training market as well as operators that want the economy of a small helicopter with the comfort, power, and performance of a larger helicopter.

Customers have a choice of optional equipment, including air conditioning, stability augmentation system and autopilot, and avionic packages for visual flight rules or instrument flight rules training. Robinson is now accepting orders with an estimated lead time of 16 weeks.

RotorBits



CHC begins Hornsea Project One flights

The first flight of a CHC AW139 left Humberside Airport in the U.K. on Jan. 24, 2018, for the initial phase of Ørsted's Hornsea Project One offshore wind farm.

Hornsea Project One will be the biggest wind farm in the world, capable of supplying clean electricity to over one million homes. It will be built 75 miles (120 kilometers) off the coast of Yorkshire, U.K., and helicopters will be used to transport workers and equipment both during the construction and operational phases.

CHC is a leading provider in the oil-and-gas industry. Working with Uni-Fly, CHC will deliver the six-year deal covering the construction phase as well as the first five years of operations and maintenance of the wind farm.



Héli-Union operates eight AW139s in Africa and Asia. **Héli-Union Photo**

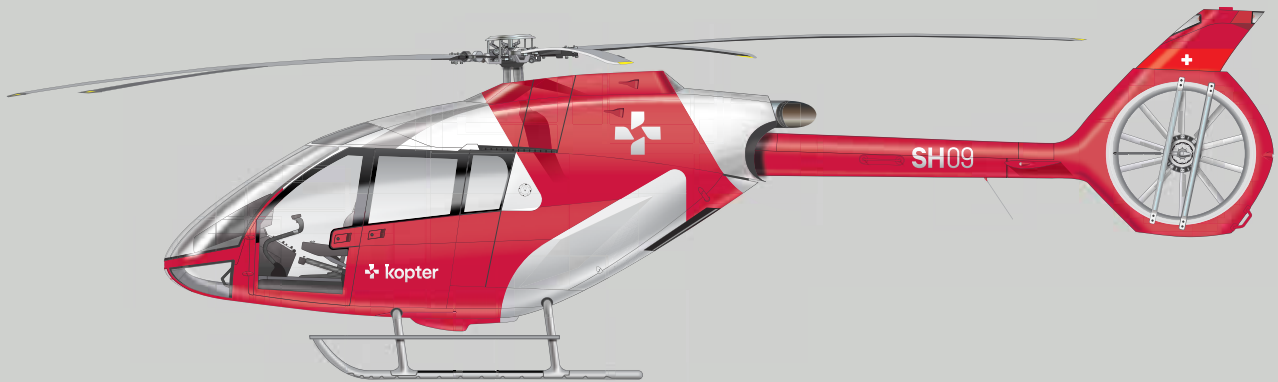
Héli-Union adds another AW139 to fleet

Héli-Union has received one Leonardo AW139 helicopter to support its offshore helicopter operations in Gabon.

The leased helicopter will operate on a new contract in Gabon for offshore passenger crew change from Port Gentil Airport to the designated offshore base.

"[The] AW139 is now becoming one of the most demanded helicopter types in [the] oil-and-gas industry," said Jean-Baptiste Olry, Héli-Union sales and operations director. "We are pleased to lease yet another AW139 to support our offshore helicopter operations. This shows that our fleet keeps on growing and we are heading in the right direction."

Héli-Union is currently operating eight AW139s in Africa and in Asia.



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The Korea Forest Service currently operates five Aircranes out of a total order of eight aircraft from Erickson Inc. The final two aircraft will arrive by the end of 2019. **Kari Greer Photo**



Erickson to build two S-64Es for KFS

Erickson Incorporated has been contracted by the Korea Forest Service (KFS) to build two new Aircranes to supplement the Forest Service's firefighting capability.

The Forest Aviation Headquarters, a subsidiary of the Korea Forest Service, has ordered two additional S-64E models equipped with firefighting tanks, sea snorkels, foam cannons, glass cockpit, composite main rotor blades, and night vision goggle capability.

"This was a global competition, and we were competing with manufacturers from around the world," said Douglas Kitani, CEO and director of Erickson. "We are pleased to bring the work and jobs to our southern Oregon facility and apply

Erickson's unique skill set to augment Korea's firefighting capabilities."

KFS was the first foreign government that purchased S-64s from Erickson in 2001, and to date it has operated five Aircranes in Korea while maintaining a contract for parts and service support. This new contract brings the total number of orders for the KFS Airplane fleet to eight, with the expectation of delivering the seventh and eighth aircraft by the end of 2019.

According to Erickson, the contract award decision was based on the performance and reliability of the Airplane, Erickson's attention to customer support, and the relationship of trust that has been built with the KFS over the past 20 years.

Erickson owns the world's largest operational S-64 Airplane fleet of 20 helicopters as part of its total fleet of 50 aircraft.

The Airplane helitanker is recognized as one of the most efficient and effective firefighting aircraft in the world. The S-64 Helitanker is equipped with a 10,000-liter (2,650-gallon) tank capable of rapid snorkeling either fresh or salt water, helping to provide an outstanding capability for fire authorities in both the initial attack of fast moving fires and advanced structure protection. It has internal foam mixing capabilities and provides water or retardant dispensation utilizing eight coverage levels. The aircraft can be configured with a water cannon for high rise and structure protection.

TSB: External bag struck Hydro One tail rotor

BY LISA GORDON

Canada's Transportation Safety Board (TSB) has revealed more information about the Dec. 14, 2017, crash of a Hydro One AS350 B2 AStar near Tweed, Ontario.

The accident claimed the lives of all four people on board, including pilot James Baragar, 39, and linemen Kyle Shorrock, 27; Jeff Howes, 26; and Darcy Jansen, 26.

The crew had been performing maintenance on high-power transmission lines and the helicopter was on approach for landing when it reportedly lost control and crashed into a nearby wooded area.

The TSB said in a news conference on Dec. 21 that bags used for carrying tools and supplies were being transported externally on an AirStair platform extending from the right side of the helicopter's fuselage.

Investigators noted these bags are normally attached to the AirStair with double-lock carabiners.

Shortly before the accident, the pilot picked up the three linemen at the base of a tower and was ferrying them to a nearby staging area. While nearing the staging area, one of the bags dislodged from the platform and, together with its attached carabiner, flew back and struck the tail rotor, which subsequently separated from the aircraft.

The helicopter departed controlled flight and all three passengers were ejected from the aircraft while it was still airborne. Investigators later found that two of the three passenger seatbelts in the aft seating area were unfastened.

Members of the TSB team also located a damaged white canvas bag (with a damaged carabiner attached) as well as the tip of a tail rotor blade more than 600 meters (1,968 feet) away from the crash site.

Investigators also recovered the aircraft's GPS unit, although it was not equipped with — or required to carry — a cockpit voice recorder (CVR) or flight data recorder (FDR).

The helicopter wreckage was sent to the TSB Engineering Laboratory in Ottawa, where its systems — including flight controls and engines — will be examined.

The investigation will also review helicopter maintenance and pilot training records, as well as operational policies and procedures and regulatory requirements.

A Hydro One crew shows the use of an external AirStar platform with an Airbus AS350 AStar during a demonstration flight. **Mike Reyno Photo**



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Marengo Swisshelicopter renames as Kopter

BY THIERRY DUBOIS

In an event held Feb. 1 at the company's new headquarters in Wetzikon, Switzerland, Marengo Swisshelicopter unveiled its new name — Kopter.

The new moniker is short, gives immediate product recognition and can easily be pronounced on international markets, CEO Andreas Loewenstein emphasized. "As we are an unmistakably Swiss company, the use of a 'k' — instead of a 'c' — gives the Kopter a strong, Swiss-Germanic feel. It has the feeling of solidity and dependability — two things that are essential in our industry," he added.

He pledged Kopter will be among the top three civil helicopter manufacturers in 10 years.

The first product of the would-be airframer, a large-cabin single, is keeping its designation as the SKYe SH09. However, it is seeing its target certification date slipping to the right again, as Loewenstein said it will happen "in the next 12-14 months." The first delivery is slated for the second half of 2019.

Prototype P2 is about to complete flight-testing before P3 takes over this quarter, according to Michele Riccobono, executive vice president of technology. After P1, described as "a demonstrator" that flew a mere 1.5 hours, P2 is used to "de-risk" the program.

The latter aircraft has flown some 70 hours. It was used recently to solve a major issue that had been keeping engineers busy for a long

time, Riccobono explained. A resonance phenomenon was causing too strong vibrations and high loads on the flight controls. The problem disappeared thanks to "a new set of main rotor blades," made "slightly stiffer." He said they were installed a few weeks ago and successfully flight-tested.

P3 will essentially open the flight envelope. PS4, the first "pre-series" SH09, is planned to fly next summer. They are anticipated to fly 250 and 110 hours, respectively. Kopter will use a flight-test facility in Southern Italy, hoped to provide better weather than Switzerland.

Loewenstein claimed to have more than 166 commitments for the SH09, including 27 firm orders.



The launch of Kopter is an opportunity for the company's leadership to share its ambitious business strategy, as well as news about its upcoming flight-test program and the start of production of the SH09 helicopter. **Kopter Image**

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RotorBits



Leonardo Photo

Falcon & Leonardo partner on Kuwait contract

Falcon Aviation — one of the UAE's leading aviation companies specializing in business aviation services, charter, and aircraft management — confirmed in January at the Kuwait Aviation Show that three new Leonardo AW169 helicopters will be deployed on a five-year contract with the Kuwait Oil Company (KOC). The helicopters will perform onshore and offshore oil-and-gas operations.

This debut in Kuwait marks a significant expansion for Falcon Aviation, which will be adding additional personnel in Kuwait, including offshore pilots and administrative personnel, plus line and base engineers to start the contract. The first two AW169s will arrive in March and April 2018.

Falcon Aviation will establish all the required infrastructure, including building a brand-new hangar to house the three Leonardo AW169s, and creating facilities to carry out line and base maintenance on the type.

TransCanada PipeLines receives H125

Airbus Helicopters Canada has delivered an H125 to TransCanada PipeLines Limited. The aircraft will be based out of Toronto, Ontario, and it will be the second H125 to join TransCanada PipeLines' fleet.

"The H125 is a natural fit for TransCanada PipeLines' mission requirements," said Tim Olson, director of aviation, TransCanada PipeLines Limited. "This new aircraft will be a genuine asset for our current operations, with its built-in maneuverability and enhanced safety features."

This will be TransCanada PipeLines' first aircraft delivered for use within the Canadian market. The newly delivered H125 will be utilized for pipeline project support as well as surveillance and has been enhanced with the addition of various supplemental type certificates, including squirrel cheeks and cargo mirror.

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EASA certifies AW109 Trekker



Leonardo has received more than 40 orders for the AW109 Trekker, which was certified by EASA in December 2017. **Leonardo Photo**

In December 2017, Leonardo announced that its AW109 Trekker had received type certification from the European Aviation Safety Agency and that deliveries were to begin in the first quarter of 2018.

The Trekker is based on the AW109/Grand range of helicopters, and is the company's first light-twin to come with skid landing gear. The Genesys Aerosystems glass cockpit can be configured to meet a variety of customer requirements, from single-pilot VFR (visual flight rules) to dual-pilot IFR (instrument flight rules). To help reduce pilot workload in challenging environments and demanding weather conditions, the cockpit display system has been designed to provide pilots with only information necessary for their current phase of flight.

Leonardo said the AW109 Trekker shares the same characteristics of its other light twin-engine helicopters. This includes high productivity, excellent performance and flying qualities, high maneuverability, robustness, advanced navigation capabilities, and high inherent safety. Power is provided by two FADEC (full-authority digital engine control) equipped Pratt & Whitney Canada PW207C turbine engines.

The cabin is the same size as the Grand/GrandNew and can accommodate up to six passengers, or either one stretcher with three to four medical attendants or two stretchers with two medical attendants. An additional passenger can be carried in the cockpit, if required, as the new model is capable of single-pilot operation.

The Trekker features a crash-resistant fuel system, crash-resistant crew and passenger seats, and a crash-resistant cocoon-type airframe. Other safety features include full Category A Class 1 performance in hot environments and a 30-minute run-dry main gearbox.

With its inherent versatility and modular interior, the AW109 Trekker can be configured for a wide range of roles, from emergency medical services, law enforcement and search-and-rescue, to utility, surveillance, passenger transport and government missions. A wide range of role equipment is available, including a cargo hook, emergency floats, external loudspeakers, external rescue hoist, FLIR (forward-looking infrared) camera, searchlight, snow skis, and video downlink.

To maximize operational safety and aircraft availability, Leonardo will provide operators with a range of service plans and access to training. Currently, the company has received orders for more than 40 AW109 Trekkers.

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Richmond, British Columbia-based Helijet International is expanding its fleet with the addition of six Sikorsky S-76C++ aircraft. **Heath Moffatt Photo**

Helijet to upgrade fleet through PHI

Helijet International Inc., based in Richmond, British Columbia, has entered into a letter of intent for the procurement and supply of up to six newer model Sikorsky S-76C++ helicopters with PHI, Inc., based in Lafayette, Louisiana.

The companies have signed definitive agreements for the delivery and acceptance of the first three Sikorsky S-76C++ helicopters, which will be prepared at PHI's Lafayette maintenance facilities for delivery to Helijet during the first and second quarters of 2018.

PHI will tailor the aircraft to Helijet's specifications — with a complete re-paint to company livery, avionics changes, and the addition of selected operating equipment — before they are added to Helijet's fleet for scheduled and general charter operating services in Canada. Helijet will redesign and refurbish the 12-passenger cabin interiors of the three aircraft.

Additional aircraft deliveries will be subject to respective company board approvals.

"Helijet has been planning its aircraft fleet expansion and upgrade for the past 24 months, and is now committed to bringing in newer, more advanced technology to the communities it serves," said Danny Sitnam, Helijet's CEO. "We are very pleased that we can accomplish this initiative in concert with an aviation world leader such as PHI."

"It is an absolute pleasure to work with Danny and his team," said PHI's chief commercial officer, Dave Stepanek. "Their long history operating the S-76 with an excellent passenger service operation makes participating in this fleet upgrade even more exciting. We know the level of professionalism at Helijet and know they will maintain and operate our S-76C++s to the highest industry standards."

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HEMS Academy H145 FFS approved

The ADAC HEMS Academy has announced that its H145 Level D full-flight simulator (FFS) is now available as a flight training source for international Airbus H145 operators.

The new H145 Level D simulator, developed and produced in close cooperation by Reiser Simulation & Training GmbH in Germany, completes the portfolio of EC135 and EC145 FFSs at the academy and sets a new standard in the world of helicopter simulation (see p.58, *Vertical 911*, HAI 2018).

The simulator comprises a six-degrees-of-freedom electric motion and vibration system; directly projected moving imagery using 15 two-channel HD LED video projectors on a 240- by 80-degree screen; and an intuitive on board instructor operating station to provide a realistic flight experience.

"Besides Level D standards, the H145 FFS offers pilots the opportunity to gain experience in night vision goggles flight, making use of the NVGs the operators use during their missions," said Thomas Hutsch, CEO of the ADAC HEMS Academy.

The mission experience of ADAC Air Rescue, the sister organization of the HEMS Academy, operating 14 H145 helicopters, has translated into the academy's safety-oriented training and the development of the H145 FFS.

ADAC Air Rescue is one of the major helicopter emergency medical services (HEMS) operators in Europe, and has established considerable expertise and a respected record for the safe flying of successful HEMS missions during more than 45 years of operation.

Operators from various mission profiles worldwide — including HEMS, law enforcement, VIP services, and offshore operators — value the professional service and personal touch of the HEMS Academy, which can be easily reached via three international airports in close proximity.

"We are dedicated to ensure the best training possible for ADAC crews," said Hutsch. "Partners worldwide can benefit from the same top-level training facilities used by Germany's largest air ambulance service."

The simulator includes a six-degrees-of-freedom electric motion and vibration system, directly projected moving imagery, and an intuitive on board instructor operating station. **Christoph Papsch Photo**



The new made-in-Germany Level D simulator was ready for training on Jan. 10, 2018. **Christoph Papsch Photo**



RotorBits



AW139 passes 2 million flight hours

At the end of 2017, Leonardo announced that the global AW139 fleet had reached the two-million-flight-hour milestone. This second million was reached just three years after the achievement of the first million, which had taken 10 years to reach.

Almost 900 units of the intermediate twin-engine helicopter are in service with some 300 commercial, government and military operators in about 80 countries across five continents. The fleet leader among all AW139s has topped 12,000 flight hours.

Assembled in Philadelphia, Pennsylvania, and Vergiate, Italy, the AW139 has been deployed across a wide range of applications, including corporate and VIP transport, disaster relief, emergency medical services, firefighting, law enforcement and homeland security, military, offshore transport, search-and-rescue, and utility.

Waypoint places H145 with CAF T  xi A  reo

Waypoint Leasing has completed a lease transaction for one H145 to CAF T  xi A  reo in Brazil to be used in private charter transportation within S  o Paulo. The transaction marked Waypoint's 15th H145 delivery, and the first lease Waypoint has completed for private charter transportation.

"We are pleased to complete our first transaction with CAF, an important new customer for Waypoint to make our entry into the private charter market," said Steffen Bay, Waypoint's vice president of sales and relationship management, Latin America.

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Bell unveils air taxi cabin at CES 2018



The four-passenger cabin demonstrates Bell's view of an on-demand mobility aircraft that focuses on a people-first engineered user experience, tailored with an urban air taxi ride.

Bell Helicopter Photo

In January, Bell Helicopter unveiled its air taxi cabin design and fully integrated user experience at CES 2018 in Las Vegas, Nevada.

"Bell Helicopter is innovating at the limits of vertical flight and challenging the traditional notion of aviation to solve real-world problems," stated Bell Helicopter president and CEO Mitch Snyder during the show. "The future of urban air taxi is closer than many people realize. We believe in the positive impact our design will have on addressing transportation concerns in cities worldwide."

During CES, attendees experienced an augmented reality simulator inside the cabin with a selection of consumer scenarios, from a red carpet premiere landing to several cross-city day and night trips. Bell said its air taxi design took inspiration from the people that

will benefit from it — bringing families, friends, and businesses closer together by gradually reducing the average in-car trip length.

Bell envisions passengers syncing into a fully integrated user experience control center, where they can catch up on world news, hold a video conference call, share documents with other passengers, or simply unplug from the noisy world below in a comfortable, relaxing space.

"The air taxi is not a new concept — Bell Helicopter has been moving people over urban landscapes for decades," continued Snyder. "While we are laser-focused on the passenger experience and eager to share with the public, Bell continues to develop our air taxi design to provide safe, reliable transportation services to the world."

Boeing unveils new eVTOL

Boeing has unveiled a new unmanned electric vertical-takeoff-and-landing (eVTOL) cargo air vehicle (CAV) prototype, which will be used to test and evolve Boeing's autonomy technology for future aerospace vehicles. It is designed to transport a payload of up to 500 pounds (225 kilograms) for possible future cargo and logistics applications.

In less than three months, a team of engineers and technicians across the company designed and built the CAV prototype. It successfully completed initial flight tests at Boeing Research & Technology's collaborative autonomous systems laboratory in Missouri.



Boeing Image

Powered by an environmentally-friendly electric propulsion system, the CAV prototype is outfitted with eight counter-rotating blades allowing for vertical flight. It measures 15 feet (4.57 meters) long, 18 feet (5.49 meters) wide, and four feet (1.22 meters) tall, and weighs 747 pounds (339 kilograms).

RotorBits

Babcock launches Nordic AW169 EMS service



The AW169 replaces the AS365 Dauphin that Babcock Scandinavian AirAmbulance has flown since 2006. **Johan Rydham Photos**



Babcock Scandinavian AirAmbulance's (BSAA's) new Leonardo AW169 — the first in the Nordic countries — is now in active service.

The helicopter is operated on behalf of Region Jamtland Harjedalen, and it replaces the former Airbus AS365 Dauphin that the company has flown since 2006.

The base in Ostersund is the first of four Swedish ambulance helicopter bases that will replace their existing helicopters with the AW169 in 2018. Next in sequence will be Gällivare, Lycksele, and the recently awarded base in Gothenburg.

Meeker R44 & R66 nose mounts certified

Meeker Aviation Services Ltd. has announced receipt of both a Federal Aviation Administration (FAA) supplemental type certificate (STC) and a parts manufacturer approval (PMA) for its new Robinson R44 and R66 lightweight nose mount.

The nose mount requires no permanent modifications to the airframe, and it fits over the existing landing light cover.

The maximum payload is limited to 50 pounds (22.7 kilograms). It can be used for various camera systems, searchlights, light detection and ranging (LIDAR) systems, and antennae.

European Aviation Safety Agency (EASA) certification is expected in early 2018.

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Eagle completes Edmonton Police H125 upgrades

The upgrades for the Edmonton Police Service's new Airbus H125, which included avionics and mission equipment, were completed by Eagle Copters. **Eagle Photo**



In August 2017, Eagle Copters successfully completed multiple avionics and mission systems upgrades for the Edmonton Police Service's (EPS's) new Airbus H125.

In addition to the installation of the latest avionics and mission equipment, EPS upgraded to the P132 Electrical Console and P139-HD Digital Audio System manufactured by Eagle Audio.

"The audio system has been extremely popular with law enforcement, EMS [emergency medical services], and government agencies worldwide for its leading-edge multicast and bi-directional repeater technology," said Luba

Jovicic, avionics manager at Eagle.

The upgrade was completed entirely in-house at Eagle's Canadian headquarters in Calgary.

"Upgrading aircraft like the H125 is a passion for us at Eagle and the three months that we spent with the Edmonton Police Service gave our team the opportunity to show how versatile we can be with these types of completions," said Wesley Semeniuk, customer support manager.

As *Vertical* went to press, the EPS was due to officially launch its new Airbus H125 in February.

AHS event showcases eVTOL progress

More than 250 of the world's leading vertical flight engineers, scientists, and innovators gathered in San Francisco, California, for two days in January for AHS International's 5th annual Transformative Vertical Flight workshop.

The event highlighted the incredible promise and progress of electric and hybrid-electric powered vertical take-off and landing (eVTOL) aircraft.

Recent advances in electric motors, batteries, and autonomous systems are enabling the development of an entirely new paradigm of aircraft.

"We are at the beginning of an exciting new era in vertical flight innovation," said Mike Hirschberg, executive director of AHS International. "Harnessing electric power transmission instead of mechanical drive systems enables the transformative design freedoms of distributed electric propulsion and other innovative approaches."

Conference sponsors Uber, Aurora Flight Sciences, Bell Helicopter, and Piasecki Aircraft — as well as many other AHS corporate members — are developing eVTOL solutions for urban air mobility operations.

RotorBits

Aeronav raffling Garmin transponder for autism program

Aeronav Avionics is bringing a fundraising campaign to its booth (#N3603) at Heli-Expo in Las Vegas, Nevada, this year. The Pitt Meadows, B.C.-based approved maintenance organization will be raffling off a Garmin GTX 335 ADS-B Transponder at the show, with proceeds benefitting adaptive hockey for children with autism. Entry into the raffle is by donation.

Aeronav sponsors the Surrey Stingrays Hockey Club, an adaptive hockey team which operates through the Canucks Autism Network Hockey Program. The goal this year is to raise the funds necessary to enable the team to travel to and participate in an annual hockey tournament in Kelowna, B.C.



RAMM R44 cabin floor trays FAA-approved

RAMM Aerospace has announced receipt of Federal Aviation Administration (FAA) approval for its Robinson R44 cabin floor trays.

RAMM Aerospace continues to expand its innovative product line for Robinson R44 aircraft. In addition to the R44 Cabin Floor Trays, RAMM Aerospace also offers affordable pre-cut carpet or utility flooring kits; a leather controls boot kit; a wipe-clean bulkhead/headliner kit for aircraft with and without air conditioning; and a replacement seat kit with detachable cushions.

The R44 cabin floor trays are thermoformed using aviation-grade material and are rugged and lightweight, the company said, adding that their installation allows for easy removal for regular cleaning.

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Milestone leases 8 AW139s to Kingwing

Milestone Aviation Group has announced the delivery and lease of eight AW139 helicopters to Shanghai Kingwing Aviation Co. Ltd.

The medium twin-engine helicopters will join Kingwing's existing fleet of 32 helicopters providing emergency medical services (EMS) in China, and will facilitate expanded services to 22 provinces nationwide.

Established in 2006, Kingwing is the largest EMS helicopter operator in China, not only providing EMS services, but also aircraft hosting, consignment stock, crew training, and helicopter maintenance services.

Shanghai Kingwing Aviation has a fleet of 32 helicopters providing emergency medical services operations in China, making it the largest HEMS operator in the country. **Leonardo Photo**



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Leonardo profits hit by 'Internal factors'

BY OLIVER JOHNSON

Indiscipline from its customer sales teams and production processes, underperformance in military sales, and challenging market conditions caused Leonardo Helicopters' profit margin to tumble to a "high single digit" number in 2017, the company has revealed.

The challenges faced by the company were detailed during the unveiling of a new five-year industrial plan by its parent company, Leonardo, in Vertigate, Italy, on Jan. 30.

Without revealing specific figures for 2017, the company said the helicopter division's revenues and profits were down from 2016, which itself had represented a steep decline from 2012 in revenue (4.2 billion to 3.6 billion euros) and profit (0.48 billion to 0.43 billion euros).

The company appointed Gian Piero Cuttillo as managing director of its helicopter division in October 2017, and he said he quickly saw the cause of the problems the manufacturer was facing.

