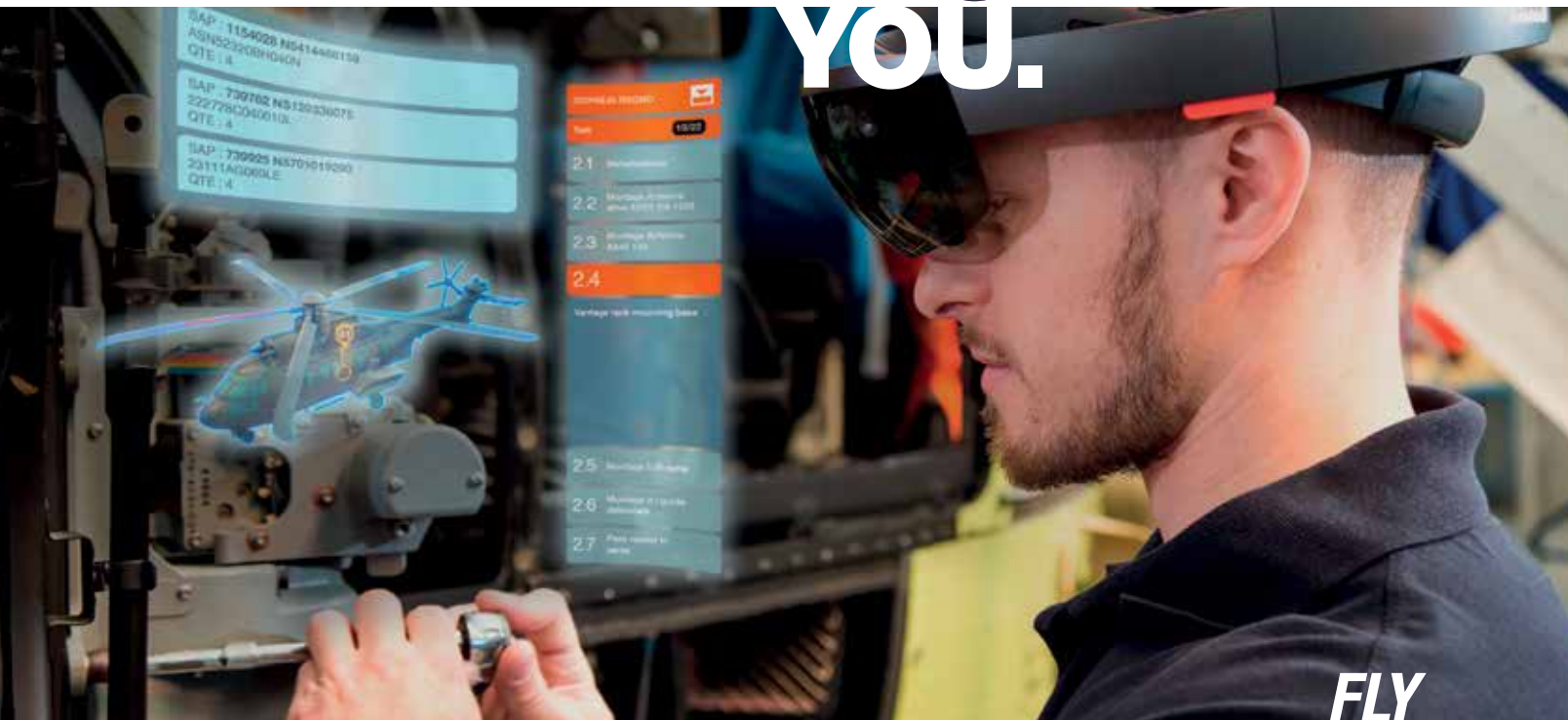


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