In addition to global civil helicopter market decline of 45 percent from 2012 -- from US\$5.6 billion to US\$3.1 billion -- Cuttillo said a lack of sales discipline was causing major issues for the company's planning and production.

"We were competing for business in a very competitive market and we lost discipline, offering too much flexibility on configurations, accepting really late configurations and short lead times," he said. "All these led to our biggest issue, the impact on our production planning and processes... [which was] affecting both volumes and profitability."

Cuttillo said the result was that the helicopter division's manufacturing process had effectively been switched from a "push" model, in which the aircraft were meeting strong demand on their exit from the production line, to a "pull" model, where market demand was the key driver. The result was that the company's "production visibility" fell from 18 months to just six months.

"I saw straight away that our production and demand plans were not aligned properly, so immediately we started installing the discipline and rigor needed," he said.

Leonardo has launched a new integrated planning and control model, and production flow and supply chain logics have changed, Cuttillo said. He added that a new simple rule was at the heart of this: "You cannot change the configuration when the helicopter is on the final assembly line."

The company also highlighted the financial impact of having a much younger fleet mix, with the recent introductions of the AW189 and AW169 to the market.

"Younger products have lower margins in early stages," said Cuttillo. "[There is an] economic impact from [a fleet] mix shift to younger products."

A final internal problem was on the military side of the market, where Cuttillo said the company had underperformed with "order slippage, and some errors in the tender process on some military campaigns."

However, Cuttillo said he maintained Leonardo's helicopter division was strong, and referenced its gain in market share -- to more than 30 percent of the civil market -- during the overall industry decline.

"We don't think there is any structural problem with this business or with the industry we operate in," he said. "We have a world class business by any analysis. One thing really stands out, and that is our product strategy has been, and continues to be, absolutely correct. We have a range of products that the market wants and we are in the right part of the market."

The company anticipates steady growth in the civil helicopter market over the next few years, taking it from an estimated US\$3.2 billion today to \$4.3 billion in 2022. It believes the intermediate and medium categories of aircraft -- of which it claims a 50 percent market share through its AW169, AW139, and AW189 -- will be the main driver of this expansion.

With this in mind, the helicopters division believes it will return to "double-digit" profitability by 2020.

The helicopters division represented 30 percent of the parent company's revenue in 2016, with defence and electronics representing 45 percent and aeronautics 25 percent.



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RotorBits

Erickson announces new hires

Erickson Incorporated announced three key appointments in February, as it builds its executive team under new CEO Douglas Kitani.

Kevin Cochie has been appointed vice president and general manager of defense and national security, Hayden Olson will serve as vice president of safety and human capital, and Chris Schuldt will assume the role of chief of staff and senior director of DNS special programs.

"We are delighted to add this exceptional caliber of talent to the Erickson leadership team," said Kitani. "Their expertise will help us build relational capacity with key customers and strategic partners, leading to opportunities for growth and continued service to the nation."

Safran appoints new executive VP

Safran Helicopter Engines has appointed Olivier Le Merrer as executive vice president of support and services.

Le Merrer, 57, joined Safran Aircraft Engines in 1982, fulfilling various roles in engineering, program management, manufacturing operations, and business unit management.

In 2009, he joined Safran Landing Systems as executive vice president in charge of the wheels and brakes division. In 2015, he was appointed executive vice president of Safran Electronics & Defense, in charge of the Safran Electronics Division.

Since Jan. 1, 2017, Le Merrer has served as executive vice president of engineering of Safran Electronics & Defense.



Safran Photo



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Airbus delivers 1,300th EC135/H135

Airbus Helicopters has delivered the 1,300th helicopter from the H135 family. The global fleet of H135s has accumulated a total of more than 4.5 million flight hours since the entry into service of the first helicopter in 1996.

More than 300 customers in 60 countries use helicopters from the H135 family for a wide range of missions including emergency medical services (EMS), law enforcement, corporate transport, offshore wind, and military flight training.

The majority of the lightweight twin-engine helicopters of this type are operated in Europe (641), followed by North America (316) and Asia (195).

Airbus announced the integration of its Helionix avionics suite into the aircraft in 2016 to help meet customers' needs. The avionics system incorporates a four-axis autopilot and is already in use with the H175 and H145.

RotorBits

Maverick expands Hawaiian operations



Maverick Helicopters Photo

Maverick Helicopters will expand operations to Hawaii's northernmost and oldest island, Kauai, later this year.

The expansion comes after nearly three years of successful operations on Maui and will be the sixth permanent location for Maverick.

Tour flights will depart daily from the company's facility at Port Allen Airport, located one mile southwest of Hanapepe, Kauai.

CHC Brazil reaches new contract with Statoil



CHC Photo

CHC Group has announced a new contract supporting Statoil, one of Brazil's largest oil producers. The two-year agreement will see the company flying to Operational Area BM-S-8, in Santos Basis.

The missions will be based out of Jacarepaguá and begin in February 2018. They will be supported by a Sikorsky S-92.

"CHC is proud to support Statoil's operations throughout the world," said Marcelo Luiz Da Silva Soares, CHC's regional director for Latin America. "We look forward to utilizing our global standards and processes to taking care of our new passengers in Jacarepaguá when this contract begins."



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The X6 was initially built to target oil-and-gas missions, search-and-rescue, VIP, and other applications, but Airbus said the project to develop a new heavy-lift helicopter will be put on hold for the time being. **Airbus Helicopters Image**



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Airbus puts X6 on backburner


BY THIERRY DUBOIS

Airbus Helicopters will not launch a heavy helicopter program in the near future, as the X6's concept phase, which started in 2015, has not been deemed "conclusive."

Citing "a lack of maturity in the supply chain" to deliver on some "disruptive technologies" envisioned for a Super Puma replacement, Airbus Helicopters CEO Guillaume Faury said the company will not proceed until solutions are found. He also mentioned "uncertain market demand" for heavy helicopters in passenger transport.

Yet, 2017 was a very good year for the Super Puma family, with 54 military and parapublic orders. But the structure of the market has evolved more deeply than anticipated, in Airbus Helicopters' view.

In offshore oil-and-gas, the downturn is the new normal. And the sustainability of the military and parapublic market is unsure, Faury said. Therefore, the necessary conditions are not thought to be fulfilled for a program launch.

When announced in 2015, the 19-seat X6 was to feature fly-by-wire controls. It was widely expected to be powered by Safran Helicopter Engines' new turboshaft in the 2,500-shaft-horsepower category. 

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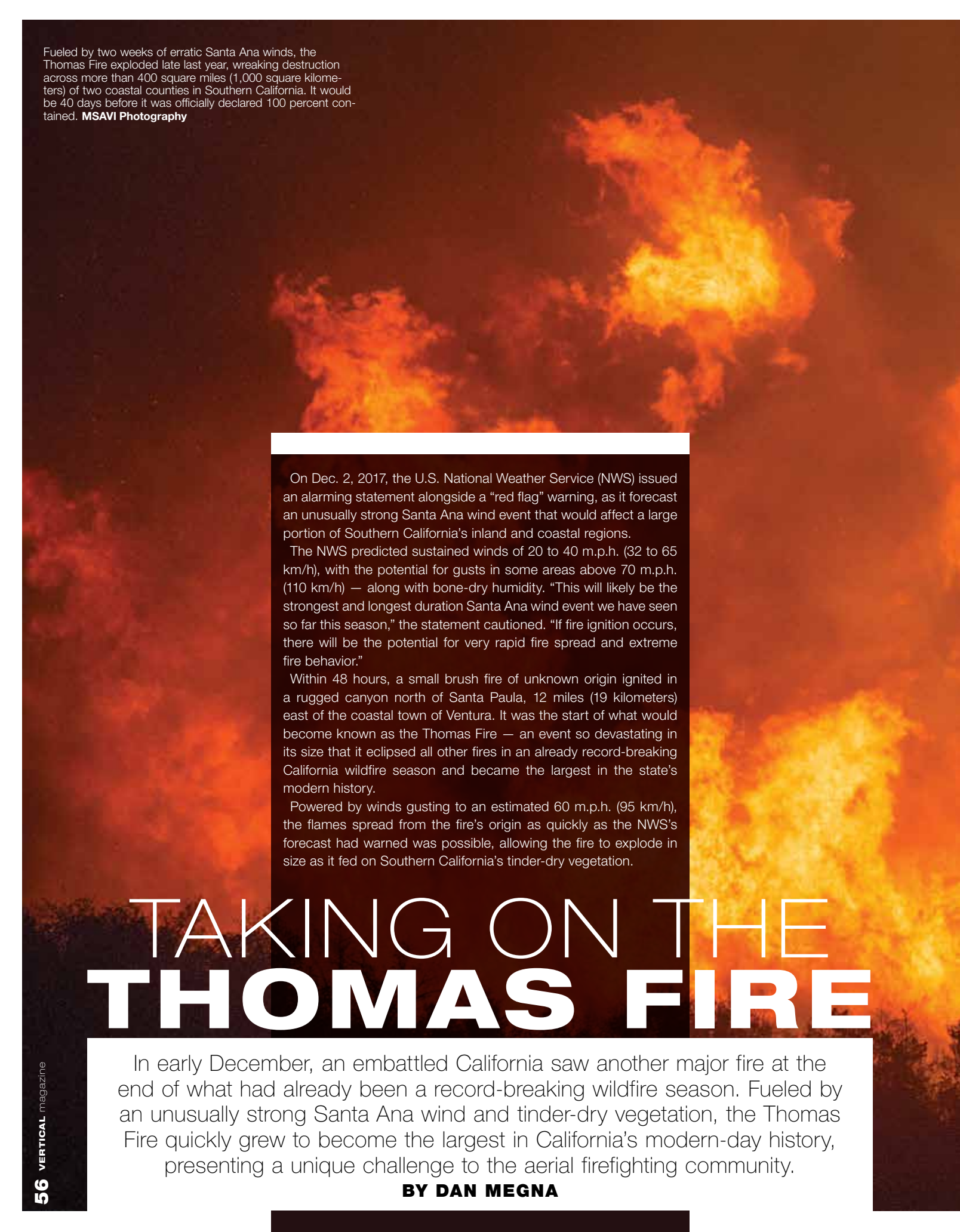


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Fueled by two weeks of erratic Santa Ana winds, the Thomas Fire exploded late last year, wreaking destruction across more than 400 square miles (1,000 square kilometers) of two coastal counties in Southern California. It would be 40 days before it was officially declared 100 percent contained. **MSAVI Photography**

On Dec. 2, 2017, the U.S. National Weather Service (NWS) issued an alarming statement alongside a “red flag” warning, as it forecast an unusually strong Santa Ana wind event that would affect a large portion of Southern California’s inland and coastal regions.

The NWS predicted sustained winds of 20 to 40 m.p.h. (32 to 65 km/h), with the potential for gusts in some areas above 70 m.p.h. (110 km/h) — along with bone-dry humidity. “This will likely be the strongest and longest duration Santa Ana wind event we have seen so far this season,” the statement cautioned. “If fire ignition occurs, there will be the potential for very rapid fire spread and extreme fire behavior.”

Within 48 hours, a small brush fire of unknown origin ignited in a rugged canyon north of Santa Paula, 12 miles (19 kilometers) east of the coastal town of Ventura. It was the start of what would become known as the Thomas Fire — an event so devastating in its size that it eclipsed all other fires in an already record-breaking California wildfire season and became the largest in the state’s modern history.

Powered by winds gusting to an estimated 60 m.p.h. (95 km/h), the flames spread from the fire’s origin as quickly as the NWS’s forecast had warned was possible, allowing the fire to explode in size as it fed on Southern California’s tinder-dry vegetation.

TAKING ON THE THOMAS FIRE

In early December, an embattled California saw another major fire at the end of what had already been a record-breaking wildfire season. Fueled by an unusually strong Santa Ana wind and tinder-dry vegetation, the Thomas Fire quickly grew to become the largest in California’s modern-day history, presenting a unique challenge to the aerial firefighting community.

BY DAN MEGNA



That first evening — Dec. 4 — fire assets from throughout Ventura began an intense nighttime initial attack by ground and air, with two Type II Bell “Super Huey” helicopters from Ventura County Aviation Unit (VCAU) supporting the effort. The aircraft were configured with 375-gallon (1,420-liter) Simplex Aerospace belly tanks, and were approved for nighttime firefighting operations with the use of night vision goggles as per California’s Firescope night flying guidelines.

While first responders understood the tremendous gravity of the blaze, it’s unlikely any could have imagined the historic devastation the Thomas Fire was about to wreak throughout their community over the next few weeks.

On scene, VCAU pilots encountered difficult and dangerous flying conditions. When they flew through the “immediate need” area of the fire, it was abundantly clear how the strong winds were going to present potentially dangerous control issues with their aircraft. So much so, they told the incident commander the helicopters would be greatly limited in their mission capabilities — and water drops were unlikely unless conditions improved.

In the early morning of Dec. 5, wind conditions improved enough to allow the VCAU helicopters, assisted by a Huey from neighboring Santa Barbara Sheriff’s Air Support Unit, to return to the fight.

By then, however, the fire had raced across 10 miles (16 kilometers) of terrain and into downtown Ventura.

“We were actively losing structures all throughout the city and in the surrounding hillside neighborhoods,” said VCAU pilot Alex Keller.

CALLING FOR HELP

That morning, Cal Fire officials called commercial aviation operators throughout the Western United States in search of air assets to fight the fire. Timothy West, a pilot for Aris Helicopters in Riverside, California, received one of those calls. “I think we got the call around nine or 10 in the morning,” he told *Vertical*. “I told them we had one ship — a Sikorsky S-58T — staffed and ready to go. Our second S-58 was down in heavy maintenance. I think I was airborne by 11 a.m.”

When Wiley Anderson, a pilot for Croman Corporation, took the call, he packed a bag and headed to McClellan Airfield near Sacramento, where the company had positioned a Sikorsky S-61 for just such an event. However, a minor maintenance item delayed his response until the following day.

The same morning, HeliQwest pilot Jody Christensen also headed to the fire — but initially it was to save his helicopter from the flames. He and his crew had been on a U.S. Forest Service



1 // Firefighters from nine states responded to the Thomas Fire, including 10 strike teams from throughout Oregon. **Kari Greer Photo 2** // In the first two weeks, periods of strong, erratic winds contributed to extreme fire behavior. At times, it burned at a rate of nearly an acre per second. **Kari Greer Photo 3** // The evening the fire was first reported, Ventura County's Aviation Unit responded with two aircraft for a nighttime initial attack using night vision goggles (NGVs). **MSAVI Photography 4** // The Santa Paula Airport was designated as the Cal Fire helibase for the incident, and was home to up to 23 helicopters. **MSAVI Photography**



(USFS) contract operating a Kaman K-MAX from a small helibase at Lake Casitas, just 10 miles north of Ventura. That base was directly in the path of the fast-moving flames.

"We got up in the morning, and we saw smoke and ash falling in Ventura where we were staying the night," said Christensen. "Then we saw the header, so we knew something had lit up. We started making a game plan for getting the aircraft out, because we knew we were in the line of fire."

The team planned to reposition to the newly established Cal Fire helibase at the Santa Paula Airport, just a short 14-mile (22-kilometer) hop south over the hills.

"I believe the numbers they were giving me were winds [of] 30 m.p.h. [50 km/h] gusting to 50 m.p.h. [80 km/h]," he said. "At that time, I actually tried to go around [the fire via] the east route to Santa Paula, and the winds were so extreme I had to turn around and go back. Instead I went south across Ventura and then into Santa Paula. Air attack was up, but there were no other aircraft flying — no bombers, no nothing — because of the extreme wind hazards."

Christensen and his K-MAX were released from the USFS contract and placed on the incident. For his first mission, he was assigned with West's S-58T as a flight of two for structure protection to the west near Lake Casitas. But en route, and after trying two different paths, the powerful winds and heavy smoke forced the two machines to turn around and return to the helibase.

"The winds were blowing 30 plus knots [35 m.p.h./55 km/h], but the [S-]58 is a great ship in the wind," said West. "So, it was nice to be in that helicopter for those kind of conditions. It has a ton of tail rotor authority and it doesn't matter which direction you land, it's happy in any kind of wind."

The K-MAX has its own handling idiosyncrasies in strong winds. "The winds were extreme, there's no denying that," said Christensen. "But flying the K-MAX, you just kinda do what it does. In a steady wind, the K-MAX is good. If it's gusting and erratic from different directions, then it is handful to fly because it wants to turn with the wind — it wants to weathervane. So yeah, it's a long day in heavy winds."

A BUSY BASE

After losing one day to maintenance, Anderson and his S-61 arrived at the Santa Paula helibase. "It was chaos!" he said. "Maybe 20 or more machines — the most I've ever seen on a fire, at least in one space. And for SoCal [Southern California], that's saying a lot."





The same afternoon, a Firehawk Helicopters Sikorsky S-70 piloted by Tony Weston and Bonnie Wilkens arrived from Boise, Idaho. "When we received the call, I was still packed from the summer," Wilkens said. "It was just a matter of us expediting our departure, and we arrived the next afternoon in time for the four o'clock in-briefing."

The following morning, Anderson's S-61 and Weston and Wilkens' S-70 went to work. "They put us on the southeast corner of the fire," said Anderson, "between Fullerton and Santa Paula.

That's where the fire was threatening the most structures at the time. The wind was right out of the east, blowing 35 to 40 knots [40 to 46 m.p.h/65 to 75 km/h]. We were there all day long. It was really windy and really crazy. I'd say at one time there might have been 10 aircraft flying in the same division. Everything from lights to heavies, which made it kind of interesting."

With their 900-US gallon [3,405-liter] Bambi Max, the Firehawk S-70 was then sent west, to the Lake Casitas area. The fire was threatening a number of structures and making a run for the coast. "The rate of spread was incredible, so your goals changed quite rapidly," said Wilkens. "From Lake Casitas, we began pulling a line that went basically to the northwest, and we were just trying to keep it in check. But unfortunately, it burned through there and then we went back to structure protection."

Considering the size of the incident and the number of aircraft, the aerial coordination won high praise. "Everything was excellent," said Christensen. "Communications, from the top down, was good. I never had any close calls with other aircraft. Everybody was very, very, professional."

"It was very well coordinated," added Wilkens. "They established an air attack who was involved with the fixed-wing tankers and we went direct with HELCO. And the individuals who did the HELCO were phenomenal — really quite outstanding. We always knew what everybody was up to as the fire progressed."

1 // Two Bell "Super Hueys" from Ventura County Aviation Unit and one from Santa Barbara Sheriff's Department with NVG-equipped flight crews were the sole aerial assets during the nighttime initial attack. **Skip Robinson Photo** **2** // The California National Guard provided a tremendous response, including Sikorsky UH-60 Black Hawk helicopters, Lockheed C-130 air tankers, and Reaper drones with infrared and camera capabilities. **Greg Doyle Photo**



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A LONG FIGHT

The first several days of the fire involved a lot of structure protection and chasing the unpredictable flame fronts. “The fire activity was very hot,” said Anderson. “[There was] a lot of torching and spotting, and that chaparral was like gasoline. There were times when the conditions were right where the fire seemed unstoppable — I don’t care how many Type-1s [heavy firefighting aircraft] you had. There were times I’d make a drop with my 1,000-[US] gallon [3,785-liter] bucket and by the time I got back it would be torching back up. It was really bad!”

Christensen, flying with a 660-US gallon [2,450-liter] Bambi Max, was mostly tasked with structure protection and working the perimeter of the fire. “You couldn’t work the head of the fire due to the extreme wind and the smoke,” he said. “So we were assigned to helping ground crews around structures. When that didn’t happen, we were going after targets of opportunity.”

“The fire had some interesting wind changes and behavior,” said Wilkens. “The Santa Ana [wind] activity wasn’t always continuous. Quite often, when the sun went down, we had the sundowner winds [a wind shift unique to that portion of the coast]. So, often, something that we checked off [as] relatively good at the end of the day would blow out at night because of a wind change, or an increase in wind, or some kind of after-hours unusual behavior.”

If the weather conditions and fire behavior were not enough, the environment presented more challenges and hidden dangers, especially in the urban interface. “There were a large [number] of powerlines, and that was the number one hazard of that fire,” said Christensen. “There was low visibility, and you had everything from 500K [volt] power lines down to a single strand running up and down valleys. It was just polluted with power lines.”

The armada of fixed- and rotary-wing air assets spent the first 15 days of the fire working against the erratic Santa Ana winds as the NWS extended the red-flag warning multiple times, becoming the longest continuous warning of its kind ever issued in California. Each day, most helicopters flew up to their mandatory eight hours of maximum flight hours. Per Cal Fire rules, single

1 // HeliQwest K-MAX pilot Jody Christensen, who worked the first 10 days of the Thomas Fire, said it was probably the worst fire he’d worked. The K-MAX would be assigned for 33 days including several days of flood mitigation after the January rains. **2** // Overnight on Dec. 10, a surge of Santa Ana winds caused a period of explosive fire growth, taking it from 173,000 acres to 230,000 acres by morning. **Kari Greer Photos**



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The Thomas Fire began as two separate fires (the cause of both is presently undetermined). The second fire ignited 30 minutes after the first, and four miles to the north. Strong winds quickly pushed the two together.
Skip Robinson Photo



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pilot aircraft are limited to seven hours, and two pilot aircraft are limited to eight hours flight time each day.

On Jan. 12, Cal Fire declared the Thomas Fire 100 percent contained. By that point, it had consumed 281,893 acres (440 square miles/114,00 hectares), and caused the evacuation of more than 100,000 people. It destroyed more than 1,060 structures, and took the lives of two people — one of whom was a Cal Fire firefighter.

Even before the fire was completely contained, heavy rains fell upon the charred hillsides, resulting in devastating mudslides into the upscale coastal community of Montecito in Santa Barbara County. These slides claimed the lives of 21 people (as *Vertical* went to press, two people were still missing), and wrought millions of dollars of destruction and damage.

"I was awestruck by this fire," said West. "There were areas of the burn that looked like a moonscape. It burned through with such intensity, such voracity, that there was nothing left. Everything was just incinerated."



Dan Megna | Dan served nearly 20 years of a 30-year law enforcement career as a helicopter tactical officer, pilot, and flight instructor with a large Southern Californian sheriff's department. He has been a regular contributor to *Vertical* since 2004.

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The second prototype of the SH09 (P2) during flight tests at Kopter's facility in Mollis, Switzerland.
Benjamin Diekmann Photo

MEET KOPTER

In early February, Marengo Swisshelicopter unveiled its new identity as Kopter. More than just a new name and brand, the change reflects 13 months of dramatic development at the fledgling manufacturer. *Vertical* was invited to its new facility in Wetzikon, Switzerland, to find out more.

By Thierry Dubois

The doors of the new design office were large enough, so the first prototype of the helicopter had been brought inside. In the small, snowy Swiss town of Wetzikon, Andreas Loewenstein was making a speech that marked “a big moment” in his company’s history. Meanwhile, three miles away, that company’s founder was probably busy with a complex engineering problem for a customer in biotechnology or solar energy — anything but rotorcraft.

When he opened the Feb. 1 event, Loewenstein had replaced Martin Stucki a mere 13 months before. The latter returned to his original company, Marengo Swissengineering, from which he had spun off Marengo Swisshelicopter to design the SH09 large-cabin single. The name change of the would-be manufacturer, to a more catchy Kopter, caps a year of profound evolution at the helm of the enterprise.

First, the symbols. Marengo is an acronym for “Martin Engineering and Consulting.” Its previous headquarters and design office, in Pfäffikon, was inside Stucki’s family house. But Stucki is no longer connected to the company, now based in nearby Wetzikon. Hence the need to both physically move the office and change the original name.

Kopter, the new moniker, is short, gives immediate product recognition and can easily be pronounced on international markets, Loewenstein emphasized. “As we are an unmistakably Swiss company, the use of a “k” — instead of a “c” — gives the Kopter a strong,



P2 has been used to “troubleshoot and derisk” the SH09 program, said Kopter CTO Michele Riccobono. The aircraft had flown about 70 hours by early February.

Rino Zigerlig Photo

Swiss-Germanic feel. It has the feeling of solidity and dependability — two things that are essential in our industry,” he added.

Second, the people. Last year, 112 new employees joined Kopter, growing the headcount by 50, to 250. Among them were some former executives of Airbus Helicopters and Leonardo’s helicopter division.

Loewenstein officially began in his new position — which he describes as a once-in-a-lifetime opportunity — on Jan. 1, 2017. In his earlier career, he had spent 13 years with then-Eurocopter (now Airbus Helicopters), notably as senior VP for development and strategy.

Christian Gras, a practiced salesperson, is the new chief customer officer. He used to be the CEO of American Eurocopter. He joined last spring.

Chief operating officer (COO) Jan Nowacki joined in September and his previous job was with Airbus Helicopters, too. He was the head of the rotor blade and airframe divisions.

CTO Michele Riccobono, who started working for Kopter in October, is a former Leonardo flight-test engineer. Shaun Dunn, another former Leonardo employee, is the new head of design organization.

Cecile Vion-Lanctuit is now Kopter’s head of communications and marketing. She used to be the director of communications at Eurocopter.

All joined a team that already included some industry veterans.

Philippe Harache, a former senior executive VP at Eurocopter, became chairman of the board in 2015. Another ex-Eurocopter employee, chief commercial officer Mathias Senes, was on the team before the program was even unveiled.

When CTO Riccobono joined, he immediately saw that a telemetry issue engineers were struggling with was “trivial.” The problem is now solved, thanks to his strong background.

This event perfectly illustrates why so many experienced executives have been brought on board. Being “a bunch of seasoned professional helicopter experts,” as Harache describes the group, they hope to convince the company’s shareholders that it can succeed in a third wide-ranging evolution. In short, they have to transform a design bureau into a fully-fledged helicopter manufacturer.

FROM DESIGN TO PRODUCTION

The founder’s leaving, in December 2016, was understood to be the outcome of diverging views with the main shareholder — a fund managed by the Lynwood foundation (the latter entity was created by Russian billionaire Alexander Mamut). Lynwood may have been happy with Stucki demonstrating a breakthrough concept and dissatisfied with slow progress in the next phase — certification and production.

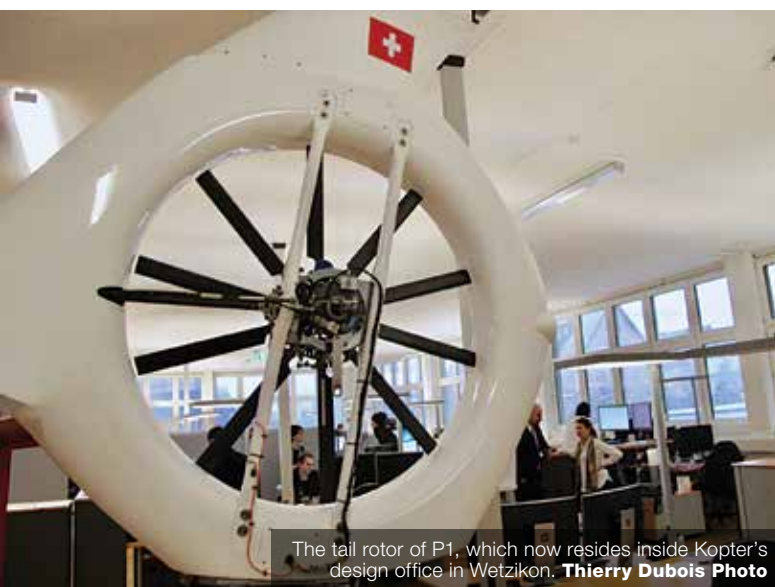
“We are not designing forever,” Loewenstein said. Kopter’s team aims to move to the production phase as soon as possible.



Andreas Loewenstein, Kopter's CEO, introduces the company's name change from Marenco Swisshelicopter at a special event on Feb. 1, 2018. **Kopter Photo**



P2 sits inside Kopter's facility in Mollis. The aircraft's time in the air is almost up. Going forward, it will be used for ground trials to certify the SH09's drive train. **Thierry Dubois Photo**



The tail rotor of P1, which now resides inside Kopter's design office in Wetzikon. **Thierry Dubois Photo**

The CEO pledged Kopter will be among the top three civil helicopter manufacturers in 10 years.

First, it needs to secure certification from the European Aviation Safety Agency (EASA). After several postponements, this is forecast for "the next 12 to 14 months." The Federal Aviation Administration would then give its nod an estimated six to eight months later. The first delivery of an SH09 is slated for the second half of 2019.

The to-do list before then is still long. Prototype 2 (P2) is about to complete flight-testing before P3 takes over this quarter, according to Riccobono. He described the earlier P1 as "a demonstrator" that flew a mere 1.5 hours, after 30 hours of ground evaluations. It proved "a Swiss company could build a helicopter and make it fly."

But some features were impossible to certify, according to Riccobono. "The flight controls used cables and their friction was so strong that the pilot had to keep the cyclic stick moving, otherwise the breakout force would have been too high." On P2, the issue was resolved with rods.

P2 is used to "troubleshoot and de-risk" the program, and has flown about 70 hours. The aircraft recently solved a major issue that had been keeping engineers busy — a resonance phenomenon that was causing strong vibrations and high loads on the flight controls. The problem disappeared thanks to "a new set of main rotor blades," made "slightly stiffer," said Riccobono. They were installed a few weeks ago and successfully flight-tested.

After Heli-Expo in February, P2 will become a "tie-down helicopter," meaning it will spend 100 hours in ground trials to certify the drive train.

P3 will open the flight envelope, including reaching maximum speed and altitude by September. Then, it will contribute to gathering compliance data for EASA certification.

PS4, the first "pre-series" SH09, is planned to fly in the summer. The design will have been "ironed out" thanks to the work on P3.

P3 and PS4 are anticipated to fly 250 and 100 hours, respectively. For both of them, Kopter will use a flight-test facility in Pozzallo, Italy, for its favorable weather. The flight-testing activity is scheduled to be complete by January 2019.

The relatively small number of remaining flight hours, around 350, is believed to be consistent with the complexity of the aircraft. The SH09 is said to be much simpler than the Airbus H160 medium twin which, at 550 hours in November 2017, was halfway its flight-test campaign. For instance, the Swiss design has no autopilot (yet).

Loewenstein said the versatility of Kopter's engineers and the company's ability to make decisions quickly would enable this quick pace of development — and keep costs low.

PREPARING FOR MARKET DEBUT

The SH-09's design features a broad use of a new composite material. Its supplier, Villmergen, Switzerland-based Connova is in charge of the fuselage, except the doors and tail boom. It has invested US\$2 million and is planning on investing another US\$8 million in manufacturing equipment for the SH09 program, said CEO Jon Andri Jörg. The new material is based on a TenCate pre-impregnated carbon fiber that, once cured, absorbs less humidity. In turn, the structure can be made lighter, Riccobono said.

Kopter's engineers target an empty weight of 1,400 kilograms (3,080 pounds), allowing for a very favorable ratio with the payload, which should stand at 1,250 kg (2,755 lb.). P2 has an empty



The company's design team is looking to certify the aircraft with a 130-knot cruise speed and a maximum speed of 140 to 145 knots.

Eugene Burgler Photo



The company has now recorded 27 firm orders, a further 19 orders contingent on certification, and 120 letters of intent.

Benjamin Diekmann Photo



P2 on display during the company's rebranding in early February. In the background, CEO Andreas Loewenstein can be seen talking to board member Andre Borschberg. **Thierry Dubois Photo**

weight of 1,600 kg (3,525 lb.) and P3 weighs 1,530 kg (3,375 lb.) but those last two numbers include the unspecified weight of the flight-test instrumentation. Meeting the 1,400 kg goal on PS4 involves some structural redesign, Riccobono acknowledged.

The aircraft features a fully redundant hydraulic flight control system. In case one of the two systems fail, the helicopter keeps the same flight envelope and the pilot can fly to the nearest practicable airport for the aircraft to be serviced.

Kopter's design team is shooting for a 130-knot cruise speed and a 140- to 145-knot maximum speed. The fuel tank will contain 200 US gallons (750 liters) and the consumption is predicted at between 42 to 47 US gallons (160 to 180 liters) per hour. Those numbers are estimated to translate into four to five hours of endurance and 600 nautical miles (1,110 kilometers) of range.

The SH09 is priced at US\$3.3 million (at 2020 economic conditions) with "a good level of equipment." A new avionics suite, to replace the current Integrated Cockpit Display System from Sagem, will be announced at Heli-Expo. Kopter will also unveil the name of its partner in pilot training at the show.

Loewenstein said Kopter has received 27 firm orders, 19 orders contingent on certification and 120 letters of intent. He said the geographic spread of the orders reflects the global single-engine fleet distribution — 45 percent in the U.S., for instance.

The SH09 is targeted at the replacement market of aging single types, like the Airbus Helicopters AS350/H125 AStar and H130 and the Leonardo AW119 Koala.

Chief customer officer Gras said Kopter intends to develop an IFR version for the emergency medical services (EMS) market in the U.S., where, thanks to its single engine, it will provide an option for operators facing increasing cost pressures.

The company also hopes the SH09's speed, the visibility it offers, and its large cabin (Kopter says it is close to finding a way to squeeze eight passengers inside) will make it an attractive


option for sightseeing operations. With SH09 sales in EMS, sightseeing and other markets such as law enforcement, Gras has a target of 600 orders from the U.S. from 2020 to 2030.

To meet Gras' ambitious sales objectives, Loewenstein has plans for more than one final assembly line (FAL). In addition to the one being readied in Mollis (a 30-minute drive from the design office in Wetzikon), one will be built in the U.S. around 2022, and another one in Asia later. Hence the organization centered on a pre-assembly facility located near Mollis. It will feed the FALs with airframes, main rotor heads, gearboxes and rotor blades.

In Mollis, the production rate is planned at "less than 10" in 2019, "less than 20" in 2020, "at least 30" in 2021 and 50 (full capacity) in 2022, COO Nowacki says.

In terms of future development, Loewenstein hinted Kopter might look into a hybrid-electric rotorcraft. A recent addition to the board of directors may help. Andre Borschberg headed the design of Solar Impulse 2, the fixed-wing aircraft that performed transoceanic flights on sun power.

Lynwood is now the only shareholder and, while Loewenstein believes it is here to stay, a capital increase is looming. Kopter is engaged in a capital-raising effort because "this is the right time — certification is approaching and the company is becoming more international," he said. The company hopes to raise between US\$150 and 200 million by year-end.

After a busy 12 months full of change, the next 12 promises to be just as interesting for the ambitious Swiss company. 



Thierry Dubois | A freelance writer specializing in aerospace technology, helicopters and business aviation, Thierry also moderates international conferences on aviation technology topics.



Over 1,100 UH-60M/S-70M/S-70i Black Hawks have been produced to date, primarily for military applications. Sikorsky now aims to see more S-70i Hawks in firefighting roles.



THE iHawk

Sikorsky is marketing its S-70i Black Hawk for firefighting applications.

We got behind the controls to learn what new capabilities it brings to the market.

STORY BY JON BOURKE
IMAGES PROVIDED BY SIKORSKY

I wasn't sure how to approach this assignment at first. I'm a seasoned firefighting and search-and-rescue (SAR) pilot with 26 years of mission experience, but most of my firefighting work has been in light helicopters and Bell mediums. Before this story, I had never flown a Black Hawk — but then, neither have many other pilots in the aerial firefighting world. So I decided to just tell it like I experienced it for the benefit of anyone else who may be new to the aircraft.

My task was to travel to the Sikorsky Training Academy (STA) in Stuart, Florida, to fly the S-70i Black Hawk for evaluation as a firefighting aircraft. Sikorsky, now a Lockheed Martin company, is marketing the S-70i as a next-generation, multi-mission capable Firehawk, although they're leaving the task of outfitting it for firefighting to third-party vendors like United Rotorcraft.

The Firehawk's marketing strength is based on the Black Hawk's over 14 million flight hours and proven safety record, Sikorsky's established support system for the model, and an infusion of upgrades and design changes to the avionics, engines, and main rotor blades. Sikorsky hopes to convince customers that the advanced technology and automation in the S-70i make it a more capable, cost-effective replacement for many of the aircraft that are currently being used for firefighting, including Bell medium helicopters like the ones that I fly.

Are they right?

A STRONG LEGACY

The S-70i shares DNA with all of its ancestors in the UH-60/S-70 series, which dates back to the early 1980s. The new-generation S-70i is basically the same aircraft as the UH-60M that Sikorsky produces for the U.S. military (and the S-70M it sells to international military customers), with some minor differences in customer-specific equipment, including a simplified engine inlet and exhaust design, and a radio package that is more suited to civilian needs.

Earlier versions of the aircraft have already proven themselves as capable emergency medical services (EMS), SAR, firefighting, and troop-carrying platforms with both military and public use operators, notably the L.A. County Fire Department. Sikorsky claims that the improvements in the latest S-70i variant will make it better at all of those missions while also easier on pilot workload.

The S-70i has a maximum gross weight with external load of 23,500 pounds (10,660 kilograms), a 9,000-lb (4,080 kg) hook capacity, and hover-out-of-ground-effect (HOGE) gross weight of 18,000 lb. (8,165 kg) at 11,000 feet density altitude. With the basic empty weight of a tank-equipped S-70i likely in the neighborhood of 15,000 lb. (6,800 kg), that will leave plenty on the table for pilots, fuel, and water in the tank.

Compared to the S-70A models currently being operated by

Two S-70i helicopters are available for flight training at the Sikorsky Training Academy (STA) in Stuart, Florida. The first S-70i airframe is also serving at STA as a static maintenance trainer.





Compared to the older S-70A, Sikorsky cites significant improvements in the S-70i in mean times between mission abort, mission affecting failure, essential maintenance action, and scheduled maintenance action.



The S-70i has automatic diagnostics for main rotor blade tracking and balancing. The new blade design has also eliminated BIM pressure indicators.

L.A. County, Sikorsky claims an increase in payload of 850 lb. (385 kg), gains attributable to both the higher available torque from the new GE-T701D engines, and the increase in efficiency of the i model's wide-chord blades, which use slightly less power to carry the same load as the old A and L model blades.

Currently, the aircraft is instrument flight rules (IFR) capable but not certified. The blade de-icing system on the UH-60M has been removed on the S-70i for a weight saving of around 200 lb. (90 kg), but it can be added back on as an option. The aircraft is night vision goggle (NVG)-compatible, with a fully integrated Sikorsky avionics suite, including four Rockwell Collins interchangeable multi-function displays, dual CMC flight management systems

(FMSs), and dual Korry flight directors with four-axis auto-flight and hover hold capability — a useful feature for SAR missions. The aircraft also has an integrated vehicle health monitoring system, active vibration control system, and Sandel helicopter terrain awareness and warning system (HTAWS).

Meanwhile, United Rotorcraft, which recently secured a contract to supply up to a dozen new S-70i helicopters to Cal Fire, is working on a completion package to outfit the aircraft for firefighting. United Rotorcraft is now in the process of working with Sikorsky, Cal Fire, and other S-70i customers to design a customized avionics suite and equipment control system for the firefighting mission. Because modifying the existing integrated avionics would

The engine/airframe management display uses linear vertical trend bars with limit lines in place, and color changes of the trend bars to indicate status of a parameter. Assessing parameters is fairly quick and intuitive, especially when it comes to power management.



The S-70i retains the A model's 9,000-lb. capacity cargo hook, but improves hover-out-of-ground-effect performance over the A by 850 lb. at 6,000 feet pressure altitude and 30 C (86 F).



NO QUESTION ABOUT IT, THIS IS A SOPHISTICATED AND COMPLEX MACHINE THAT IS NOT TO BE APPROACHED HAPHAZARDLY.

be cost-prohibitive, that system will stay largely intact. However, United Rotorcraft plans to replace the existing intercom system (ICS) with a Becker audio system, and is also working on a solution to make the aircraft ADS-B capable.

The Cal Fire aircraft will also feature an Axnes wireless ICS, Churchill Navigation augmented reality mapping system, Air Comm environmental control system, Goodrich external rescue hoist, and interior seating for up to 14 passengers for the transport of fire crews. Extended landing gear will be installed to accommodate a new-design, 1,000-gallon (3,785-liter) Kawak Aviation firefighting tank with retractable snorkel. Cal Fire has also requested a cargo hook and left-side bubble window to facilitate water bucket operations.

I would not have any of this mission equipment on the S-70i that I would be flying, but that was OK: in reality, you don't need to snorkel and drop water to evaluate an aircraft's suitability for doing so. There are a lot of other factors — including performance, handling qualities, cockpit layout, and visibility, to name a few — that can make it or break it in that role.

TO THE SIM!

My first stop was Flight Safety International's (FSI's) facility in West Palm Beach, Florida, which conducts S-70i simulator training for Sikorsky's students. There, I was greeted by Jeanette Eaton, Sikorsky's regional vice president, U.S. and Canada; Keith Little with Lockheed Martin communications; and FSI

Sikorsky's S-70i Black Hawks are built in at PZL Mielec in Poland, which is Lockheed Martin's biggest manufacturing facility outside the U.S.





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S070A/L/M program manager and flight instructor Dave Prewitt, who would be introducing me to the aircraft.

FSI conducts initial training on the S-70i cockpit layout, “switchology,” and systems using a graphical flight-deck simulator: an arrangement of touchscreen panels with visuals representing the actual cockpit. Pop-up graphics and systems diagrams correlate with the switches and buttons being touched, helping students understand what’s happening behind the scenes. It’s a convenient, efficient way to get oriented to the aircraft, for a fraction of the cost of using the full-motion Level D simulator (or, for that matter, the actual helicopter).

The full-motion Level D simulator is certainly impressive, though. After a safety briefing, we strapped in for a flight, starting with a pick up to a hover and a few traffic patterns back to a hover and set down. Once I got a feel for the sim, Prewitt transported us to an L.A. County Fire helibase, where we lifted off and headed into the surrounding hills to practice some typical mission scenarios, including responding to a small fire and the crash of a light plane.

It was easy to work in this familiar environment due to the sim’s very high quality graphics and movement. Conditions such as lower light angles, smog, and brown-out were introduced to make pilot workload as close to the real deal as possible, minus the smell of smoke. We made a scene landing at an impromptu marked helispot near the crash site, and had full functionality of the landing/searchlight to help with the brownout. Even the rotor-wash was accurately portrayed on the bushes, trees and grass as we landed.

The landing was a bit rough — my fault, as it takes a while to get used to the control reactions of the sim. We then did a confined area takeoff and moved on to fight a ground fire, setting up for water drops as if we had the tank installed. Targeting 70 feet on the radar altimeter and 70 knots of ground speed, we made several passes and I found myself making water-dropping noises, really enjoying the experience.

After that, we headed to San Bernardino International Airport for a couple of visual approaches to the 10,000-foot runway, and some unlocked-tailwheel taxi practice on the tanker base ramp. While en route, I practiced using the auto-flight, inputting various flight director commands for heading, altitude, and airspeed changes. On our second visual approach to the runway, I used the flight director to step down to the aim point and then engaged the hover hold, which kept us at 50 feet stationary over the runway. Pushing the go-around button at that point had the aircraft do an altitude-over-airspeed departure to a selected altitude.

Prewitt also vectored me for a back course localizer approach in instrument conditions. Using the large flight director input knobs, it was easy to intercept the course, at which point the auto-flight captured the approach and took over, bringing us down to the minimum descent altitude. After doing a go-around, Prewitt restored the blue skies and I did a bit more hands-on flying at low level in the mountains to the north before our time was up.

S-70i FIREHAWK AT A GLANCE

Last year, Cal Fire awarded a contract to United Rotorcraft to supply up to a dozen new S-70i helicopters equipped for firefighting. Here’s a look at some of the features that will be on Cal Fire’s new i model Firehawks. United Rotorcraft will be offering its Cal Fire modifications to other S-70i Firehawk customers.



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- Medical Litters
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- Goodrich External Rescue Hoist
- Directional Hoist Mission Lighting
- ACC Environmental Control System (ECS)
- High Intensity Searchlight
- PA/Siren
- Breeze Eastern Cargo Hook/Load Cell System
- Forward Recognition LED Lighting

1 COMPOSITE WIDE CHORD, ROTOR BLADES

- 16 percent wider blades alone provide 500-lb. more lift than the A model

2 IMPROVED DYNAMIC SYSTEMS AND MAIN ROTOR GEARBOX

3 COMPOSITE FOLDING STABILATOR

4 HIGH SPEED MACHINED FRAME

- New manufacturing techniques on the i increase fatigue life and offer additional anti-corrosion protection compared to the A

5 INTERNAL FUEL SYSTEM

- The 360-gallon fuel system features ballistic tolerant fuel cells and self-sealing fuel lines, reflecting the Black Hawk's military legacy

6 T-700-GE-701D ENGINES

- With improved performance and reliability, the new GE engines combine with the wide-chord blades for a payload increase of up to 850 lb. over the A

7 STRAIGHT ENGINE EXHAUST

- Compared to military Black Hawks, the i Model features a simplified inlet and exhaust design

8 1,000 GAL EXTERNAL TANK

- United Rotorcraft is working with Kawak on a new firefighting tank design

9 CARGO HOOK

- The 9,000-lb. cargo hook will permit bucket as well as tank operations



FIREHAWK AVIONICS MODIFICATIONS

- Churchill Augmented Reality System (ARS) Mapping System
- TDFM 9000 Series Tactical Communications System
- Becker Audio System
- AXNES Wireless Audio System
- Flightcell Satellite Communications/Tracking System
- Traffic Advisory System (TAS)
- ADS-B Compliant Transponder



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THE CERTIFICATION PROBLEM

After flying the Sikorsky S-70i, I'm enthusiastic about its possibilities as a firefighting and SAR aircraft. Unfortunately, the market for the S-70i is currently limited by the fact that it does not hold a civil type certificate. For government agencies that own and operate aircraft under a public use declaration, this is not an issue. However, for companies like the one that I work for, this becomes problematic given conflicting regulations and policies regarding the transport of government firefighters on contractor-operated aircraft (see p.62, *Vertical*, Oct-Nov 2017).

Our company holds contracts with the U.S. Forest Service and Department of Interior to provide medium Bell 205 and other light helicopter models for firefighting and SAR use. Some of our missions, such as short-haul rescue, clearly fall into the category of a "public use operation." However, for transporting their personnel, our customers require contracted aircraft to hold FAA standard airworthiness certificates in either the normal or transport category. They must also be operated by certificated air carriers under 14 Code of Federal Regulations (CFR) part 135, which provides for FAA oversight of maintenance, pilot training, company structure, facilities, and insurance.

Paradoxically, this requirement for standard airworthiness certificates has resulted in an outdated firefighting fleet. Although our Bell 205s hold standard airworthiness certificates in the transport category, that is only because they were grandfathered in from older Civil Air Regulations 7, circa 1967. None of our 205s are less than 30 years old, none of them meet the current transport category standards of 14 CFR part 29, and none of them incorporate anything close to the level of crashworthiness, redundancy, and technology that's in the S-70i.

Yet, because the Black Hawk was designed to meet U.S. military specifications, rather than civil part 29 requirements, Sikorsky is pessimistic about its ability to certify the S-70i in the transport category given the FAA's insistence on meeting its current prescriptive standards. Although the Black Hawk has proven itself to be a safe and capable aircraft, Sikorsky believes that attempting to obtain a transport category type certificate for the aircraft would simply be cost-prohibitive.

That means that the only U.S. customers who can currently use the S-70i for firefighting are government agencies who choose to operate it as a public use aircraft, such as the L.A. County Fire Department. Conceivably, the S-70i could be used by civil operators for water-dropping and other limited operations under a special airworthiness certificate with a restricted category, but they wouldn't be able to take anything close to full advantage of this aircraft's impressive capabilities.

There are a few ways in which the S-70i could see wider use in the commercial firefighting industry. First, customers like the U.S. Forest Service could decide to accept liability for operating it as a public use aircraft, even if they still contracted with 135 air carriers like ours for the safety benefits associated with FAA oversight. Or, Sikorsky and its parent company, Lockheed Martin, could decide to shell out for a full transport category type certification program under the current regulatory framework (which seems unlikely).

My preference would be to see the FAA replace its existing, prescriptive requirements for rotorcraft certification with performance-based standards, much as the agency did with its recent rewrite of part 23 certification standards for normal category airplanes. When the manufacturer of an advanced modern aircraft like the S-70i doesn't even want to attempt transport category type certification, it seems pretty clear that the FAA's prescriptive standards are setting back safety and innovation.

OFF TO STUART AND THE STA

Forty miles north of West Palm Beach is the city of Stuart. Once home to Grumman Aircraft facilities, KSUA is now the location of the new Sikorsky Training Academy, which boasts extensive classroom facilities, a 24,000-square-foot flight operations hangar, and a 2,500-square foot maintenance training bay. These accommodate a full spectrum of flight and maintenance training for Sikorsky customers, many of whom are international.

The academy has two S-70i flight training aircraft, which are certificated by the Federal Aviation Administration (FAA) in the experimental category for both research-and-development and market survey purposes. That allowed me to fly with STA chief pilot Joe Stoney as a zero-Black Hawk-time pilot (the aircraft normally requires a minimum flight crew of two). After I received a tour of the facility, Stoney and I mapped out a plan for my one-hour demo flight and went through a safety briefing. We were ready to go fly.

Approaching the aircraft, its four wide-chord, all-composite main rotor blades — with noticeably swept and downwardly angled tips — made the helicopter look like it was eager to go to work. Before entering the cockpit, the front seats get set by an indexed slide lever to tune the crash attenuation of the seat to the weight of the occupant. I set mine to 190 pounds, which was closest to my weight, then climbed in the right side.

The cockpit is wide. I had to crane my neck around to be able to read the overhead and some lower panel switches. Comfort with this cockpit layout will require a lot more "in seat" time than in most of the light and medium aircraft I've flown.

No question about it, this is a sophisticated and complex machine that is not to be approached haphazardly. Stoney had me run the checklist in standard challenge-and-response fashion, while he pointed to and explained each switch and process. From the pre-power-up checks, we moved through power-up and auxiliary power unit (APU) start, to checks for the control systems, stabilator, avionics, and EGIs (embedded global inertials, or attitude and heading and reference systems to civilians). Then we accomplished starts for both engines (using bleed air from the APU), went through run-up and systems checks, and pre-set frequencies in the FMSs, before finally contacting the tower.

Altogether, the start-up process for this instructional flight took around 20 minutes. Stoney said that the first start-up of the day, from getting in the cockpit to lifting off, usually takes eight to 12 minutes. To me, that's a long time when you're on initial attack (IA) for a fire. However, if the aircraft is readied for IA by completing all required checks with just the APU running, and then shutting down, the cockpit can be "set" for a quicker



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Aero Union designed and manufactured the original 1,000-gallon water tanks for L.A. County Fire's S-70A Firehawks. When the company went out of business, Simplex purchased the rights to the system. United Rotorcraft is currently working with Kawak to design a new tank for the S-70i.

Skip Robinson Photo

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response time of around two to four minutes to lift off.

Stoney graciously let me have the controls for the whole flight, so we went to work right away with a roll taxi into position on the non-movement area, followed by a liftoff and air taxi to a grass practice area in the middle of the airfield. At 15,405 lb. (6,988 kg), the aircraft was far from its maximum takeoff gross weight of 22,000 lb. (9,979 kg), and I could see that it had power margins we would not be able to fully utilize under our mild sea level conditions. Health indication test (HIT) checks were then taken on each engine, calculated, and logged from within an integrated cockpit display.

Maneuvers began with some vertical set-downs and lift-offs to a 10-foot hover to get used to the sequence of contact points — tail wheel, left wheel, right wheel, weight on wheels (called out by a crew chief) — and hover attitude sight picture. I'm 5'9", and I found that landing on a tailwheel with a very high nose-up attitude took some wiggling in the seat to keep a clear view ahead.

We moved on to some pedal turns and turns around the tail. The wind was 15 knots gusting to 19 that afternoon, but there was no problem with controlling the broadside weathercocking; it had authority to spare. Though the aircraft has been tested to military standards, there isn't really an apples-to-apples comparison to a similar FAA part 29 certified aircraft in regards to tail rotor authority. Sikorsky says that under most HOGE conditions the crosswind authority has been demonstrated to 45 knots, which is far above the standards defined in part 29. Anyway, it has back!

Pattern work included normal takeoffs, both rolling and from a hover; rolling landings to the runway, both normal and single-engine; stabilator failure in cruise to a landing; full primary hydraulic assist and



The new GE-T701D engines on the S-70i have improved performance and reliability. The S-70i also incorporates a Donaldson inlet barrier filter.

stability augmentation system failure in cruise followed by an approach to hover and landing; and an autorotation. Stoney also gave me a demonstration of auto-flight coupling to recover from an unusual attitude, which is as easy as plunging the auto-flight engagement control on the cyclic and letting the aircraft right itself and climb to a preset altitude. I then flew the flight director, selecting headings, airspeeds, and altitudes to line up on a runway and bring it down to a hover-hold.

By then our time was up, so we air-taxied back to the hangar apron and proceeded with the shutdown checklist. Stoney said a shutdown normally takes around three to five minutes depending on installed equipment, but until a pilot is familiar with the process, it can take longer. The APU must be started first in order to power the large amount of current-hungry avionics and airframe systems when the generators are taken offline, and in case there is a need to motor the engines after shutdown. After eight minutes, we were ready to unbuckle and head to the debrief.

POST-FLIGHT REFLECTIONS

The S-70i is highly responsive and maneuverable; confidence-inspiring and manageable under the minor failure modes I was given. I would describe its handling qualities as like a very large Bell 407 equipped with wheels, in that it responds predictably without surprises and one can quickly adapt to its manual flying characteristics.

At first this aircraft can be a bit overwhelming to an uninitiated pilot. For example, getting proficient at finding information on the primary flight display (PFD) and nav display takes a bit of time, which is why significant simulator and classroom time is necessary. Syllabi for the S-70i, currently a combination of FSI and STA training,

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With a cabin volume of 396 cubic feet, the S-70i offers significantly more room for passengers and internal cargo than competing firefighting aircraft including the Bell 412 and Leonardo AW139.


call for 29 days of ground school, sim and flight training for a pilot with no previous Black Hawk experience, and a total of 20 days for pilots who already have S-70 or UH-60 experience. With the high standards of FSI and STA training, however, pilots who complete the regimen should be able to operate the aircraft with confidence.

In the standard S-70i, flight plans, waypoints, nav/comm radio tuning, and transponder setting can only be accessed through the FMSs and entered via keypad, although more complex mission plans can be uploaded to the system with a programed data card. The FMS displays are a bit cluttered and monochromatic, so on-the-fly frequency entries may be difficult and time-consuming until one is familiar with the keypad protocol. If you are used to flying FMSs in jets this may come easily, but to a pilot flying in a fire environment — where eyes need to look outside more than inside — it may be difficult as a single pilot, though fine in a two-pilot crew. United Rotorcraft's radio package may offer a more conventional interface.

The display screens are abundant and functionally interchangeable, making it possible to safely dispatch with screens inoperative. Do you want the PFD displayed on an inboard screen and the engine/airframe parameters displayed directly in front of you? Just toggle it to the display you want. From the initial attack firefighting perspective, the capabilities of the system far exceed what we are used to having at our disposal. Combined with the aircraft's automation, these capabilities can be very powerful tools when properly employed on missions like SAR in the mountains, over water, or at night, both to ease pilot workload and maintain precise control.

Another fantastic feature from an IA/SAR point of view is the S-70i's integrated health monitoring system, which could give operators a significant advantage in maximizing dispatchability while minimizing down-time and maintenance costs. Data can be quickly downloaded via removable media after each flight for accurate diagnostics and early problem detection, enabling preventive maintenance measures to be taken before any catastrophic failures can occur.

The crashworthiness of the aircraft shouldn't be overlooked, either. Even the original UH-60A Black Hawk was designed with crash safety features that far exceeded those in the Bell UH-1 it replaced (see p.38, *Vertical 911, HAI 2018*). Given that 1960s-era Bell UH-1 and 205 helicopters still form the backbone of the medium firefighting fleet in the United States, the S-70i represents several quantum leaps forward in safety and technology from what's flying today (see sidebar, p.72).

At a base price of around US\$15 million before modifications, these capabilities won't come cheaply. However, with wildfires growing larger and more destructive every year — and the need for more capable rescue aircraft to deal with the aftermath of these and other disasters — the S-70i could be exactly what's needed to counter this growing threat. 



Jon Bourke | Jon Bourke is the director of quality assurance and quality control for Atlanta, Georgia-based Helicopter Express. He has served as chief pilot (parts 135/133/137), company instructor, and check airman for three different companies, in addition to owning his own helicopter company.



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The sheer scale of the terrain in the Nepal Himalayas can be mind-blowing. Whether on the ground or in the air, these lofty mountains command absolute respect. "Everything's challenging in the Himalayas," said rescue pilot Jason Laing, who has spent several seasons flying in Nepal with Simrik Air. "The higher you go, the more careful you have to be."



FLIGHT AT THE **EXTREME**

What does it take to operate helicopters in the highest mountains on Earth? We traveled to the Nepal Himalayas to see for ourselves.

STORY BY ELAN HEAD

PHOTOS BY DIRK COLLINS & BRITTANY MUMMA

Mount Everest has been an object of fascination to climbers since at least the 1920s, when British mountaineers George Mallory and Andrew Irvine disappeared in their attempt to summit the highest mountain on Earth. Every year, hundreds of climbers make their own summit attempts, drawn by the allure of the extreme: extreme altitude, extreme weather, and an extreme test of their courage and skills.

Those same factors make Everest uniquely fascinating to helicopter pilots. We were 52 years behind Tenzing Norgay and Edmund Hillary in reaching the summit — a milestone that was achieved by Eurocopter (now Airbus Helicopters) test pilot Didier Delsalle in 2005. However, that record-setting flight in an AS350 B3 was primarily a marketing demonstration. The real work of helicopters on Everest is not in making it to the top, but in helping sick and injured climbers back down, a business that continues to grow every year.

In October 2017, *Vertical* traveled to Nepal to learn more about that country's helicopter industry, which has exploded with the increasing popularity of high-altitude climbing and trekking. We discovered an industry in flux, with operators there, like helicopter operators everywhere, forced to balance competing pressures of profitability and safety. The difference is that helicopter operators in Nepal are doing so in one of the most challenging environments imaginable, with very little of the aviation infrastructure that most of us take for granted.

Yet the allure of flying in Nepal remains strong. Like the climbers they're often tasked with rescuing, pilots who thrive on challenge and adventure will find plenty of both in the Nepal Himalayas. And, as you can see on these pages, the office views are unparalleled.



Andy Thapa of Simrik Air pilots an Airbus H125 with Everest looming in the background. While the Himalayas are associated in most foreigners' minds with snow and cold, the latitude of Mount Everest is approximately the same as that of Tampa, Florida, which can make for exceptionally high density altitudes.



An Air Dynasty H125 lands during a training exercise. Most of the terrain features in the Nepal Himalayas, not just the summits, are at very high elevations, making power management critical on every takeoff and landing. As American pilot Chris Creamer explained, many of his high-altitude landings in the United States are made to pinnacles, where "you have falling terrain basically all around you. So you commit to landing really late in your approach, and you always have an escape route." By contrast, in Nepal, "say landing at Camp 2 on Everest, you're landing at 21,000 feet, but you're landing in a bowl, so you still have [8,000 feet] of mountains all the way around you. So you're low on power at that elevation anyway, but you're also committing to your approach really early on."

Aaron Mauck, an American pilot who flies with Simrik Air, observed that many of the challenges associated with flying at these extreme altitudes are mental: "Mentally you build it up in your head that it's a big deal, but it's like flying any low-powered helicopter." That said, he cautioned that the Nepal Himalayas are a place for experienced pilots who are confident in their abilities and who know when to say no. "You need to be pretty comfortable with your own limits when you come out here," he said.



NO PLACE FOR BEGINNERS

Imagine landing on the highest point in the contiguous United States, California's Mount Whitney, at 14,505 feet (4,421 meters). Now imagine looking up from that point to see mountains looming another 14,500 feet above you. That's the Nepal Himalayas.

While Everest is the mountain most commonly associated with Nepal, it's only one of many towering peaks in the country. Eight of the world's 10 highest mountains are located either partially or entirely within Nepal. For helicopter pilots here, even many of their routine landings take place at elevations well above what most of us will ever experience.

According to Captain Siddhartha J. Gurung of Simrik Air, who is one of Nepal's best known and most accomplished helicopter pilots, the basic principles of mountain flying don't change at these heady altitudes, only the performance margins. "For pilots who have flown in the mountains, it's actually the same — just 10,000 feet higher," he said. Of course, that 10,000 feet is nothing to scoff at. Flying in these conditions can be exceptionally fatiguing,

and supplemental oxygen becomes critical above certain altitudes, even for pilots who are well acclimatized.

Altitude is not the only challenge. For Chris Creamer, an American pilot who spent a season flying in Nepal for Mountain Helicopters, an even bigger obstacle was swiftly changing mountain weather. "It's really easy to get trapped in places," he said. "You might be able to make it up to some area, and you're above the clouds, but you can't get back down. . . . There were times when we'd just land somewhere on a terrace and wait it out."

While the majority of helicopter pilots in the country are Nepali, operators do have regular openings for foreign pilots. The romantic prospect of flying in the Himalayas attracts plenty of them, including some who are out of their depth.

"I've seen a lot of people from all over coming in and wanting to be a rescue pilot," said Jason Laing, a helicopter pilot from New Zealand who has flown multiple seasons for Simrik Air and was featured on the Discovery Channel series *Everest Rescue*. His advice to such pilots is, "Make sure you go and learn some good skills before you get there. Don't expect to learn the skills there. It's not a place to go and give it a crack."



The extreme risk factors faced by helicopter pilots in Nepal, combined with a relative lack of infrastructure and weather reporting, place a heavy burden on pilots to assess and manage those risks effectively. Here, Andrew Gutsell, a helicopter pilot from New Zealand who conducts rescue missions for Air Dynasty, is shown with an oxygen mask on his way to higher altitudes. Gutsell said that he mentally calculates a safety margin before each flight; if he's not comfortable with that buffer, he won't fly. As he explained, it simply doesn't pay to take extra chances when you're already operating so close to your own and the aircraft's limits.



Fuel management is a huge issue in a country where Jet A bowsers are few and far between. Pilots departing Kathmandu for the mountains will typically carry as much fuel as they can, siphon it out at an intermediate location to reduce weight before continuing on to higher altitudes, and refuel from jerry cans as needed. Many missions require pilots to carefully plan their fuel needs and cache fuel along their route — a task rarely faced by pilots in countries with more developed aviation infrastructure.



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During the busy climbing and trekking seasons, Air Dynasty bases one Airbus H125 at Lukla in the Everest region to facilitate high-altitude rescue flights. Prompt evacuation to lower altitudes can be life-saving for climbers and trekkers who are experiencing altitude sickness. When there were fewer helicopters available, such evacuations were typically reserved for the sickest patients. However, as more visitors arrived in Nepal with travel insurance policies covering helicopter evacuations, the civil helicopter industry expanded. Today, it is common for patients with milder symptoms to also be flown out by helicopter, as the ambiguous symptoms of altitude sickness encourage many to err on the side of caution.





THE BUSINESS OF RESCUE

While technical, high-altitude rescues of alpine climbers are what Nepal's civil helicopter industry is famous for, they're not its primary source of revenue. Instead, operators fly many more hours evacuating tourists who have shown signs of altitude sickness.

Demand for these flights has boomed with the growth of Nepal's trekking industry. Climbing Everest is for most people physically or financially prohibitive, but reaching Everest Base Camp at 17,600 feet (5,380 meters) is a relatively attainable goal. However, even this trek requires a slow and deliberate process of acclimatization. Tourists who push too hard can develop acute mountain sickness, typified by symptoms including headache, dizziness, and shortness of breath. While these may at first appear mild, altitude sickness can quickly turn deadly if ignored. A quick helicopter ride to a lower elevation can be life-saving.

Many trekkers carry travel insurance policies that will pay for helicopter evacuation in the event of altitude sickness, and insurance money has been a primary driver of recent growth in Nepal's civil helicopter industry. According to Airbus Helicopters — which holds close to 85 percent of the country's light single-engine market share — 20 H125 helicopters have been delivered into Nepal since 2012, and the company expects to have more than 30 H125s flying there by 2025. Already, customers including Shree Airlines, Simrik Air, Fishtail Air, Air Dynasty, Heli Everest, Mountain Helicopters, Altitude Air, and Manang Air have collectively logged more than 50,000 flight hours with their combined H125 fleet.

Although insurance money has been a boon for the industry, it has also created opportunities for abuse. In 2013, the British Mountaineering Council called attention to some common scams associated with rescue flights, including unnecessary evacuations and overcharging. According to independent rescue specialist Suraj Paudyal, who has been outspoken about the need for reform, the primary beneficiaries of these scams are not helicopter operators, but third-party agents who arrange the rescues and take a cut of the reimbursement. Patients who are in genuine medical distress may face delays in being evacuated as agents negotiate for larger commissions.

"The current way of doing things is hurting the industry," said Paudyal, who has argued for standardized pricing policies and a centralized dispatch center to coordinate rescue missions. Although there have been some attempts at reform, Paudyal acknowledged that it is difficult for any helicopter operator to pursue reform unilaterally — as is true in competitive sectors of the helicopter industry everywhere in the world.

The autumn months following the summer monsoons are the most popular season for trekking in Nepal. Most trekkers who are headed to the Everest region will start their journeys by taking a short takeoff and landing (STOL) plane from Kathmandu to Lukla's Tenzing-Hillary Airport, elevation approximately 9,335 feet (2,845 meters). However, the weather in Lukla can be iffy, and the steeply rising terrain surrounding the notoriously short runway doesn't permit an instrument approach. When low clouds prevent the STOL planes from landing, helicopters can sometimes make it into Lukla by approaching the airport through a series of narrow valleys below — creating high demand for helicopter charters out of Kathmandu.



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Simrik Air, which has partnered with Switzerland's Air Zermatt for long-line rescue training, specializes in technical rescues of climbers on the Himalayas' highest peaks. These are the high-profile rescues for which Nepal's civil helicopter industry is famous, although for Simrik and other operators, the majority of rescue flights are routine evacuations of trekkers to lower altitudes. During the trekking season, about 60 percent of Simrik Air's business comes from rescue flights. The company recently established a standard rate for these flights, in an effort to prevent delays caused by agents attempting to negotiate lower rates.



While rescue flights are the primary driver of Nepal's civil helicopter industry, helicopters also play a valuable role in getting critical supplies to remote mountain communities. The alternative to moving supplies by helicopter is transporting them on foot. Heavily laden porters, such as these two headed out of Lukla, are a common sight on Nepal's mountain paths.



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Fishtail Air pilot Eric Ridington makes an approach to land above Everest Base Camp in an Airbus H125. Scenic “mountain flights” to such locations are becoming increasingly popular with tourists who lack the time or stamina for a traditional trek, although without having undergone the slow acclimatization process, the time they can spend on site is limited. **Surya Rai Photo**

CHANGING ATTITUDES

The high tempo of helicopter operations in Nepal, combined with extreme altitudes and weather and underdeveloped aviation infrastructure, make the country an extraordinarily unforgiving place in which to fly. Not surprisingly, that fact is reflected in the accident record. However, as helicopter operators around the world place increasing emphasis on safety, Nepal’s civil helicopter industry is also making safety a higher priority.

“In this last year I have seen a huge push for safety,” said Aaron Mauck, an American helicopter pilot who has spent several seasons flying in Nepal, most recently with Simrik Air. “There have been a lot of big improvements for safety. . . . People are actually taking this seriously out here in the industry.”

Fishtail Air is an example of a company that has taken positive steps to enhance the safety of its operations. In the aftermath of the 2015 earthquake in Nepal that killed nearly 9,000 people, Fishtail flew approximately 2,500 hours in support of relief efforts through a program partially funded by Mission Aviation Fellowship (MAF), developing a strong working relationship with the organization in the process. In 2016, after Fishtail experienced a fatal

crash in poor weather, the company reached out to MAF for help in improving its safety culture.

MAF connected Fishtail with Bev Preater, an experienced Canadian helicopter pilot who signed on as the company’s director of safety last year. Having spent many years working in Papua New Guinea, Preater understands the challenges of remote operations in places with limited infrastructure and inadequate weather reporting. In his time with Fishtail, Preater has focused on understanding the obstacles to safe operations and identifying practical interventions. He said he is also working with Fishtail management to develop an approach to mentoring new pilots, which entails, in part, clarifying what is expected of them: “What standards and proficiencies are you aspiring to have here as professional aviators?”

In June 2017, Fishtail became the first operator in Nepal to cover its H125s under Airbus Helicopters’ HCare service offer, which provides a full material management service backed by a parts availability commitment. By helping to ensure high standards in maintenance, this is another way in which Fishtail is demonstrating its commitment to safe operations. “The future course of Fishtail is to enhance our safety,” emphasized CEO Suman Pandey.



Bev Preater, left, with dispatcher Prabal Pradhan, joined Fishtail last year as the company's director of safety. Preater spent many years in Papua New Guinea (PNG), where most helicopter operations are also challengingly remote. In contrast to the steady work provided by PNG's resource sector, however, much of the helicopter business in Nepal is highly seasonal and uncertain, which poses additional challenges to safety and oversight.



Fishtail's distinctive "dragon" H125 is refueled on the ramp in Kathmandu. In addition to tourism and rescue flights, Fishtail supports development work around Nepal. In the aftermath of the 2015 earthquake, Fishtail flew about 2,500 hours of relief missions through a program funded by the U.K.'s Department for International Development and Mission Aviation Fellowship (MAF). "The efficiency was incredible," said Stan Unruh, MAF's country director in Nepal.



Elan Head Photo



During peak climbing and trekking seasons, the helipad at Lukla's Tenzing-Hillary Airport is a hectic place. Lukla's remote mountain location makes it impossible to truck fuel to the site, and scarce real estate means that helicopters operate in close proximity to waiting passengers. Such infrastructure limitations are among the many challenges to safe operations in Nepal.

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An Air Dynasty H125 lands at a high mountain lake.



On final approach to the Lukla airport.



Pilot Ryan Skorecki en route to Everest Camp 2 during his time flying for Manang Air. **Photo courtesy of Ryan Skorecki**



Lukla is the jumping-off point for most Everest climbing and trekking.

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A Simrik Air H125 is dwarfed by its spectacular backdrop. When operating in mountains like these, pilots must be constantly alert for shifting winds and changing weather.





The natural beauty of Nepal attracts tourists from around the world.



Trekkers wait to board an Altitude Air H125 at Kathmandu's Tribhuvan International Airport in October.



An Air Dynasty H125 soars past Makalu, the world's fifth highest mountain with a summit of 27,838 feet (8,485 meters).



On approach to the airport in Lukla. Arrivals are rarely a problem on sunny days like this, but bad weather can shut down the airport for days at a time.





Weather is a constant challenge in the Nepal Himalayas, but the views are unbeatable on blue-sky days.



Air Dynasty pilot Pravakar KC returning to Lukla.



A Simrik Air H125 during training.



Not only are Nepal's helicopters the world's highest flying, they're also some of the hardest working, with many of them logging a thousand flight hours a year, most of those during the busy climbing and trekking seasons.



Dirk Collins



En route with Air Dynasty pilot Andrew Gutsell.



On the ramp at Tribhuvan International Airport in Kathmandu.



Fishtail's operations building at the airport in Kathmandu.



ELAN HEAD

An award-winning journalist, Elan is also an FAA Gold Seal flight instructor with helicopter and instrument ratings, and has held commercial helicopter licenses in Canada and Australia as well as the U.S. As *Vertical's* special projects editor, she travels frequently to report on helicopter operations around the world.



DIRK COLLINS

Dirk Collins has built a life based on adventure. For the past two decades, his work in filmmaking and photography has taken him around the globe, working with the world's top brands and action-sports athletes. Dirk is recognized for his ability to get the job done no matter the location or logistical challenge.



BRITTANY MUMMA

With a passion for photography and love of the outdoors, Brittany has become entrenched in adventure-based film production. Her travels have taken her to some of the most remote corners of the world and helped her develop a broader sense of global citizenship.



2018 **HELICOPTER** INDUSTRY OUTLOOK

The major OEMs and sector experts discuss where the helicopter industry stands after a challenging 2017 — and what the prospects are for the year ahead.

BY OLIVER JOHNSON

Airbus Helicopter Photo

AIRBUS HELICOPTERS

Airbus Helicopters reported a solid year in orders in 2017, as Guillaume Faury came towards the end of his five-year tenure as the company's president and CEO. Reflecting on this period during a call with media in early January 2018, Faury said the last four years had seen the industry endure "a very difficult crisis, maybe the worst crisis it has faced in the last few decades."

In terms of its product line, Airbus officially ended production of the H120 in 2017, which Faury said would enable it to refocus on the light segment with the H125 and H130.

"These will continue to evolve to become digitalized and connected platforms," he said.

At the other end of the spectrum, Airbus recorded 54 orders for the H225/H215 Super Puma line of heavy-lift aircraft, despite the challenges of the oil-and-gas market. The number represented the best year for the type since 2009, with orders coming from the military and parapublic segments. The Super Puma received no orders from the oil-and-gas sector, but Faury said no heavy aircraft from any manufacturer has received any orders from this segment for the last three years.

However, despite the apparent success of the Super Puma, Faury said Airbus has put a hold on its X6 program to develop a next-generation heavy lift helicopter due to "an uncertain market demand for heavy helicopters in the passenger transport role" — as well as a lack of maturity in some of the disruptive technologies the manufacturer was envisioning for the type.

Looking ahead, the company is a keen participant in the race to develop future vertical takeoff and landing (VTOL) systems, having delivered an ambitious innovation roadmap towards urban air mobility. The manufacturer is aiming for a first flight of its CityAirbus demonstrator — a multi-passenger, self-piloted VTOL vehicle designed for urban air mobility — later this year.

In other new technology development, the company is continuing its work on the VSR700 VTOL system — an unmanned Cabri G2 — for the French Navy.

"As a whole, the urban air mobility drones market is bound to become a US\$1 billion business in the decades to come, and our ambition is to be in the lead," said Faury.

Under the Clean Sky 2 research program, Airbus is also building on the legacy of its X3 hybrid aircraft demonstrator in the form of the Racer high-speed demonstrator. Final assembly of the Racer, which aims to have a cruise speed of more than 250 miles per hour (400 kilometers per hour), is expected to start in 2019, with first flight the following year.

"We believe in the power of new technologies to drive safety, competitiveness, quality, and customer satisfaction to new levels," said Faury. "This is for the benefit of our traditional customers in the traditional helicopter market. We believe that the convergence of disruptive technologies and global megatrends will drive the emergence of new markets for VTOL systems. This will bring profitable growth in the decades to come,

and we are organized for that."

Faury said the manufacturer is now entering a second wave of transformation — following an overhaul of industrial operations and specialization of its production site — and is accelerating its investment in digital technology across its business.

"We have learned how to crawl and walk digitally," he said. "Now is the time to run."

On the operational side, Faury said end-to-end digital continuity will become the standard. "This will drive improvements in lead time, quality, and data reliability. . . . We will roll out new connected services, harnessing the power of digital and big data. This will transform the way our customers interact with us and with our platforms."

This connectivity will extend to existing platforms, and Faury said the "future is digital" for the H125 and H130.

In terms of growth prospects in 2018, Faury said Airbus expects the civil and parapublic sectors to be stable, if not grow.

"We saw some interesting signals at the beginning of the year, so we intend to continue to sell well on the light single engines and the light twins," he said. "The 145 seems to be particularly strong in that field. [And] we have the growth expected in China, with the assembly line for the 135."

Finally, 2018 will see the first contracts signed for the H160, Airbus's new cutting-edge medium lift aircraft.

“

"WE HAVE LEARNED HOW TO CRAWL AND WALK DIGITALLY, NOW IS THE TIME TO RUN. THIS WILL DRIVE IMPROVEMENTS IN LEAD TIME, QUALITY, AND DATA RELIABILITY. . . . WE WILL ROLL OUT NEW CONNECTED SERVICES, HARNESSING THE POWER OF DIGITAL AND BIG DATA. THIS WILL TRANSFORM THE WAY OUR CUSTOMERS INTERACT WITH US AND WITH OUR PLATFORMS."

— GUILLAUME FAURY, OUTGOING PRESIDENT AND CEO OF AIRBUS HELICOPTERS

AIRBUS



Bell Helicopter is hoping to carry the momentum gained from a better-than-expected 2017 into the coming year. According to Patrick Moulay, executive vice president of commercial sales and marketing at Bell, 2017 was “one of the best years for a long time” for the company, driven primarily by its success in China, and the 505’s entry into production.

“The industry is finally getting out of the bad cycle we have experienced for the last two years,” Moulay told *Vertical*, “[but] we don’t see every segment of the market picking up.”

More specifically, Bell is not expecting any immediate uptick in the oil-and-gas sector — at least until 2020.

“We are starting to see some signals of recovery [in oil-and-gas], but we are way behind where we used to be,” he said. “Even if the demand is coming back, what I’m expecting is that demand is going to first absorb all the aircraft that are idle.”

The law enforcement market has been a strong sector for Bell in 2017, said Moulay, and the company expects this to continue in 2018.

At the other end of the scale, the helicopter emergency medical services (HEMS) sector has been in decline in the U.S. and flat in Europe — but is offering opportunities for growth in regions that are new to HEMS.

“Out of the 200 orders we got last year in China, many of those are actually going to be addressing the HEMS market there,” said Moulay.

Regionally, Bell expects the North American and European markets to remain flat, and the company aims to continue to diversify geographically so it’s not so heavily reliant on North America, in particular.

“We continue to see a lot of potential in Asia,” said Moulay, “so our main focus is going to be definitely on Asia and China.”

In terms of its product lines, the company has a healthy backlog on its 407 and 412 aircraft, but is hoping for renewed interest in the 429.

“It’s a great aircraft, but we have seen the demand a bit stagnating on that segment of the market, on the light twin, and I want 2018 to be a new beginning for the 429,” said Moulay.

This year will be the first full year of production for the light single 505 Jet Ranger X, and Bell hopes an ongoing ramp-up of the production line will reduce the lead time for deliveries, from the current 20 months to around 12 months.

The recent publication of the National Transportation Safety Board’s final report on the crash of the first 525 Relentless prototype (see p.24) has marked the start of a new chapter for the program’s development. Moulay said Bell plans to spend the first half of 2018 communicating the findings — and Bell’s responses — to its customers, and will then re-enter commercial discussions and start accepting firm orders for the super medium aircraft.

With the unveiling of the FCX-001 concept aircraft at Heli-Expo 2017 last year, Bell

sought to re-establish its reputation for innovation, and Moulay said this is a core part of the company’s strategy going forward.

In addition to revealing potential “disruptive technologies” it is developing on the FCX-001, Bell has been busy working with Uber on the design of a self-piloting air taxi — the cabin for which it unveiled at the Consumer Electronics Show in Las Vegas, Nevada, in January.

“We are bringing Bell Helicopter to a market way beyond the helicopter segment,” said Moulay. “It actually is branding Bell as a technology company, which is in the transportation business. It goes way beyond the boundaries of the typical helicopter industry.”

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“WE ARE BRINGING BELL HELICOPTER TO A MARKET WAY BEYOND THE HELICOPTER SEGMENT. IT ACTUALLY IS BRANDING BELL AS A TECHNOLOGY COMPANY, WHICH IS IN THE TRANSPORTATION BUSINESS. IT GOES WAY BEYOND THE BOUNDARIES OF THE TYPICAL HELICOPTER INDUSTRY.”

— PATRICK MOULAY, EXECUTIVE VP, COMMERCIAL SALES AND MARKETING AT BELL HELICOPTER



Paul Sadler Photo

Despite missing some of its internal targets, Leonardo closed 2017 better than it expected, in large part due to its strength in the intermediate and super medium categories with the AW139 and AW189. The two types have been a huge source of strength for Leonardo in recent times, and last year proved no exception.

At the end of the year, the AW139 fleet passed two million flight hours — just three years after reaching one million flight hours. Nearly 900 of the type are now in service with more than 300 customers in 80 countries.

“It’s a well established platform, it’s something that I believe we can easily confirm is a market leader in this segment, and up to now, nobody has been able to come close to the results we have been able to achieve with such a platform,” Carlo Gualdaroni, Leonardo’s chief business officer, told *Vertical*.

With regards to the AW189, Leonardo has now received 150 firm orders and framework contracts for the aircraft, and delivered 50. The global AW189 fleet also recently passed 33,000 flight hours.

At Helitech 2017 in October, Leonardo announced the development of a re-engined version of the AW189 (known as the AW189K), which utilizes the new 2,500-shaft horsepower Safran Aneto instead of the current 2,000-shaft horsepower General Electric CT7-2E1.

“We have received the first set of engines from Safran and we are progressing with

the development program according to the agreed schedule without any delays,” said Gualdaroni. “This will provide the 189 with additional capabilities that will reposition this platform as the very state-of-the-art solution for the super medium helicopter, able to cover most customer requirements for any application.”

The prototype AW189K has now logged over 50 flights and about 50 flight hours to date at Leonardo’s flight test center in Cascina Costa, near Milan, Italy.

Gualdaroni said Leonardo has been surprised to receive significant interest in both versions of the AW189 from the VIP market, but that this hadn’t yet transferred into any firm orders from that sector.

The last member of Leonardo’s new “family” — the AW169 — has now recorded more than 50 deliveries, and the manufacturer has an order backlog of more than 100 for the type, which was certified by the European Aviation Safety Agency (EASA) in 2015, and the Federal Aviation Administration (FAA) in 2017. “On my understanding, that’s one of the fastest market entries ever experienced by the rotary-wing industry,” said Gualdaroni.

This year will see the first deliveries of the AW109 Trekker, which is equipped with skid landing gear and a Genesys Aerosystems glass cockpit, following the aircraft’s certification by EASA in December 2017.

“We received a huge interest in this segment and we expect in the very near future

some significant orders,” said Gualdaroni, noting particular interest from China, the U.S., and South America.

More broadly, Gualdaroni said the most promising sector at the moment appears to be the HEMS market, with Leonardo’s entire product line receiving interest from those working in the sector.

At Heli-Expo 2016, Leonardo launched the AW009 — an upgraded and re-engined version of the PZL SW-4 — as it attempted to enter the competitive light single market. However, Gualdaroni confirmed the manufacturer does not consider the program a priority due to “the market trends compared to other programs we have in place.”

Chief among those programs is the AW609 tiltrotor, which is set for FAA certification by the end of 2019. The fourth prototype is now being assembled at Leonardo’s facility in Philadelphia, Pennsylvania, with modifications largely focused on its avionics. Gualdaroni said the manufacturer hopes 2018 will see the type secure some firm orders.

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“[THE AW139 IS] A WELL A WELL ESTABLISHED PLATFORM, IT’S SOMETHING THAT I BELIEVE WE CAN EASILY CONFIRM IS A MARKET LEADER IN THIS SEGMENT, AND UP TO NOW, NOBODY HAS BEEN ABLE TO COME CLOSE TO THE RESULTS WE HAVE BEEN ABLE TO ACHIEVE WITH SUCH A PLATFORM.”

— CARLO GUALDARONI, CHIEF BUSINESS OFFICER AT LEONARDO



Mike Reyno Photo



SIKORSKY

For Sikorsky, the theme of 2017 was taking positives from a challenging environment, according to Dana Fiatarone, the company's vice president for commercial systems and services. And the manufacturer is expecting more of the same in 2018.

"Overall we had set company goals and objectives at the beginning of the year that we were able to meet in terms of deliveries to our customers, the type of quality we want to deliver to our customers, and improvements to our service and support, but it was amid a very difficult continued downturn in the offshore oil-and-gas sector," he told *Vertical*.

The ongoing slowdown of the oil-and-gas industry represents the single biggest challenge the manufacturer is facing, he said, but Sikorsky is working hard to develop solutions to enable its customers be more competitive in this environment.

"I think the biggest initiatives that we've undertaken over the past couple of years have all been around making certain that when our customers have a mission to fly, that they have the aircraft available," said Fiatarone. "We've paid a tremendous amount of attention to improving our overall aftermarket service and support."

Using data gathered from fleet maintenance and health and usage monitoring systems for better parts forecasting; feedback from its service representatives; and efforts to put parts closer to its customers, Sikorsky reduced its aircraft on ground (AOG) events by 72 percent from 2016 to 2017. It now measures AOG in terms of hours, and

reduced that figure from an average of 35 hours in 2016 to 24 hours in 2017. It hopes to bring that number down even further in 2018.

Fiatarone said Sikorsky saw a small uptick from oil-and-gas operators in terms of flight hours at the tail end of 2017 — and that these were on small, exploration-style contracts.

"In terms of this investment cycle that you typically see in oil-and-gas, you start to see the down-cycle, which we've seen in the last couple of years, [where] oil-and-gas companies pull back their investments or maybe even underinvest to conserve cash," he said. "Then that would spur the next up-cycle, beginning with exploration — and that's what we're starting to see."

Fiatarone expects flight hours to continue on their upward trend, but is not anticipating that to translate into new aircraft sales in the immediate future.

"There's certainly a number of idle assets still in existence, and I think with a couple of competitors adding even more new assets into the mix, it'll still be flat in 2018 and maybe flat in 2019 also."

In other markets, Sikorsky is seeing reasonable demand for both the S-76 and S-92 for search-and-rescue (SAR) and disaster relief missions, particularly within Asia. The S-70 Firehawk has also secured some notable orders within North America for firefighting missions.

"I would say one surprise for me has been the emergence of [orders for] firefighting

missions," said Fiatarone. "I am starting to see a little uptick globally there as well."

In January 2018, Sikorsky sold its light aircraft line — spanning the S-300 and S-333 — to Schweizer RSG (see p.22), allowing the company to focus on its core medium and heavy product lines.

In terms of new technology, Sikorsky is continuing its work in the autonomous/optionally piloted space with the SARA aircraft (an S-76 equipped with the company's MATRIX technology). In addition to expanding that aircraft's capabilities in 2018, Sikorsky is also putting MATRIX into a UH-60A to test autonomous flight in that type.

"The ultimate goal is to make flying fundamentally safer and more reliable, so we continue to self fund that program, [and] continue to take flights in that aircraft," said Fiatarone. "Really what we would like to be able to do is take an aircraft that's able to fly in an obstacle rich environment and have the aircraft actually make decisions to sense and avoid, so there's plenty of work and research going into that area."

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"REALLY WHAT WE WOULD LIKE TO BE ABLE TO DO IS TAKE AN AIRCRAFT THAT'S ABLE TO FLY IN AN OBSTACLE RICH ENVIRONMENT AND HAVE THE AIRCRAFT ACTUALLY MAKE DECISIONS TO SENSE AND AVOID, SO THERE'S PLENTY OF WORK AND RESEARCH GOING INTO THAT AREA."

— DANA FIATARONE, VP FOR COMMERCIAL SYSTEMS AND SERVICES, SIKORSKY



Skip Robinson Photo



MD HELICOPTERS, INC.

MD Helicopters, Inc. (MDHI) reported a banner 2017, thanks to a \$1.4 billion contract from the U.S. Department of Defense for an estimated 150 MD 530Fs for the Afghan Air Force. On the civilian side, the company recorded sales across its product line, including an MD 902 to Cox Health (which will represent the first delivery of the aircraft with a Genesys Aerosystems cockpit), and a multi-mission configured MD 600N to Sapura Aero.

The company also continued its drive to improve its sales and support following the introduction of MyMd.aero in 2016, which the company said has allowed it to take a more proactive approach to its support, and provide faster response times. It has also expanded its maintenance, repair and overhaul capabilities at its headquarters in Mesa, Arizona, with the establishment of its own comprehensive transmission test capability particularly noteworthy.

"Vertically integrating the company has been a primary goal of our CEO [Lynn Tilton] since she purchased MDHI in 2005," an MDHI spokesperson told *Vertical*. "Manufacturing certain components and piece-parts in-house, in addition to our fuselage production, assembly, and completions capabilities, improves overall quality control and gives us more authority over the production timeline."

Looking ahead to 2018, the company said it was excited about growth in the U.S. law enforcement market, as well as in the VIP and transport sector in Southeast Asia.

"As we continue to integrate new technologies and performance improvements into both the single- and twin-engine offerings, we expect to see upward trends in acquisition in these areas, as well as significant growth among utility and general transport operators in all geographic areas," the spokesperson said.

Additionally, the company highlighted the number of severe natural disasters in 2017, which it said showed a need for agencies to deliver fast response times.

"I think it is fair to say that budget is going to remain an issue across all segments, although it is no secret that acquisition plans for aircraft that can effectively serve a range of public safety missions will be on the rise," the spokesperson said. "More aircraft will be required for the purposes of rescue, recovery, supplies delivery and medical transport, as well as law enforcement . . . and natural resources protection."

MDHI said shrinking budgets in the parapublic market, as well as the ability to keep ahead of the technology curve while maintaining affordability, were two of the biggest challenges it currently faces.

"We've always been among the most affordable aircraft when it comes to DOCs [direct operating costs]," said the spokesperson. "As such, we believe we are well positioned for success even as a more vigilant approach to evaluation of cost beyond the acquisition price is taken."

With regards to other developments within the company, MDHI plans to have the

MD 902 certified with the Genesys Aerosystems cockpit by the end of this year, and is "continuing market validation" on the MD 6XX — the new 2.5-tonne eight-seater single-engine concept aircraft it unveiled at HAI Heli-Expo 2017 in Dallas, Texas.

"Feedback [on the MD 6XX] from utility and international EMS/rescue operators, as well as law enforcement and military agencies worldwide, has been incredibly positive, and we will dive in to VIP/VVIP configuration options next," said the spokesperson.

Finally, despite the interest in the unmanned sector among the other airframe OEMs, MDHI said it isn't looking to enter that market.

"While we do recognize the perceived benefits of incorporating unmanned vehicles into an agency's airborne fleet, we believe that there is a reason our airframes have successfully stood the test of time and remain preferred platforms in global law enforcement, military, EMS, utility and other markets," the spokesperson said. "Our near-term efforts remain focused on advancing the capabilities of our current platforms and introducing new platforms that marry the features that are inherently MDHI with next generation design, manufacturing and systems technologies."

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"OUR NEAR-TERM EFFORTS REMAIN FOCUSED ON ADVANCING THE CAPABILITIES OF OUR CURRENT PLATFORMS AND INTRODUCING NEW PLATFORMS THAT MARRY THE FEATURES THAT ARE INHERENTLY MDHI WITH NEXT GENERATION DESIGN, MANUFACTURING AND SYSTEMS TECHNOLOGIES."

— MD HELICOPTERS, INC.



P&WC Image



PRATT & WHITNEY CANADA

In terms of major developments in 2018, engine manufacturer Pratt & Whitney Canada is particularly excited about customers seeing the benefits of the work being done by its diagnostics, prognostics, and engine health management group.

Led by Bjorn Stickling, the group is developing cutting-edge technologies and initiatives to aid the drive towards more proactive and predictive engine maintenance.

In recent years, the company has retrofitted thousands of engines (including over 900 in helicopters) with improved diagnostics systems that are capable of monitoring more than just the engine. Its FAST system, now available in the Leonardo AW139, wirelessly captures, analyzes and sends full flight data, including health and usage monitoring system data, as well as information from the aircraft's flight data recorder, to operators and maintenance technicians within minutes of the pilot shutting down the engines.

"We think it's a really good, cost-effective solution to capture the aircraft data and the engine data at the right density, get it off at the cellular and Wi-Fi method, completely automatically process it . . . and take all the engine performance power data, engine fault data, and send out the trend alerts," said Stickling. "That complete package is a turnkey package."

This data, combined with mission usage analysis, analytics, and the engine manufacturer's new oil analysis technology, helps lead to better outcomes for opera-

tors, said Stickling — such as extended on-condition maintenance programs, increased performance and availability targets, improved operational times, and extended time on wing.

"Quite often we see the gap between what the operator is trying to achieve and what we try to achieve as maintenance programs," said Stickling. "Diagnostics and prognostics help and usage monitoring capabilities are out there bridging [the gap] for the customer so they can take the right action at the right time."

The overall program is managed by Pratt & Whitney's proactive help desk. Over the last two years, it has seen a dramatic change in fixed-wing participant's planned and unplanned "availability events" — from 85 percent of such events being unplanned in 2015, to just 20 percent being unplanned in 2017.

"Bringing all the pieces together, and reaching out to customers practically and guiding them, has made a huge difference," said Stickling.

The plan is to bring similar change to the rotorcraft market.

"We feel so confident that we can bring similar results to the rotorcraft that we're actively working at expanding the proactive help desk — which we first rolled out on the large corporate market — to the helicopter market," he said.

The company is in the process of doing so, and should have it in place in the next 12 to 18 months, said Stickling.

Pratt & Whitney is also looking at expanding its trial of its oil analysis technology, in which engine debris in oil is monitored to detect specific engine conditions.

"We're still looking at opportunities to work with either OEM providers or customers on main gearbox-type of operations, but right now the PW200 is really where we're focusing on next, and the PT6C-67 on the helicopter side to bring that fully into service early this year," said Stickling.

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"QUITE OFTEN WE SEE THE GAP BETWEEN WHAT THE OPERATOR IS TRYING TO ACHIEVE AND WHAT WE TRY TO ACHIEVE AS MAINTENANCE PROGRAMS. DIAGNOSTICS AND PROGNOSTICS HEALTH AND USAGE MONITORING CAPABILITIES ARE OUT THERE BRIDGING [THE GAP] FOR THE CUSTOMER SO THEY CAN TAKE THE RIGHT ACTION AT THE RIGHT TIME."

— BJORN STICKLING, MANAGER OF DIAGNOSTICS, PROGNOSTICS AND ENGINE HEALTH MANAGEMENT AT P&WC



Pratt & Whitney Canada

A United Technologies Company

Steve Whitby Photo



George Hill, executive director of the American Helicopter Services and Aerial Firefighting Association

Vertical: How was the 2017 fire season?

George Hill: We had several members of the association who set records for the amount of flying they did in 2017. The big challenge, I think, is the length of the season. Years ago, they had much more of a predictable time, where you knew when it was going to start and when it was going to stop. And that's the genesis I believe of the exclusive-use contracts that come out from the [U.S.] Forest Service — which generally have about 120 to 180 days on the contract of mandatory availability. Now, the fire season basically starts in January and ends in December. You saw this year that the huge fires in California were very late in the year.

V: What were you hearing from your members in terms of the challenge of fighting these large fires?

GH: The challenge is in how much more flying has to be done, with the pilot training, maintenance, and all those types of things. It's an opportunity, though, in the aspect that they're better-equipped. Members have gone from a [Bell] 212 to a [Bell] 412, for example; or someone like Columbia Helicopters, which has two CH-47s that they've modified to carry 2,800-gallon internal tanks. There's an awful lot of surplus Black Hawks coming into the market, too. That will be interesting to see how it develops in the not-too-distant future.

V: What's the outlook for this upcoming year?

GH: I believe operators are primarily optimistic in terms of the prospect of work. They're in the process of preparing for another long fire season. If you look at the way the government budgets for these things, it's based on the 10-year average. Unfortunately, in the last three years, all of the last three have been above the 10-year average in terms of how many fires there were. If you read all the news reports and information from atmospheric scientists, they seem to be predicting that the seasons are going to get drier and longer — so I think the industry guys are preparing for that.

V: What would the main challenges be going into this year?

GH: If you look back almost 10 years, there were a lot of difficulties in getting contracts in place and a lot of protests. Primarily that's not the case any longer. The Forest Service has contracts in place for multiple different kinds of helicopters and they have access to the private industry that will allow them to fulfill that sort of stuff. I still think there will be challenges associated with the contracting, because it's the hydraulic fluid that makes the whole industry work. If they continue to make the kind of progress that they have, then I think that will be a good news story.

V: Are we still seeing any major issues with regards to UAVs on and around fires?

GH: I applaud the FAA for what they're doing in terms of education. But their ability to do enforcement is pretty much limited. Is this still a hazard? In my opinion, this is still a severe hazard. I think it's only a matter of when, not if, there's going to be a collision between either a helicopter or a fixed-wing aircraft operating near or on a fire with a drone. I don't worry about the professional operators of UAVs; I worry about guys who don't pay attention to that kind of stuff. I read some statistics that said the sales of drones over the Christmas holiday was in the millions. So there's a lot of them out there. The professional organizations that operate those things, they're doing all the right things in my opinion. They're doing extensive training, they know what the rules are, and they try very hard to follow the rules. But recreational users who want to post videos on YouTube, I believe they're the biggest hazard. You've probably seen the Forest Service rules—they make some effort to do education about this too, and they've had some postings that said, 'If you fly, we can't.' I applaud what they're doing. They're trying to make sure the public is educated about how dangerous this really is.

This interview has been edited and condensed.



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Songa Offshore Photo

Gretchen Haskins,
chief executive officer at
HeliOffshore

Vertical: What were the major accomplishments for the offshore industry in 2017?

Gretchen Haskins: I'm really seeing a step change in the levels of collaboration to enhance safety. I think it's fantastic to see companies, who are competitors, really joining forces. The speed at which this has happened has been impressive, and there have been a lot of challenges financially and in other ways in the sector.

V: Is the oil-and-gas industry appreciating the effort that the offshore providers are putting in?

GH: This year we signed a reciprocal membership with the International Association of Oil and Gas Producers, and a number of these companies are also members of HeliOffshore independently. And we did a lot of work in this last year to fully align our strategies and our action plans, and I think the relationship has gone to yet another level where we're basically actively working on our top safety priorities together.

V: What studies has HeliOffshore been working on?

GH: We're looking at things like making sure you never lose control of the helicopter under low air speed or unusual attitudes — so maintaining and managing your flight path. The other big aspect is avoiding controlled flight into obstacles or the surface. We've got a whole package of activities aimed at further enhancing operational effectiveness.

One of the key things is monitoring. What is the pilot looking at? What is their situational awareness? What information are they using? These are key things to ensuring effective flight path management. Phase one of the eye tracking study looked at normal flight, and phase two is now looking at unusual or emergency circumstances. What we're hoping to do is take any lessons learned about where pilots are looking — and what information they're getting about the system as a result — and use it to influence procedures, design and training.

We've recently published an approach path management best practice guidelines, and experts from around the globe have contributed to that document. We've also done some training videos for best

use of automation, so that's all on the theme of enhancing operational effectiveness. And our work with helicopter terrain awareness and warning systems has continued apace.

V: What do you see as the main challenges for 2018?

GH: We have to be as careful in challenging times as we are in times of growth. If we start to see an upturn, we need to make sure we can adequately resource and manage all of that. One of the good things that I can say is we're getting better at sharing safety data and information. Our hopes are that if we're starting to see strain due to growth or strain due to cost or financial pressures, the leading indicator safety data will help give us a heads up of any potential issues before they can manifest themselves as something more serious.

V: Does the current environment put pressure on HeliOffshore to justify its expense to its members?

GH: No. In fact it's been the opposite. There's been a big conversation this year about safety as an investment. And more people are coming around to the idea that the money you spend to prevent accidents is money well spent. When accidents do occur they are incredibly costly. A lot of the actions we're taking to improve safety also improve effectiveness, efficiency and productivity.

V: What are you hearing from your members in terms of an economic squeeze from the oil companies?

GH: There has been a lot of financial pressure on the industry and what I see is the recognition that we need to invest in safety, in even that circumstance. There's an active conversation going on with the oil companies, with the operators, with the OEMs, the leasing companies, everyone, to look at how we use our resources wisely.

This interview has been edited and condensed.



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BJG Photo

Bryan Cox, president & CEO of the Mining Association of British Columbia

Vertical: How is the mining industry looking in 2017?

Bryan Cox: I think it's important to look at what our main commodities are in British Columbia that we produce now, and they are steelmaking coal and copper. If you look at where the market has been over the past few years, it's been really depressed across all commodities. Steelmaking coal and copper took a big hit during the commodity downturn. The good news is over the last 12 to 18 months or so we've seen quite a resurgence in those and other commodities. To put it into context, B.C. is Canada's largest producer of copper, also the largest exporter of steel making coal, so really a significant producer of both, and with commodity markets being back in a more favorable place, it helps.

V: What are you hearing from the exploration industry?

BC: They just had their annual roundup here in B.C., and numbers were up over the past several years. There's just a general optimism and buzz at that group. But from the operating side, what we've seen is a few mines that during the downturn went into what we call care and maintenance — so they essentially closed due to the market conditions — we've seen a few of those mines reopen and are looking at actually four of them opening here in 2018. So, we're actually getting back the production that we lost temporarily in the downturn, which is really great from an economic point of view and jobs. There's also several projects that are moving along the regulatory process.

But the opportunity more generally in Canada is that when you look at where clean energy is going, where electric cars are going, you only have to look at the fact that an electric car takes four times more copper to build than a conventional

combustion car, or that a wind turbine takes 100 tonnes of steelmaking coal to make just one wind turbine, to see what the opportunities are for the mining industry in contributing really significantly to our transition to a lower carbon economy. So we're very optimistic about our opportunities for growth.

V: How long does it take to filter down to helicopter operators if there is an uptick?

BC: The stats we have show that for every direct job at a mine, there are at least two indirect jobs, supplier jobs. So as we get mines into operation, that's the opportunity for suppliers from our perspective. We're already seeing a bit of an uptick.

V: What are you hearing from other associations around Canada or U.S.?

BC: Each jurisdiction in Canada has a slightly different regulatory system, and in many cases much different commodity mix as well. So it's really dependent on what the opportunities are. Canada generally has a real opportunity when you look at something like a solar panel — 14 of the 19 metals and minerals that go into a solar panel can be sourced from Canada. I think our entire industry is seeing that as we make this transition to a low carbon economy, not only does mining continue to be extraordinarily essential, it becomes absolutely front and center for being the feedstock for being the transition.

V: So your feeling is that the downturn isn't part of a fundamental shift? It's cyclical?

BC: We would definitely hope so. It's all about what the market and investment community and those exploration groups see as being a path to success. For the world that we're hoping to get to, there is an opportunity for industries like the helicopter industry to really take advantage of the benefits that we think are to come in the mining industry.

This interview has been edited and condensed.

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Forrest Burkholder,

VP of operations at
SAExploration

Vertical: How has the seismic market been with regards to helicopter operators?

Forrest Burkholder: Due to the gas prices, the heli-portable operations that we used to do pretty much every summer have all but dried up. Years ago, we started to regulate ourselves and make our line narrower, so it made sense for us to continue using helicopters in the summer time and into the winter to move our equipment just because it was easier to get equipment in and out of the line and our locations. But the amount of work has reduced the last few years quite dramatically just as a result of pricing in general.

V: Has the downturn been across the board, or have there been any regions that have been a bit more resilient?

FB: It's been across the board. Canada certainly has very stringent regulatory requirements for working, but we've been doing

it for a long time so the process is quicker. Internationally, you go to a lot of places and it takes a bit longer to get your permits in place to go to work, just because they don't have as defined regulations and so forth, and governments don't process it as quickly as we do in Canada. Canada slowed down immediately because seismic is the first thing to get shut off when oil prices drop — generally speaking, it's too far from the wellhead. The main seismic that keeps happening is the seismic that's related to development, not exploration. So, Canada shuts off very quickly, and turns on as quickly as anywhere else in the world. But internationally, because it takes a while for those permits to get in, projects still get done — there's a lag typically, internationally speaking, for the slowdown to happen.

V: When did you notice the slowdown in Canada?

FB: In 2014 — basically as soon as the oil dropped below \$100, we started seeing the impact of it.

V: How much has the market slowed down by?

FB: Easily by half. We were starting to see a little bit more activity over 2017. This year will

likely be a little bit busier than 2017, but not by a lot. From 2013, our revenue is 60 percent less right now.

V: What sort of impact has it had for the helicopter companies that you've been working with? Are they having to continue to drop their prices?

FB: We have a couple of companies that we work quite closely with, and we understand that they have a business to run, as well. We try not to grind on them too much. But it's had a huge impact on those guys. In 2013, company X that we worked with, we were probably their largest customer and now we're probably hardly on their radar relative to what we were using in 2013.

V: How many hours were you using at that peak?

FB: We flew 10,269 hours around the globe in 2013. We also had a heli-portable project in the mountains in Canada. On that project, we had seven machines — three mediums, one spare medium, and three lights — for 90 days. And then in the winter that year I think we had five machines flying from January until the end of March.

V: How would that compare the hours flown for you last year?

FB: It was 1,621 worldwide last year. We've also had quite a bit of activity within an air weapons range here in Canada — they used to let us fly to move equipment out there, and they don't let us do that anymore. And that's like 65 or 70 percent of our work in the winter time. So that's had an impact, as well.

V: What's the outlook for 2018? When might the industry pick up again?

FB: I think there will be a little bit of an uptick. We need the price of a barrel of oil to stabilize at \$70 to \$75 for us to start getting more consistent work. But who knows, this really could be the new normal for Canada. If you look at it from an oil company's perspective, there's a huge lack of clarity from our governments — not just federally, but provincially, as well.

This interview has been edited and condensed.



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HELICOPTERS AIRCRAFT,
ASHLAND, OREGON-BASED
BRIM AVIATION (QUIETLY)
FLIES A HUGE VARIETY OF
UTILITY OPERATIONS.

STORY & PHOTOS BY SKIP ROBINSON

A Brim Aviation MD 902 trains around a cargo vessel before beginning hoist operations with the ship's crew near Astoria, Oregon.





A visit to the flight line at Brim Aviation, a utility operator based in the small city of Ashland in southern Oregon, is a pretty unique experience. Not only is it somewhat unusual to see a fleet that includes the entire family of MD Helicopters' civilian rotorcraft, but given that all but one of Brim Aviation's aircraft have a NOTAR anti-torque system rather than a traditional tail rotor, it's one of the quietest fleets you'll find.

Now in its 25th year of operation, Brim Aviation operates one MD 902 Explorer, three MD 600Ns, leases an MD 520N when required, and flies a Leonardo A109SP Grand New on a bar pilot transfer program in Astoria, Oregon.

The company is owned by Burl and Julie Brim. Burl became hooked on helicopters after taking a ride in a Robinson R22 at a county fair in the early 1980s. While continuing his career as an excavator building roads and installing underground utilities, Burl gained his commercial pilot certificates, purchasing his first aircraft (an R22) in 1993 — the year Brim Aviation was established.

The company started out by offering flight instruction and aerial rides, and within three years had added two more R22s to its fleet. By 2000, two Robinson R44s had joined the fleet, and Brim had gained certificates for part 133, 135 and 137 operations (for external load, air carrier and operator, and agricultural operations, respectively). Its work had expanded to include fish and game census operations and some firefighting support, and it gradually phased out of flight training.

It was around this time that Brim made the move to a bigger aircraft — and one that would define its future. Its acquisition of an MD 500E expanded its animal capture work, brought in wild horse and burro herding, and helped secure firefighting contracts with the U.S. Forest Service and the Oregon Department of Forestry. It also took the company into the realm of power line maintenance and the annual Christmas tree harvest.

Brim liked flying the MD 500E so much, he sold the company's R44s and added two more 500s to the fleet over the next couple of years — one E model and one D model. Although the aircraft were successful, Brim ultimately found that further development of the utility market would require a move away from the 500.

"The utility market for the 500 series was saturated, so I was looking at the next model that would give me more access to market share," he told *Vertical*. "I looked at [Bell 206L] LongRangers, [Bell] 407s and [Airbus AS350] AStars, but had experienced such great success running the MD 500s that I looked at the MD 600N. I went to the factory and took a test flight and was sold."

Brim bought a used 600N and put it into utility work.

"No one in the U.S. had been doing utility work with them, so there was a lot to learn — but it has proved to be a very strong performer," said Burl, adding the benefits of the aircraft's NOTAR (which is derived from "NO Tail Rotor") anti-torque system quickly became apparent.

"I did a drill support job in Alaska and found that I could land in tighter confines with the 600 than with the 500s due to the NOTAR being able to sit down in the wispy willows that we were working in [amongst]."

The NOTAR system works through the use of an enclosed variable-pitch composite blade fan to produce a low pressure, high volume of ambient air to pressurize the composite tailboom.

This air is then expelled through two slots that run the length of the tailboom on the starboard side, causing a boundary-layer control called the Coanda effect. This effectively turns the tailboom into a "wing" flying in the downwash of the rotor system, and this produces up to 60 percent of the anti-torque required in a hover,

1 // A Brim MD 600N flies above a vast forest in Oregon. The company has a training site near Ashland that is utilized quite often. 2 // Both the MD 600N and MD 902 work well for Brim — the MD 600N for its lifting strength and the MD 902 for its superb visibility and stability during hoist operations.

3 // Landing on a tower at Brim's training site. Rescue and special mission operators can train in a realistic environment with Air Rescue Systems (ARS).



according to MD. The remainder of the aircraft's directional control is accomplished through the use of a rotating direct jet thruster at the end of the tailboom.

In forward flight, the vertical stabilizers provide the majority of the anti-torque, but the direct jet thruster still provides directional control.

"I'm a strong supporter of the NOTAR concept," said Burl. "The safety they provide is second to none, in both field and off-site operations, [and when] having people working close to the helicopters, [as] they simply cannot walk into a tail rotor. The NOTAR is also very quiet — which is always good — and has proven to be very reliable and low maintenance."

The company had such a positive experience with the 600 that it soon added a 520N — the NOTAR-equipped version of the 500 — to its fleet.

"We were working powerlines in urban areas and experienced way less noise complaints," said Burl. "There were neighborhoods [where] we always had complaints when using the 500s, that, with the 520s and 600s, they never knew we were there."

Burl said the aircraft also became very popular with fish and wildlife biologists. "We were conducting waterfowl surveys and found that the ducks, geese and cranes were hardly even bothered by the NOTARs, which in turn allowed the biologists much more time to count the different kinds of birds. We experienced the same [lack of reaction] with large animals such as elk, moose and deer."

A BROAD RANGE OF OPERATIONS

Today, there are two companies associated with Burl Brim's company: the helicopter operations division under Brim Aviation; and Air Rescue Systems (ARS) — a company that provides specialized advanced training and equipment for a variety of operations within the helicopter industry.

With its one MD 902 (Brim plans to add another to its fleet in the near future) and three MD 600Ns, Brim Aviation performs a huge variety of work, including aerial firefighting, animal capture and tagging, powerline construction and support, mountain and river rescues, Christmas tree harvesting, logging support, and aerial photography. It even responded to requests for help in Houston, Texas, following the destruction of Hurricane Harvey. There, it provided search-and-rescue (SAR) assets and support for the bar pilot transfer program in Houston.

1 // Used for the Columbia River bar pilot contract, the Leonardo AW109 Grand proves itself every day (and night) in some of the toughest offshore conditions in the continental U.S. **2** // It could be 3 p.m. or 3 a.m., when a ship comes in, the helicopter goes out. The bar pilot contract is a 24/7/365 contract and the aircraft operates in almost all weather conditions.

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Burl Brim said the factory support his company has received from MD Helicopters has been excellent. "When we call them, they always seem to be able to help us with any issues we are having," he said.







1

"Brim Aviation has a large breadth of operational experience, so there are few missions we aren't familiar with," said Julie Brim. "One of our specialties is precision longline work, [and we have been] teaching Chinese police officers the finer skills of police aviation. Also, we have MD 600s in Puerto Rico at the moment providing support for the rebuilding of the electrical system on the island. We expect to be working there for the foreseeable future."

For the Columbia bar pilot hoist program, Brim uses a Leonardo A109SP. The aircraft transfers ship pilots out to large cargo vessels beyond the mouth of the Columbia River near Astoria, Oregon. The flights take place 24 hours a day, 365 days a year, over some of the roughest ocean weather in the continental United States. The flights can take place in low visibility conditions, with fog and rain a normal occurrence.

The seas can reach 25 feet (eight meters), so using a helicopter is much safer and faster than using boats. The flight only takes about 20 minutes, as the helicopter makes a direct approach, enters a hover, and puts the pilot onto the ship (or removes him or her) as efficiently as possible. Burl said the A109SP is well suited to the program.

"It has plenty of power, great single engine performance, a strong tail rotor, and is just plain fast," he said. "It's quite a machine, and performs well for us."

Burl said the idea for ARS was the born out of the need for a dedicated training, equipment and response company within the



2

1 // ARS uses the MD 902 to perform the entire spectrum of rescue operations. "It's my favorite helicopter we operate," said Burl Brim.

2 // The visibility from the MD 902 is exceptional.



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industry. ARS was formed by Burl together with Bob Cockell, who now oversees the company. It specializes in specially purposed and designed equipment for the helicopter industry, with a particular emphasis on human external cargo missions. ARS manufactures this equipment with design criteria that is specific to short haul and hoisting missions.

ARS also put together an experienced team of instructors who have thousands of hours of experience and thousands of rescue and short haul missions under their belts. ARS instructors train personnel around the world in the specialized techniques the company has developed and in the use of ARS equipment.

ARS and its engineering and manufacturing department are located in Ashland at the Brim Aviation facility. ARS has approximately 25 employees, with 12 working in the Falkland Islands supporting the British Forces South Atlantic Islands SAR operations. These employees crew the two Leonardo AW189s located on the islands and perform both civilian and military SAR support.

THE 520 IS A GREAT AIRCRAFT, AND WITH THE NOTAR IT CAN LAND IN SMALLER AREAS WITH MUCH MORE SAFETY THAN A TAIL ROTOR BIRD, PARTICULARLY IN THE BUSH.

— **BURL BRIM, OWNER OF BRIM AVIATION**

A NOTAR FLEET

The company has now phased out its own 500s and 520s, preferring the 600N due to its capabilities and economics (according to Brim, it operates the 600N for basically the same hourly cost as the 500E, but with higher overall performance). A further bonus of the 600N is a larger cabin, which offers the flexibility to add more seats.

Still, Brim Aviation leases a 520N when required.

"The 520 is a great aircraft, and with the NOTAR it can land in smaller areas with much more safety than a tail rotor bird, particularly in the bush," said Burl. "It's a very smooth aircraft, and this is appreciated after a long day of flying. We also found it to be a superb photography platform — again, because of its smoothness. Down low, it's a good performer, and can lift a bit more than a MD 500E, but once you go to altitude, the MD 500E becomes the better performer."

The 600N is a stretched version of the 520N, with the addition of a powerful 800 horsepower Rolls-Royce C47 engine. This results in a fast, maneuverable, and powerful machine, said Burl. "It's also a pilot's machine, and needs to be understood to get maximum performance out of it," he said. "The aircraft takes specific techniques to fly effectively, and is best suited for an experienced pilot with good low speed, stick-and-rudder skills. It's an underrated aircraft, but is very rewarding to fly, and we have found it to perform very well — even at higher altitudes and hot conditions."

Brim said it had the first supplemental type certificate for a belly hook on a 600N, which makes it much more useful for the huge amount of utility work these aircraft perform.

However, Burl said the 902 is his favorite aircraft, praising the aircraft's reliability, safety, smoothness of flight, and quietness of operation. "It has unbelievably good cockpit forward visibility — top of its class," he said. "As a rescue aircraft, the large unobstructed cabin is perfect, and the rear clamshell doors give

1 // Fire bucket work is part of the MD 600N mission set. Brim told *Vertical* the MD 600N is an underrated aircraft. **2** // The bar pilot program is flown by experienced pilots and well trained hoist operators.



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The MD 600N's NOTAR technology helps Brim keep the noise down, resulting in fewer noise complaints when operating in urban environments.



us flexibility. The large sliding rear cabin door works great during hoisting operations, and the engine produces plenty of power.”

Burl said the company “obviously really likes” MD products, and praised the support his company gets from the manufacturer. “We have found the factory support to be excellent in both maintenance training/pilot training and overall product support,” he said. “When we call them, they always seem to be able to help us with any issues we are having. I find them to be good, knowledgeable people.”

Brim Aviation operates under Federal Aviation Administration part 135 air carrier regulations, and performs most of its maintenance in-house, including standard inspections and part replacement. Component and engine overhauls are outsourced. The company employs 10 to 12 mechanics at any one time, and they go where the aircraft go to make sure they are maintained to the company’s standards.

Most of Brim Aviation’s heavy maintenance is performed at its bases in Ashland and Astoria, and it has a satellite base in Wellington, Texas, where it can do whatever is required in terms of maintenance to keep the aircraft flying.

“We are routinely in the field at remote sites, such as Puerto Rico after the [recent] hurricane, and all over the Western U.S. doing utility and animal surveys, so we routinely move parts and

mechanics to these locations,” said Burl. “Our experience with MD has been they provide us with support when we need it, from parts availability, AOG [aircraft on ground] help, and general technical support.”

Looking at the state of the company’s operations and prospects for the future, Burl and Julie Brim said the strength of the utility market showed good prospects for growth.

“Currently the utility market is strong, with a lot of new work created by the [need to fix the damage caused by] hurricanes and other weather events,” said Burl. “Even without these events, the whole construction and utility industries are expanding, with a focus on updating the power grid through new funding to renew the overall system.”

Julie added that they expect the economy to get stronger in the future, providing further hope for future growth. “This gives both private business and the government sectors the ability to fund upgrades for large projects — this obviously helps support businesses like ours in the long term.”



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



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An Airbus AS355 TwinStar sits on the ramp as the sun sets. The ebb and flow of demand for vertical flight drives the international helicopter brokerage industry.
Airbus Helicopters Photo

THE BROKERING SALE

By Kenneth I. Swartz

Helicopter brokers are an often-overlooked part of the global helicopter industry, but for many operators, they provide the vital link to getting rid of an unwanted aircraft — or finding a bargain buy.



A helicopter doesn't make money sitting on the ground. That's why more than 2,215 pre-owned piston and turbine helicopters changed owners in 2016, according to fleet tracking company Jetnet. A good number of these were direct transactions between a buyer and a seller, but many others would never have happened without the hands-on participation of a helicopter broker to bring the buyer and seller together.

For the first 50 years of the civil helicopter industry, brokers sold aircraft by word of mouth or print advertisements.

"Everything was a lot simpler through the 1980s, when guys confirmed a sale with a handshake," said Ed Eckhart of Eckhart Helicopter Sales of Grayslake, Illinois. "But as helicopter values increased, deals became more complex and required more attorneys and more time."

With the growth in use of the Internet in the 1990s, helicopter brokers had to change their business model and focus on client services that capitalized on their deep knowledge of the marketplace.

"My role as a seller agent is to try and differentiate the aircraft I'm selling to highlight its unique value, and for a buyer to meet their initial criteria for best value," Mark V. Clancy, president and CEO of HelicopterBuyer of Minneapolis, Minnesota, told *Vertical*. "The big challenge for buyers is to decipher what aircraft on the market best meet their needs and preferences for capability, configuration, condition, component value, and overall cost."

For a lot of helicopter operators, buying and selling is not their core business, said Clancy. Buyers don't typically have time to find and determine the aircraft that represents the best value among the range available, and sellers often need help to stage and market a helicopter to maximize its value and help it stand out in a crowded market.

A SOUND INVESTMENT?

As helicopters have historically appreciated in value, they've represented a good investment for most owners and operators.

"Helicopter values steadily increased until 2008," said Jason Kmiecik, acting president of HeliValue\$, Inc., but "today, nothing is appreciating, and the value of some helicopters is going down faster than others."

HeliValue\$ has published the *Official Helicopter Blue Book* for more than 37 years, but its core business is conducting about 2,500 helicopter valuations for banks, lenders, insurers and other financial institutions that require an asset verification and residual value forecasts.

The specific value of a helicopter is primarily determined by global market conditions, as well as its age, condition and configuration, together with the residual value of the time remaining on the engine and dynamic components before overhaul or replacement.

"Going back several decades, it's normal to see a cyclical economy where business goes down and comes up again," said Eckhart. "After 2008, the helicopter downturn was deeper than ever before — and the recovery much more shallow."

"It used to be that new rising prices for a helicopter would 'drag up' the value of older aircraft and [it] kept residual values strong, but today you can see a split where new prices are climbing and used prices are lagging."

Low demand from the natural resource sector has driven down helicopter utilization rates and valuations, and "no one has cash anymore," said Kmiecik.

In the offshore sector, for example, "U.S. and international operators are thinning out their fleets by retiring some Airbus EC155s, Bell 427s and 412s, and Sikorsky S-76s," said Kmiecik. "The large volume of available aircraft hurts valuations because owners are dropping prices until they find a buyer, and buyers take the posture [of], 'What kind of deal can you do for me?'"



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According to Martin Weening of TransGlobal Aviation of Newmarket, Ontario, there has always been an ebb and flow in helicopter demand, and commercial operators routinely adjust their aircraft fleets to meet end users' needs. "A few years ago, their end user was willing to pay the higher tariff on a AS350 B3e, and it pushed a LongRanger out of a forestry job. Now, budgets are tight, and customers want to pay LongRanger rates again."

The cabin configuration and mission equipment installed on aircraft can also affect its sales potential.

"Some buyers will pay more [for] a specific interior, and others will pay less," said Kmiecik. "It's really a matter of supply and demand."

For example, the grounding of the Airbus EC225 fleet in 2015 stimulated huge demand for offshore SikorskyS-92s, in both the offshore and search-and-rescue (SAR) configurations.

On the other hand, a commercial operator seeking a Leonardo AW119 Koala for utility work will see little value in an aircraft having a corporate, emergency medical services (EMS), or offshore configuration.

WHAT'S POPULAR?

"Single engine helicopter values are not dropping as fast as other models," said Kmiecik.

The six brokerage companies *Vertical* spoke with for this story all said the Bell 407 and Airbus H125/AS350 B3e were holding their values, since they can be used for many different missions.

"The bigger companies are reducing or modernizing their fleets by selling off older aircraft like the JetRanger and LongRanger, and buying AS350 B3es, 350 B2s or Bell 407s," said Steve Dettwiler, president of Maple Leaf Helicopters, an international broker based in Vancouver, British Columbia.

Clancy said the Bell 407 is holding its value. "Bell received a big EMS order from Air Methods a couple of years ago that was [cancelled and] later replaced by a 100-helicopter order from China

1 // The Bell 407 (foreground) is in high demand. Production of the Bell 206L-4 LongRanger (background) ended in 2017. **Anthony Pecchi Photo**

2 // Bell 212s are replacing single-engine Bell 205A-1s on wildfire contracts. **Mike Reyno Photo** 3 // Helicopters with analog avionics are losing value faster than those with glass cockpits. **Skip Robinson Photo**

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and some significant military sales. The backlog means there is an extended delivery lead-time of up to 1.5 years for a new aircraft, which has helped firm up prices for used 407s.”

Bell's strong order book for the Bell 505 Jet Ranger X includes many owners/pilots currently flying a piston Robinson R22 or R44. As owners trade up to the 505, the number of R22s and R44s coming on the market will increase and reduce values, said Kmiecik.

Falling prices are a challenge for sellers, but it makes private helicopter ownership more affordable, and helps operators upgrade their fleets.

“We've been very successful placing LongRangers with flight training schools,” said Mike Bashlor of Meridian Helicopters, a broker based in Broussard, Louisiana. “The drop in prices has allowed some commercial operators to trade up to more capable aircraft.”

Most helicopter brokers utilize their extensive professional networks as well as various data services to closely monitor global helicopter transactions and demand.

“We're following 51 different turbine helicopter models and see that there are 905 aircraft listed for sale [in early January], out of a total fleet of 15,025 aircraft made by Airbus, Bell, Leonardo and MD,” said Clancy. “In a balanced market, you'd only expect to see between three to four percent of the individual models for sale, but today availability ranges from five to 12 percent for many helicopter types.”

A GLOBAL BUSINESS

One half of the world civil helicopter fleet is flying in North America, with about 10,000 aircraft in the largest single market — the United States. Economics and geography have always played an important role in defining helicopter use, with Canada home for the second largest fleet (2,830 units as of Dec. 31, 2017) thanks to its vast geography and natural resources, and China the world's fastest-growing helicopter market thanks to a booming economy.

“U.S. and Canadian operators generally have good maintenance practices and well-maintained technical records, and this is reflected in higher aircraft values,” said Kmiecik.

Canada is a highly seasonal utility helicopter market, and charter rates are lower than in most Western European countries, which helps explain long-standing local operator preference for pre-owned turbine helicopters over new aircraft.

“You need a broker if you are going to sell aircraft across borders and successfully navigate all the regulations and pitfalls of moving an AStar from Brazil to New Zealand,” said Felix Christians of TransGlobal Aviation.

All brokers *Vertical* spoke with stressed the importance of having a pre-purchase inspection done by an aircraft maintenance engineer who is well versed in the airworthiness regulations of the destination country.

Longstanding bilateral agreements between the Federal Aviation Administration (FAA) and Transport Canada make it relatively easy to transfer aircraft between the two countries, and this also applies to many supplemental type certificate (STC) modifications found on utility helicopters, said Maple Leaf's Dettwiler.

On the other hand, local STC modifications on any aircraft entering Europe have to be certified by the European Aviation Safety Agency (EASA), which can be a costly and time-consuming barrier to entry if the modification was never certified in Europe by the STC holder.

However, operators in New Zealand and Australia routinely shop for



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Sikorsky S-92 values surged with the grounding of the EC225 fleet, pushing the value of SAR configured S-92s as high as \$40 million.
Skip Robinson Photo

pre-owned helicopters in the U.S. and Canada, and don't have a lot of difficulty getting STCs recognized.

In Latin America, Eckhart said that motivated sellers will often reposition an aircraft to the U.S. to reduce buyer uncertainty regarding export rules and bureaucracy.

On the other side of the Pacific, most Japanese operators buy factory new aircraft, and it has become an important source for well-maintained pre-owned aircraft, since Japanese government operators regularly upgrade their fleets.

The Chinese fleet recently overtook New Zealand, Italy, Germany and Japan in terms of size, and now totals more than 1,000 aircraft. Regulators require new aircraft imports to come directly from the country of manufacturer, but some used aircraft are also trickling in to China. The average helicopter utilization across the country is low.

The complexion of the helicopter market has changed in the past 10 years as billions of dollars of new helicopters were acquired by leasing companies and placed on contracts with offshore operators.

"In the past, operators would never lease an aircraft, because they preferred to own an asset," said Eckhart, "but the new generation of helicopters are very expensive, and there were lots of accounting reasons why an operator might want an aircraft off [the] balance sheet."

Kmiecik said that with the delivery of new aircraft to lessors, a lot of older aircraft are being returned. "The companies have a financial obligation to get all these aircraft flying on another lease, and have been known to offer favorable lease terms in some cases," he said.

The growth of the leasing industry has been generally positive, but it is also removing some buyers from the market for pre-owned helicopters.

From a support perspective, most leased and new generation aircraft fly under power-by-the-hour (PBH) engine and spare parts contracts.

"This is highly beneficial to an operator because it evens out the exposure on maintenance by reducing lump sum payments," said Kmiecik. "It also significantly adds to the value of an aircraft, because all the components are regarded as being 'zero-timed', since there is money in the program for overhauls."

Since a PBH program is transferable when an aircraft is sold, it makes an aircraft more desirable, command a higher price, and sell faster than a similar helicopter without a PBH program.

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A BROKER'S VIEW

Helicopter brokers are close to the global rotorcraft market, and talk to manufactures, operators and even other brokers on a regular basis. They offer skills and knowledge that the Internet is not able to provide, according to Eckhart. "In a word, it's called service," he said.

Broker commissions are generally on a sliding scale from two to five percent, but can vary widely depending on the specifics of the transaction and the other services provided.

"THE KEY TO SELLING A HELICOPTER IS POSITIONING IT CORRECTLY. YOU ALSO HAVE TO BE HONEST WITH THE SELLER AND GIVE THEM REALISTIC AND ACCURATE EXPECTATIONS OF WHAT THE AIRCRAFT WILL SELL FOR."

— **MIKE BASHLOR, MERIDIAN HELICOPTERS**

Eckhart has been buying and selling helicopters for 40 years, and his father was doing so before him. He said the helicopter industry is a small community, and if you have good contacts, you'll know what's being bought and sold, and what's in demand in different corners of the world.

"For example, if you need an Airbus EC145 to expand your hospital HEMS program, there is a good chance the aircraft that meets your specifications is on the other side of the world," he said. "It's a big challenge for a hospital to find and buy a helicopter overseas if they have never done it before, but it's all very routine for us."

According to Bashlor of Meridian Helicopters, the value of a helicopter can be increased by overhauling some key components and improving its cosmetic appearance.

Bashlor has worked as a pilot, mechanic and director of maintenance for helicopter operators in Guam, Alaska and the lower 48 states for more than 30 years. Meridian was founded in 2010 in partnership with Cadorath Aerospace.

"The key to selling a helicopter is positioning it correctly," said Bashlor. "You also have to be honest with the seller and give them realistic and accurate expectations of what the aircraft will sell for."

Meridian and Cadorath support thousands of helicopters owned by hundreds of helicopter operators. The helicopters it brokers are marketed to these customers, as well as to other companies it knows.

THE CANADIAN PERSPECTIVE

Steve and Keren Dettwiler run Maple Leaf's brokerage business. Steve worked as a commercial helicopter pilot in northern Canada for 12 years, while Karen's background is in the health industry and real estate. They work with clients from as far away as Australia, New Zealand, Europe, and Hong Kong.

"When someone is looking for a broker, they are looking for someone with a lot of integrity, who is really looking out for your best interests and has a reputation for dependability [in making] the transaction as seamless as possible," he said.

Dettwiler said that in today's market, there is a high probability that a helicopter buyer and seller are in different cities or countries.

Many of the aircraft Maple Leaf has sold have been utility helicopters, outfitted with cargo hooks, bear paws and other accessories. New Zealand and Australia are the most common export markets for Bell and Airbus aircraft from Canada, with Lamas from Asia mostly finding new customers in Scandinavia or Latin America.

The international nature of many helicopter transactions sees Dettwiler routinely coordinate all the details associated with the sale and export process.

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2



3

"We'll schedule pre-buy inspections and flight tests for the prospective buyer, look after opening escrow accounts, drafting up purchase agreements and bills of sale, providing export C of As [certificates of airworthiness] when required, and can also organize shipping of the helicopters anywhere in the world," he said.

Over at TransGlobal Aviation, Weening said commercial helicopter demand changes every time an operators' end customer changes its requirements.

The company has focused on helicopter sales for the past 10 years. Its first rotary-wing project involved helping a Canadian fixed-wing flight school find a Schweizer S-300C to launch helicopter training. Weening said this led to further Canadian sales as helicopter operators realized they were not receiving the same high level of service routinely offered to the fixed-wing community.

Felix Christians, a commercial helicopter pilot who now runs TransGlobal's rotorcraft brokerage, said it's important that a pre-purchase inspection be done by an aircraft maintenance engineer who is familiar with the regulatory requirements of the destination country.

"You are probably going to need the help of a broker if you are going to sell a helicopter across an international border," he said. "It can be

a really complicated, time consuming 'nuts-and-bolts' process that is full of risks if you don't."

Many of the aircraft listed on TransGlobal's website are exclusive listings from large commercial operators who are adapting their fleets in response to changes in user demand. In the past 12 months, there has been strong demand for Airbus AS350 B2s and B3s, and Bell 212s are finding more favor for wildfire and utility work over Bell 205A-1s.

THE PERSONAL TOUCH

According to Andy Caddick, president of UK Heli Sales, the country is a vibrant second-hand market with a lot of Robinsons, AStars, JetRangers and MD500s available. "Aircraft are passed around a lot within the country because of the high taxes, including a 20-percent Value Added Tax (VAT) on helicopter imports," he said.

Caddick was a professional cricketer for 22 years, which provided the means in 2001 to buy and fly an MD 500 before he transitioned into the helicopter and business jet brokerage business prior to his retirement in 2009. He realized a buyer's and seller's personal needs were paramount, requiring a more personal and hands-on service.

1 // The AS355 TwinStar is an older aircraft filling a niche role for operators. **Marc Witolla** Photo 2 // The Leonardo AW109S GrandNew is holding its value better than the AW109E Power. 3 // The Leonardo AW139 replaced the S-76 in many offshore and corporate markets. **Skip Robinson** Photos

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Long wait times for new Bell 407s have firmed up values for the aircraft. **Bell Helicopter Photo**

BY THE NUMBERS

DATA COURTESY OF JETNET

(FROM SEPTEMBER 2017)

21,865
turbine helicopters

1,431
turbine for sale

9,981
piston helicopters

541
piston for sale

NUMBER OF USED TURBINE HELICOPTERS TRADING HANDS IN THE FIRST 11 MONTHS OF 2017



180

Bell JetRanger



95

Airbus AS350 B2



72

Bell 407



66

Airbus AS350 B3



66

Airbus H120



56

Robinson R66



47

Airbus EC130 B4



40

Airbus AS350 BA



46

Bell 206 L-4



31

AS350 B3e/H125



29

Leonardo 109E Power



28

Bell 206 L-3



28

Bell 206 L-1



365

R44 Raven II



142

R44 Raven I



122

R22 Beta II



75

R22 Beta



35

Schweizer S-300C

"I like to personally meet buyers and the sellers and will then bring the parties together to facilitate a transaction," he said. "The U.K. is a small country, so it's not that difficult to travel around. It also takes the stress off a private owner, especially if they are reluctantly selling an aircraft due to a personal or business reason."

Caddick also regularly visits his customers after a transaction has closed to ensure everything went smoothly. Staying in touch with clients has also allowed him to broker the sale of a first-time business jet to a helicopter customer, and a first helicopter for a bizjet client. He said that building a relationship of trust with a customer is crucial in securing return business.

"I find that nine out of 10 private buyers usually know a tremendous amount about the aircraft they want to buy," he said. "You have to work down a list of tick boxes to find an aircraft that meets their exact needs."

Back across the Atlantic, Helicopter Buyer's Clancy said the value of a broker is greater in a "buyer's market" because they can help the seller differentiate their aircraft in the high volume of aircraft available.

"One of the challenges is that sellers don't take a buyer's perspective when they list an aircraft for sale," he said. "Most buyers are looking for a quick purchase of an aircraft they can put to work on a contract they just won and is 'ready to go' with a minimal amount of work required."

"They are not looking for a shop project that will take three to six months to get ready. Ideally, they also want an aircraft in a state where they can operate it for a couple of years without major maintenance, and that doesn't have to be reconfigured to perform the job."

Obtaining the best value when buying or selling a helicopter is not a straightforward process, since accurate aircraft valuations require a tremendous attention to detail. On top of that, international transactions require expert knowledge of import regulations, aircraft certifications and modification approvals.

Many great deals — especially the most complex — would never occur without the direct involvement of a professional helicopter broker.



Ken Swartz | Ken has spent most of his career in international marketing and PR with commercial aircraft manufacturers, airlines and helicopter charter operators. An award-winning aviation journalist, he runs Aeromedia Communications, and can be reached at kennethswartz@me.com.



The Sikorsky S-76C++ sells faster with a power-by-the-hour parts and engine program. **Mike Reyno Photo**

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EXPERTS OF THEIR CRAFT

Celebrating its 25th anniversary in 2018, MRO provider InterMountain Turbine Services has become an industry expert on the Honeywell LTS101, and has invested heavily to ensure it offers that same level of capability and expertise for customers operating the HTS900.

STORY BY DAYNA FEDY // PHOTOS BY MIKE REYNO



While the LTS101 once had a poor reputation for performance, the team at Intermountain Turbine Services (ITS) has worked for 25 years to ensure aircraft fly longer, farther, and better with the engine.



If you fly an aircraft powered by a Honeywell LTS101 or HTS900, you'll be well aware of Intermountain Turbine Services (ITS) — and there's a good chance you're one of the Lindon, Utah-based company's customers. Now celebrating its 25th year in service, the maintenance, repair and overhaul (MRO) company may have a laser-focused business niche, but within that it has built an outstanding reputation for the quality of its work, and above all else, the level of its customer support.

"I'm here for the customers; my goal is to keep these people flying," ITS president and CEO Darryl Christensen told *Vertical* during a recent visit to the company's headquarters. "I started out in the helicopter EMS [emergency medical services] business. If [those] helicopters are sitting on the ground, they aren't saving any lives. My philosophy is 'Do whatever you can to get these guys back up in the air.'"

This unswerving focus on customer support has not only helped build the company into the market-leading presence it is today; it was, in essence, the ethos that inspired Christensen to join the industry in the first place.

"My older brother was a pilot," recalled Christensen. "He convinced me that if I learned how to fix them, then he'd fly them." After gaining his airframe and powerplant license in 1986, Christensen secured a job at Rocky Mountain Helicopters — the largest EMS operator at the



1 // An Eagle 407HP operated by Yellowhead Helicopters. The type replaces the Bell 407's Rolls-Royce C47 turbine engine with a Honeywell HTS900. **Heath Moffatt Photo** **2** // ITS has become the world's largest service center for the LTS101. **3** // Engine technician Luke Olsen is one of ITS's 29 employees, helping ensure every engine that comes into the shop is overhauled with expertise.

4 // ITS stores over \$5 million worth of inventory on its shelves in order to best serve its customers' needs. Inventory specialist Kyle Jones confirms that all tools and engine components are stocked and in their proper place. 5 // Fuel pump specialist Wanonah Rabbers make sure every engine that comes into the service shop has a smooth-running fuel system. 6 // Engine technician Bob Luxe never misses a step in an engine component repair process. 7 // ITS has built a team of experts, like repairs specialist Mike Juvenal, who know the LTS101 inside and out — literally. 8 // ITS uses a 101 test cell to ensure every engine is running properly before it's returned to the customer. The company will soon welcome a brand new HTS900 test cell to its facility, with a \$1.5 million price tag attached to it.



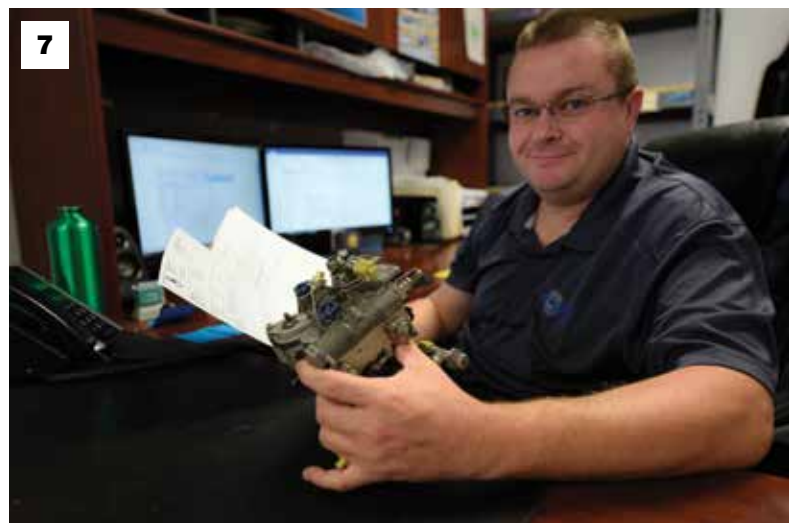
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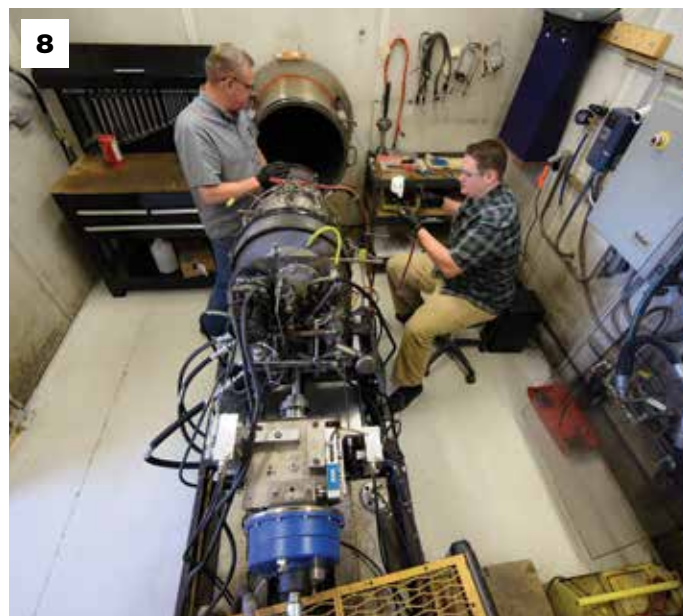
time. After three years working in the completion center, he moved to the helicopter engine shop — and instantly fell in love with the work.

The Lycoming (now Honeywell) LTS101 engine became his specialty after focusing on it for four years; in one year alone, he repaired 100 of the engines. "I liked the 101 the best," he said. "I knew it the best, [and] I could tear it apart in my sleep — still can."

In September 1993, within a month of being made redundant as Rocky Mountain Helicopters fell into bankruptcy, Christensen accepted a loan from his parents to start up his own helicopter engine shop in the mountainous region of Lindon. It was then and there that Intermountain Turbine Services was created.

The LTS101 did not have a great reputation for reliability at the time, but Christensen believed he could help customers fly longer, farther, and better with the 732- to 780-shaft-horsepower engine.

However, building the business around this philosophy required patience. "I didn't start taking a real paycheck until 1999," said Christensen. "I paid myself 12 dollars per hour, 40 hours per week — no matter how many hours I worked." Buying and selling engine-repair tools — and later, engine parts — was how he began making a profit. ITS landed more and more customers, with its first significant customer being Air Methods.



8



Today, ITS is the world's largest service center for the LTS101, with its employees working on over 80 engines per year (the engine powers several Airbus AS350 types, Avic AC311, Bell 222, and Airbus BK117s). In the company's 25 years of operating, Christensen has built a team of experts who know the LTS101 inside and out — just as he does. And his passion for helicopters appears to run in the family, as among the company's 29 employees are his four children, his sister, and his son-in-law.

"We're the experts," said Jaclyn Hawke, ITS's customer support director. "[Our technicians] know exactly where they need to go [and] exactly how they're supposed to do it; if they don't know, there's an expert sitting next to them who they can ask."

ITS became a Honeywell authorized customer support center in 1998, and then became the only service center for Honeywell's HTS900 engine in 2010. The 1,021-shaft-horsepower engine powers the Eagle 407HP and the Marengo Swisshelicopter (now Kopter) SKYe SH09, and has been chosen as the engine for the upcoming XTI TriFan 600. ITS's commitment to the engine represents a long-term investment, with the HTS900 test cell alone costing \$1.5 million. With only 13 of these engines currently operating in the world, Christensen said it will be at least two years until ITS performs an overhaul on the 900. "This is a long-term investment that we're hoping pays off," he said.

CUSTOMER-CONSCIOUS

When an engine arrives with ITS for maintenance, it is first closely examined to see if any repairs are required. This information is put into a preliminary technical report sent to the customer, along with photos of the parts that need to be replaced. "Our customers are always getting emails and constant updates as to what is happening," explained Hawke. "We try to work very closely with them to make sure they get the personal touch."

That personal touch extends to rejecting work if it's found to be unnecessary; it's not unknown for operators to send engines in for maintenance based on incorrect calculations. "We analyze the engine first, and we look at it to make sure we need to do the maintenance," said Hawke. "If not, we aren't going to waste their money or time."

In order to efficiently serve customers, ITS keeps over US\$5 million worth of inventory on its shelves — this includes 16 LTS101 rental engines, available to customers who need to be in the air while their engine is being overhauled.

"We have more inventory than anybody else. . . . We could put together an engine tomorrow if we wanted to," said Christensen, highlighting the importance of not having to rely on the OEM to supply a part. "[We want] to make sure our customers are going to have the hardware [they need] to put on their engines."

1 // ITS's engine technicians use a CMM machine to accurately measure all engine components. **2** // There are now 13 HTS900s operating in the world. In addition to Eagle using the engine in the 407HP, XTI Aircraft has chosen it for the upcoming TriFan 600. **Heath Moffatt Photo** **3** // Inspecting engine technician Dave Dalley always keeps a close eye on possible cracks on engine components. Catching these details helps to ensure the engines run longer — and lowers the customers' costs.

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1

1 // Engine technician Chad Hawke inspects a part at the company's facility in Lindon, Utah. 2 // ITS owner Darryl Christensen (right) stands with his son Brad Christensen, ITS's quality manager, behind the LTS101 and HTS900 engines.

The wide variety of inventory is a key factor in allowing ITS to record quick turnaround times. Engines can be expected to go through full service in the shop in 45 days, but the company will strive to return engines even faster, if needed.

When a Chilean engine came into the ITS shop and the customer needed it back as soon as possible, Christensen and his team accepted the challenge. Hawke said the strategy was to analyze the engine before it arrived to figure out what it needed, as well as strong communication among team members. The result was a 30-day turnaround time for a very happy customer.

Another customer, Mercy Flight, will be switching its BK117 fleet to the Bell 429 later this year, so it will no longer be able to rely on ITS for engine maintenance.

"One thing I'm going to miss about [ITS] is their professional customer service," said Rick Parsons, Mercy Flight's director of maintenance. "If I have a problem and I need something overnight, I have it overnight. . . . I really hope I get as good service from Pratt & Whitney as I do from Intermountain Turbine."

In order to deliver this timely service, ITS ensures there is always someone answering the phone when a call comes in, and has a technician available 24/7. Mark Steen, president of Heliproducts Industries, was thrilled to receive help from ITS over Christmas.



2

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"You can call them day or night," said Steen. "I had Jaclyn on the phone over Christmas, which wasn't planned, but she was shipping out parts over her Christmas holiday. We've always had great AOG service from them. You can get things from them whenever you need them."

TRAINING FOR RESULTS

ITS currently offers four-day training courses on LTS101 line maintenance and HTS900 line maintenance, allowing operators the chance to learn how to take care of their engines the same way the experts

do. "The better they maintain their engine, the cheaper their repairs can be coming back," said Jennilee Warren, ITS's chief financial officer and general manager.

Not only does better ongoing maintenance keep its customers' operating costs low, it ensures the longevity of their engines — preserving the pool of LTS101s as long as possible. "We're here to help the customer, ultimately," said Christensen. "But I understand what the customers have to do if the cost of operating [the LTS101] goes too high . . . they're going to go over to another engine model."

In this vein, ITS has developed a field service kit for operators to

allow them to independently perform 600-hour inspections to keep their engines in top form. The kit includes accessory gearbox module seal pushers, a fuel filter bypass check kit, an inspection mirror, a compressor wash kit, and all consumables (such as filters, packings, and seals).

Christensen said a "proper" compressor wash is crucial in order to prevent pitting corrosion and poor engine performance. "If your compressor is not clean, the engine is not going to run as it's supposed to," he said. "We put together our compressor wash kit, and we developed it to make sure it's going to deliver that gallon-and-a-half of water per minute that is required [to clean the compressor properly]."

And, while ITS concentrates on servicing the HTS900 and LTS101, it also manufactures tooling for both engines, and sells components to operators who choose to do their own maintenance on them.

It's just another way ITS finds to help reach its goal of keeping its customers in the air — and the company has helped changed the reputation of the LTS101 through these practices.

"An eye-opener for the industry is . . . the 101 engine has made us more money than any other engine, without a doubt," said Heliproducts' Steen.

This hasn't just happened by chance; it's the result of what Christensen estimates to be hundreds of years of expertise across the company's employees in their subject matter — and a dedication to ensuring the customer benefits from that expertise as fully as possible.

"One thing we've really done well is we've concentrated on the LTS101, so we're not guessing on other engine models," said Christensen. "This is our bread and butter. This is what we do."



Dayna Fedy | Dayna is junior editor of *Vertical* magazine. She completed her undergraduate degree in communication studies in June 2017, joining MHM Publishing later in the year to pursue a career as a writer and editor.



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In love with the Cabri... A BC Helicopters Guimbal Cabri G2 is framed by a heart-shaped lake during a photo shoot just north of Abbotsford, British Columbia.



FAMILY AFFAIR

BC Helicopters has enthusiastically embraced the Hélicoptères Guimbal Cabri G2 for its flight training operations, and the aircraft is well suited to the company's forward-thinking approach.

Story by Howard Slutsken

Photos by Heath Moffatt



1



2

Sancho and Mischa Gelb look at each other, and laugh.

The two brothers are sitting in a cozy classroom in their office hangar, and have just been asked how they ended up co-owning BC Helicopters.

"I was sitting in my living room, looking out the window, calling him, and wondering what he was going to think," said Mischa. "I said, 'Hey, Sanch, you want to buy a business?'"

It was 2008, and Mischa was already a helicopter flight instructor for the Abbotsford, British Columbia-based helicopter training and charter company. Sancho was an aircraft maintenance engineer (AME), and was working on both fixed-wing aircraft and helicopters for a number of companies.

Bonnie and Gerry Friesen had established BC Helicopters in the 1990s. They decided to retire, and approached Mischa and Sancho with a proposal to take over the operation.

"At the time, it was four aircraft flying flat out," said Sancho. "Twelve students at a time — it was a really busy school." BC Helicopters was using the Sikorsky (formerly Schweizer) S-300 as its primary trainer, and was also a dealer for the light helicopter.

The brothers approached the Business Development Bank of Canada with their business plan, and were approved for a loan to purchase the company. A key part of the plan was an immediate move and expansion of the flight training operation.

The transaction closed in November 2008, and in early 2009, BC Helicopters moved from its original location at YXX to a 10,000-square foot hangar and office on the north side of the Langley airport, closer to Vancouver.

"And right about that time was when the [financial] crash happened," said Sancho. "It was probably one of the best learning experiences we could have had, realizing that it's just not worth it to try and push to be so big."

For the next three years, BC Helicopters suffered from a huge downturn in business, sometimes operating with just one student at a time. By 2012, the Gelbs recognized that the Langley operation wasn't financially sustainable. They downsized the company, and moved back to the original location at Abbotsford airport.

"We had to re-invent ourselves. In the last five years, we figured out how we wanted the business to look, how we wanted it to feel, and have started figuring out our stride. It's been a slow climb, and in the last year we've really seen all of our work coming together," said Sancho.



3



4



5

1 // BC Helicopters now has two Cabri G2s, having taken delivery of its second of the type at the end of 2017. 2 // In addition to the Cabri, BC Helicopters operates a Robinson R44 and R66. **BC Helicopters Photo 3** // The Gelb family is front and central at BC Helicopters. From left: Amy Gelb (office administrator), Mischa Gelb (president), Sancho Gelb (vice president), Tey Steenberg (aircraft maintenance engineer). 4 // The company transitioned to the Cabri from the S-300, and said it would still be flying the older type if it was effectively supported by the manufacturer. After this story was written, Sikorsky announced it had sold the S-300 line to Schweizer RSG. 5 // BC Helicopters is currently the sole Canadian distributor of the Cabri, having established a great working relationship with the type's manufacturer, Hélicoptères Guimbal.

“WE HAD TO RE-INVENT OURSELVES. IN THE LAST FIVE YEARS, WE FIGURED OUT HOW WE WANTED THE BUSINESS TO LOOK, HOW WE WANTED IT TO FEEL, AND HAVE STARTED FIGURING OUT OUR STRIDE. IT’S BEEN A SLOW CLIMB, AND IN THE LAST YEAR WE’VE REALLY SEEN ALL OF OUR WORK COMING TOGETHER.”

— SANCHO GELB, VICE PRESIDENT BC HELICOPTERS





At the moment, BC Helicopters' Cabris are flying about five hours a day.



The company likes to make training fun for its students, occasionally incorporating special events like heli-skiing operations in order to increase the amount of learning from a lesson.

1 // The Cabri's anti-torque is provided by a Fenestron tail rotor — Guimbal shares the patents for the Fenestron's design with Airbus. **2 //** The cockpit may be small, but it's incredibly clean-looking. The Gelbs reserved praise for the Cabri's modern avionics. **3 //** The Cabri is powered by the Lycoming O360-J2A — the same piston engine that powers the Beta II version of the Robinson R22. **4 //** The Cabri's three-bladed high-inertia rotor system gives the aircraft really good controllability, said Mischa Gelb. **5 //** A Cabri sits outside the company's hangar in Abbotsford, British Columbia.



COZY QUARTERS

BC Helicopters' pad and hangar is somewhat hidden, down a short, tree-lined lane across the street from the Abbotsford airport flight line's massive hangars. Surrounded by a small blueberry and raspberry farm, and with picnic benches and a BBQ under the mature trees in the backyard, it seems to be more of a family's home hangar than a corporate operation.

And it certainly *is* a family affair — Mischa is chief pilot and flight instructor; Sancho is chief maintenance engineer and a flight instructor; Mischa's wife, Amy, is the company's administrator; and Sancho's brother-in-law, Tey Steenbergen, is a helicopter engineer and also handles sales. Simon Wittinger is a recent addition to BC Helicopters, flies charters, and is the only team member who isn't related to a Gelb.

The compact hangar can hold five machines. Right now, it's home to a Robinson R66, an R44, and two Hélicoptères Guimbal Cabri G2s. One of the two-seat training helicopters is brand-new, and was delivered just before Christmas, 2017.

The decision to move from the Schweizer to the Cabri wasn't taken lightly, explained Sancho.

"To be honest, the Schweizer was the dream helicopter, in most ways. Across the board, it was a really good training helicopter — and it still is. We would still be flying it as our trainer if it was still supported by the manufacturer in an effective way. There are so many



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parts, major parts like driveshafts, that you just can't get. And that was the demise for us with the Schweizer."

They evaluated other machines, including the Enstrom TH180, before a colleague suggested they have a look at the piston-powered Cabri. At the time, the helicopter wasn't yet certified in Canada or the U.S., but had its certification from the European Aviation Safety Agency.

They visited Hélicoptères Guimbal's headquarters in Aix-en-Provence, France, just north of Marseille. Sancho and Mischa met with helicopter engineer and founder Bruno Guimbal, who had decades-long experience with Eurocopter (now Airbus Helicopters) before he left to establish his company. With Airbus exiting the light helicopter market, Guimbal saw an opportunity and designed the Cabri specifically for training.

A clean-sheet design that had its first flight in 2005, the three-bladed Cabri has a Fenestron — a design for which Guimbal co-holds the patents.

"It's just an awesome mix of everything," said Mischa. "It's a little bit like so many different things. It's a little bit like an [Airbus AS350] AStar, it's got such good maneuverability. It's got modern avionics like an AStar. With the three-bladed rotor, it's got really good controllability — the same controllability as the Schweizer. But the Fenestron makes it fly very much like an EC120 in pretty much every way possible."

The Cabri has a fully-articulated rotor system, with elastomeric bearings in the rotor head. That impressed AME Sancho, both for maintenance and in-flight.

"There's no greasing of the head, so it's strictly visual inspections on the pre-flight," he said. "It creates a very modern, very low-maintenance

rotor hub that's very smooth. The lead-lag dampers are elastomeric as well. And they recently incorporated a flapping counter-weight which has made it butter-smooth. It's amazing. I've never flown another helicopter as smooth."

MADE FOR TRAINING

With crashworthy seats and passenger compartment, up-to-date flat-panel avionics, and even a luggage compartment, the Cabri has been designed to endure the rigors of flight training operations. Aside from the time-limited gearbox and engine, all the machine's components are serviced "on condition."

During the design process, the Cabri's composite main rotors were ground-tested to see how they'd handle an accidental contact with a six-inch (15-centimeter) telephone pole, simulating a confined-area operation gone awry.

"It shattered the telephone pole, and when they finished, they inspected it, and determined that it was serviceable to fly home," said Sancho. "It had a little dent in the stainless steel leading edges. That's the kind of stuff that blew my mind."

In addition to flying the Cabri for training, BC Helicopters is currently the sole Canadian distributor for the machine. The Gelb's goal is to have three Cabris for flight training, along with the R44 and R66 for advanced training and charters. And according to the brothers, Guimbal has a four- to five-seat helicopter in the works.

Will that new machine be joining the BC Helicopters' fleet?

"Guaranteed," said Mischa. "As soon as it comes out, I don't even need to see it — we're going to be getting one. I just know that the next helicopter they put out is going to be amazing."



BC Helicopters wants to ultimately add a third Cabri to its fleet. The Cabris would then be used for flight training, with the company's R44 and R66 used to fly charters and for advanced training.

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Currently, about 12 students graduate from the BC Helicopters training program each year, but the company hopes to increase that to between 20 and 24 graduates annually.

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The Cabris are currently flying about five hours a day, but Mischa notes that one of the biggest challenges is scheduling students, machines, and maintenance.

"If the helicopters aren't booked, the company isn't making any money," he said. "If they're fully booked, that's great. And as soon as you're bordering on getting fully booked, then there's always extra people that want to fly. Trying to manage that is challenging."

About 12 students per year graduate from the BC Helicopters training program, and the brothers hope to grow to between 20 and 24 students per year, with a maximum of four students assigned to an instructor at a time.

The Gelbs have focused the training syllabus to create pilots that are industry ready. "You can almost train anybody to pass a flight test," said Mischa. "But for them to go out and meet an employer, and for that employer to say, 'This guy's awesome, he's useful, he thinks on his feet' — that's the direction we're going."

Instead of having a ready-to-go machine on the flight line, students arriving for a lesson can be expected to pull a helicopter out of the hangar, fuel and pre-flight it, and then come and get the instructor. And while the lessons follow the normal training process, students might be surprised to find they're part of a special event, like a heli-snowboarding and heli-skiing day, or a long-line challenge.



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"We took the helicopters out, and we literally did a long-line challenge with different obstacles that they had to handle," said Mischa. "Our students love doing super-fun things like that, and the amount of learning that happens in that day is phenomenal."

LOOKING AHEAD

It's clear that Sancho and Mischa are passionate about flying, and are excited to train new helicopter pilots. But they suggest that some of the long-standing hiring practices in the industry need to change, to have well-trained and qualified pilots in the system.

"I think the most frustrating thing is that the industry is so closed minded to being more creative to getting pilots flying, building experience, and mentoring pilots into positions where they'll eventually become very valuable," said Sancho.

"'You're going to work ramp here until maybe someday we can use you.' That's the mentality: 'You're just a grunt laborer until we can maybe use you to fly our helicopters.' That's the thing we'd ultimately like to see change, because if it doesn't happen, the industry will collapse."

Mischa has spoken with his colleagues at other operators, to promote the idea of mentorship. "They've said that there's lots of times when there's a front seat open. So why not throw a 100-hour pilot up there? If everybody starts thinking of the bigger picture of what this industry is going to look like in 10 or 20 years, then maybe we can make it happen."

And maybe the two brothers can make it happen — but not at the expense of changing the nature of their family-run business.

"You feel it throughout the operation, when the students come in," explained Sancho. "It's not like going into a big university operation, where you have 1,000 people walking around."

"That's something that we really love about what we do, and we don't really want to change."



Howard Slutsken | Howard Slutsken's lifelong passion for aviation began when he was a kid, watching TCA Super Connies, Viscounts, and early jets at Montreal's Dorval Airport. He's a pilot who loves to fly gliders and pretty much anything else with wings. Howard is based in Vancouver, B.C.



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VerticalRewind

Bell HSL-1

written by Bob Petite // photos courtesy of the Jeff Evans Collection

The HSL-1 was the first —and last — tandem-rotor aircraft developed by Bell. Here, ship 12, built in 1954, is flown at Bell's facility to test a hoist.



LOST TO HISTORY

In the early 1950s, the U.S. Navy placed an order for 78 Bell HSL-1s — the first and only tandem-rotor aircraft designed by Bell. But none ever entered operation, and all those that were manufactured have now disappeared.

Ask someone to name a tandem-rotor heavy-lift helicopter, and it's likely the response will include the name Boeing. From the CH-46 Sea Knight and CH-47 Chinook, to the Vertol 107-II and Model 234, Boeing has dominated the tandem-rotor military and civilian markets ever since it entered them with the acquisition of Vertol (previously known as Piasecki) in 1960. But in the early development of tandem-rotor aircraft, there were several manufacturers vying for success with their own designs. For a brief period, Bell Aircraft Company (now known as Bell Helicopter) was among them.

While Bell has made a substantial contribution to the development of tiltrotor technology over the decades, its involvement in tandem-rotor aircraft spanned just one type — the Model 61. The aircraft, which first flew in March 1953, represented Bell's first departure from the single-rotor helicopter design it had produced since 1942. It also became the first helicopter specifically designed for anti-submarine warfare, and was designated the HSL-1 by the U.S. Navy (the "H" stood for helicopter, "S" for anti-submarine warfare, and "L" for Bell Aircraft).

It was developed to combat the perceived threat of the Soviet Union's submarine fleet, which had been growing rapidly since the end of World War II. By the end of the 1940s, the U.S. military had become concerned that its existing aircraft and ships were no longer sufficiently able to detect and destroy submarines. To fill this perceived gap in capability, the U.S. Navy envisioned a new fleet of helicopters that had the endurance to fly long missions away from its ships, and the ability to carry much heavier loads off its aircraft carriers than possible with its existing fleet.

THE NEED FOR AN ANTI-SUBMARINE HELICOPTER

Helicopters had, of course, made a limited appearance during the latter years of World War II (in the form of the Sikorsky R-4, R-5 and R-6 on the U.S. side), but they weren't specifically used for anti-submarine work. In April 1945, as the war reached its last few months, the U.S. Coast Guard (USCG) took the first steps to gauging the helicopter's ability to perform this role, experimenting with a Sikorsky R-6 (designated the HO5 by the USCG) carrying a sonar dome and reel underneath. The trials had limited success. Later, a larger Sikorsky R-5 (HO2S) with an improved sonar and reel was used more successfully in tests in Long Island Sound, New York, and down in Key West, Florida, during 1946.

Further experimental sonar trials began in 1948 using a tandem-rotor Piasecki PV-3 (HRP-1) in Key West. Very high temperatures and problems with the sonar hampered the tests, and during November 1949, one of the HRP-1s crashed into the water. Further sonar trials were conducted using Sikorsky S-55s (HO4S-1s), U.S. Marine Corps Piasecki HRP-1s, and Navy tandem-rotor Piasecki PD-18s (HUPs). Unfortunately, they all failed to produce the required performance for an anti-submarine mission, with insufficient engine power and cooling concerns for operations in high temperatures and humidity.

Following these trials, the Navy issued a request for proposals in January 1950 for a new anti-submarine warfare helicopter. The Navy was looking for an improved, larger, more powerful helicopter, capable of not only detecting and destroying submarines, but

In 1957 this HSL-1 was put into storage in Norfolk, Virginia. It was struck off service with just 225 hours on the airframe.



Bell HSL-1 helicopters during their manufacture at the Bell Aircraft plant in Hurst, Texas, in the early 1950s.



HSL-1 ship 9 was built in May 1954 and kept at Bell Aircraft for testing. It is seen here in tests for mine sweeping development.



also of being used for air sea rescue, transport duties, reconnaissance and patrols, and other related naval missions.

By April, 12 companies had bid on the contract, including Bell, Curtis-Wright/Doman, Gyrodyne, Hughes, Kellett, McDonnell, Piasecki, Sikorsky, Hiller, and several small companies that had never even built a helicopter before. In June 1950, the Bell Aircraft Company's submission was named the winner. This was a real surprise to Frank Piasecki, as his company was the only manufacturer of tandem helicopters in the U.S. at the time.

BUILDING A SUBMARINE HUNTER

The primary job of the Model 61/HSL-1 was to detect, identify, track and/or destroy enemy submarines. It was designed to operate from ships in all weather conditions, and was expected to be used in both a search and an attack role, with two aircraft working in tandem. The HSL-1 was equipped with dipping sonar for tracking, and was capable of carrying both torpedoes and missiles when required to attack.

The HSL-1 was powered by the proven Pratt & Whitney R-2800-50 radial 2,400-shaft-horsepower engine, which was mounted in the aft of the aircraft. This drove a transmission shaft to the front pylon. Attached to each end of the HSL-1's large airframe was a classic two-blade main rotor with a stabilizing bar (as on the Bell 47), which gave the aircraft an overall rotor diameter of 51 feet and 6 inches (15.7 meters). Underneath was a four-wheel undercarriage.

Including the sonar equipment, the HSL-1 weighed 26,500 pounds (12,020 kilograms). It was designed to operate with a crew of four (a pilot, co-pilot, and two sonar operators), and was the largest four-person helicopter Bell had designed to that point. The aircraft had a cruising speed of 98 m.p.h. (161 km/h), and a range of 350 miles (563 kilometers).

The challenge for Bell and its engineers over the next few years would be to bring it into production alongside the Bell 47 line.

A full-size mock-up of the HSL-1 was completed by early 1951 at the Bell plant in Niagara Falls, New York, and this was quickly followed by three prototype XHSL-1 airframes manufactured at its Buffalo, New York, facility. It was about this time that company president Larry Bell decided to move his helicopter operations from Niagara Falls to a new facility in Hurst, Texas. The HSL-1 airframes were shipped to the new plant by rail in late 1951.

The first prototype started ground runs in April 1952, and by December that year, the program had begun taxi test runs. The noise and vibration in the cockpit was particularly noticeable. The first hovering flight, with chief pilot Floyd Carlson and Joe Dunne at the controls, took place at the Amon Carter airport east of Hurst on March 3, 1953.

Flying continued throughout the year, with Bell's engineers gradually improving and correcting the HSL-1's initial problems with low speed and hovering. By December 1953, three aircraft were flying in the air together at Hicks Field, northwest of the Hurst plant. The next month, Dunne and Bill Quinlan flew an HSL-1 700 miles to Elgin Air Force Base in Florida for climatic testing.

A TROUBLED DEVELOPMENT

Around this time, Bell received an order for 78 HSL-1 helicopters for the U.S. Navy. Of these, 18 HSL-1 helicopters were to go to the British Royal Navy.

In early 1954, Bell developed an autopilot system for the HSL-1. Ship 4 — the first production HSL-1 — was used to qualify the autopilot when using the dipping sonar while hovering during

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XHSL-1 ship 2 was a pre-production experimental anti-submarine warfare helicopter. It was eventually retired from service in 1957.



search missions. Testing took place on a lake northwest of the Hurst plant, and the autopilot was a complete success.

Another major success for the program was the development of autorotation techniques, due to the helicopter's high inertia rotors. The testing was completed by Bell test pilot Elton Smith.

However, by mid-1954, it was apparent the overall HSL program was in trouble. Only three production HSL-1s had been built to date, and those were being used by Bell for development work. Maneuvering of the HSL-1 was restricted to a diving speed of 100 knots, the angle of bank could not exceed 45 degrees, and the flight controls were not to be moved abruptly. The Navy felt the program was not moving along as they had expected, and cancellation was a possibility. They decided to wait until the Naval Air Test Center (NATC) evaluations and demonstrations had been completed before making any decisions on the program's future.

Bell delivered its first HSL-1 (ship 6) to the Navy in August 1954, for ferry to the naval test center at Patuxent River, Maryland. Two more HSL-1s followed in late August for service test.

Later that year, the program suffered the loss of an aircraft, when an HSL-1 crashed near the Bell Globe plant north of Fort Worth. The front rotor hit the ground after the ship pitched down, destroying the aircraft, but thankfully all the crew survived.

In February 1955, a Navy HSL-1 (ship 9) was used on a tow testing mission at Corpus Christi, Texas. The aircraft pulled loads at sea, at the end of a 600-foot cable. The tests proved to be successful.

Carrier trials took place aboard the Kula Gulf in March 1955, with the three test center HSL-1s. Flight availability was excellent over the eight days of the trials, but blade folding proved to be a very

labor intensive and cumbersome task, and the size of the helicopter made for a tight fit on the elevator deck. Overall, the HSL-1 performed satisfactorily, and it appeared that the Navy was planning to continue operationally with the HSL-1. By now, Bell was delivering four of the type each month.

In April 1955, ship 13 crashed during a Navy acceptance flight at the Hurst plant, killing one pilot and badly burning the other. The helicopter's nose suddenly dipped during a low hover, resulting in the front main rotor hitting the ground. The aircraft caught fire in the resulting crash.

The HSL-1's introduction into the Navy fleet was held up and then canceled altogether. In July 1955, the Navy officially terminated HSL production after 50 ships were built. None of the HSL-1s were ever used operationally by the U.S. Navy.

FINDING A NEW HOME FOR THE HSL-1

The HSL-1 termination was a real blow for Bell. Deliveries of the aircraft slowed down until early 1956, with others delivered in the fall. Many were ferried to naval air stations in Arizona, California, and Virginia and put straight into storage where they were stricken off, never to fly again.

In 1956, Bell pilot Dick Stansbury demonstrated one HSL-1 to the U.S. Army at Fort Rucker, Alabama. Unfortunately, there was little interest and Bell received no orders from the Army. Bell came up with the D216 proposal — a three-engine turbine version of a larger Model 61 — for civil use. They contacted New York Airways, but again, there was no interest from them or other commercial operators.

Five HSL-1s were taken out of storage and used in a Navy

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Three HSL-1 helicopters in flight at Hicks Field north of the Bell plant in Hurst in late 1953. Two of the HSLs have experimental dorsal fins attached.

minesweeping program from March 1957 to late November 1959 in Panama City, Florida. The last production HSL-1 was kept at Bell until 1959, when it was used on a small Navy contract to test stability improvements. It eventually ended up in San Diego, California, at naval air station North Island.

A HSL-1 helicopter was reported to have been shipped by rail to Fort Rucker in 1960 for display at the Army Aviation Museum. But, as it was not an Army helicopter, the museum was not interested in it. The HSL-1 ended up in an aviation trade school outside the Army base, and eventually discarded in a field near the Dothan, Alabama, airport. It soon disappeared.

Another HSL-1 supposedly ended up at a commercial helicopter operator's facility in Texas. The owner had plans to convert it with a water tank for use on firefighting operations on the west coast. But, like all the other HSL-1s, the final fate of that aircraft remains unknown.

Sadly, no HSL-1s appear to have survived to this day, leaving little evidence of Bell's short-lived foray into the tandem-rotor helicopter sector.

If you have information on the whereabouts or final disposal of an HSL-1, please contact the author through Vertical editor-in-chief Oliver Johnson (oliver@mhmpub.com).



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Bob Petite | Bob is a member of the Twirly Birds, AHS International, the Canadian Aviation Historical Society, the American Aviation Historical Society and the Bell 47 Helicopter Association, Inc. He is the author of *The Bell 47 Helicopter Story*.



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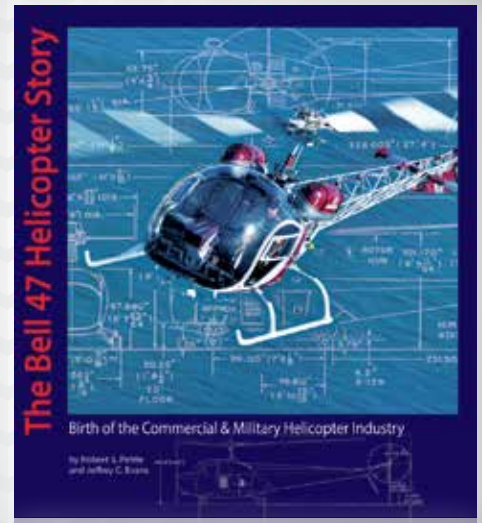


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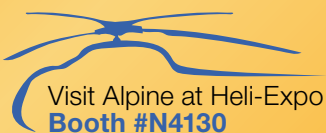
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There I Was...

written by Dorcey Wingo

Vester the Molester

Vester L. Thompson was a Warrant Officer Candidate whom I met while assigned to WOC Class 68-523, Fort Wolters, Texas. This was way back when, and we were being trained to fly "The Truck," our affectionate name for the Army's "Raven," the Hiller OH-23D.

All of us guys with last names near the end of the alphabet somehow got lumped into flying Hillers, unless they were height-impaired, whereas the Army squeezed them into tiny Hughes TH-55 "Mattel Messerschmitts," and they were just as happy as we in our trucks.

Vester seemed to be in every class and onboard every bus we candidates rode to the farther-out heliports around Fort Wolters. Candidate Thompson had prior service before getting into flight school, as did I, so it was natural for us "old guys" to hang out together and shoot the breeze.

One more thing Vester and I had in common was our accents. I had grown up in north-central Texas and he was from Louisiana, so we tended to talk through our noses — especially if we were talking to (or about) each other. It seemed natural to call him "Hillbilly," among other things.

Somehow, Vester and I made it to the point in our flight training syllabus that called for a night cross-country flight of some magnitude. Since our instructors were way too smart to fly with us on such a risky venture, they allowed one of our fellow candidates to occupy the right seat of the Hiller, believing that we would learn something from it, and hopefully keep each other awake.

An assembly took place before takeoff. The briefing officer stood before us, fresh from having the morning off and pleased to have his class reach a milestone in training, with zero accidents. Following his summary of weather and hazards-to-flight, we were assigned flying buddies.

I drew Vester. By then, almost everyone called Vester "The Molester," poor fellow. Nicknames were something you lived with in the military, and it doesn't matter if you've never molested anyone or if you were called "Dorky Bingo" your whole life. Thin skin will get you nowhere.

Having The Molester as a stick-mate for my night cross-country was a relief. I feared I'd get one of the airline or ag pilots in our midst, guys who already had commercial

licenses and were just doing their patriotic duty, like the rest of us. They wouldn't be *near* as much fun.

Takeoff occurred near sundown to give us candidates some time to adjust our prying eyes and get on course over Texas's flat, undistinguishable terrain. It also gave Vester time to get his gigantic map folded so he could navigate us safely to places like Desdemona and beyond.

If you've never been on a long cross-country flight over flat, undistinguishable terrain at night, I can tell you that it invites conversation. When not switched to the local Unicom frequency, I selected "intercom" and we pretended to be two idiots, out for

a helicopter ride. At night. With no moon.

Without boldly painted names on municipal water towers to navigate by, pilots need reassurance from time to time that the ship is on course. And navigators need their pilots to agree with their navigating. But neither of us were actually "pilots" yet. So, when in doubt, we followed the rotating beacons of our brothers in arms ahead of us.

Not actually being pilots did not stop us from conversing like aviators and navigators, however. Between *Vester the Molester* and *Dorky Bingo*, there was plenty to be criticized concerning our magnetic course versus our true course, the height of multiple transmission antennae in our path, and the amount of thick, hard, bone in one or the other's skull.

It was likely somewhere high over Hico that I touched a nerve, reminding my opinionated navigator that he was also a hick, so why didn't we land and have some supper with his kinfolk?

Vester was not about to be undone by anybody from Texas and lit into me about my lousy flight control technique, comparing me to a bull in a china closet. In doing so, he bumped the cyclic control with his poorly-illuminated map, jostling said Hiller and giving me cause to describe his ham-fisted paws in highly unflattering terms.

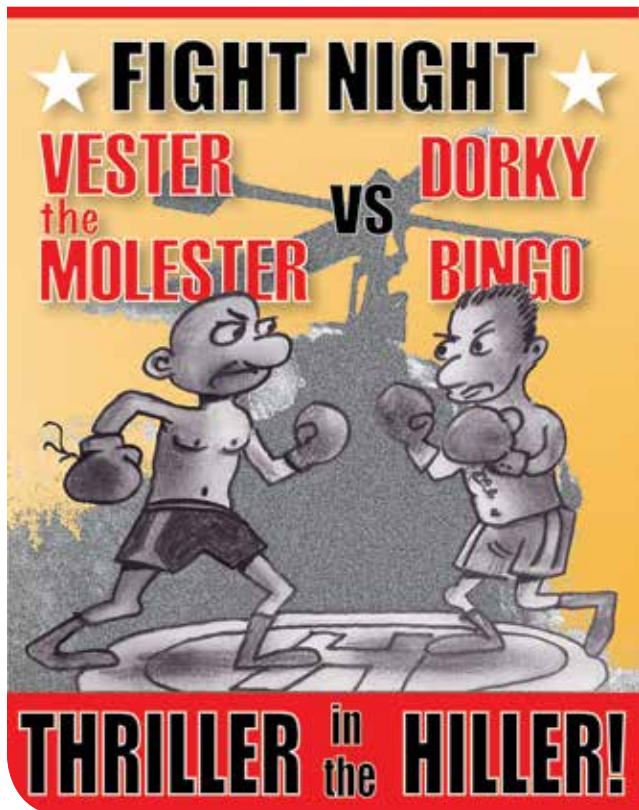
After another colorful discourse on our return leg to Mineral Wells, I faintly heard someone radio, "Hot mic." I glanced at the panel's transmit selector. It was pointing at the radio's Unicom frequency, not the intercom, where it shoulda been! "Uh oh."

Somehow, Vester and I made it back to the main heliport at "Miserable Gulch," or Mineral Wells, as the locals had it. Landing light on, I hovered down long parallel rows of identical, tied-down Ravens to our starting point, and shut 'er down. Invigorated by our night-flying experience, we followed several flight-suit clad candidates filing back into the debriefing room.

We were called to attention as the briefing officer entered the room. It was the same briefing officer who saw us off hours earlier, but he appeared to have had a hard night — a tattered flag after a tornado.

He told us to take our seats. His critique was short and sweet: We were all back "safe and sound. Mission accomplished. *Except for one thing,*" he hesitated, looking us over. "Candidates Thompson and Wingo need to find new stick-mates."

Chris Rohrmoser Illustration





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“I have been operating Bell 206's since 1996 and am currently an owner, pilot, and licensed mechanic. I have Van Horn Aviation tail rotor blades on all of my helicopters. The VHA blades are manufactured with 21st century technology, and most importantly to any operator who plans to stay in business long term, the cost per hour of operation drastically decreases. I am very pleased with my VHA rotor blades.”

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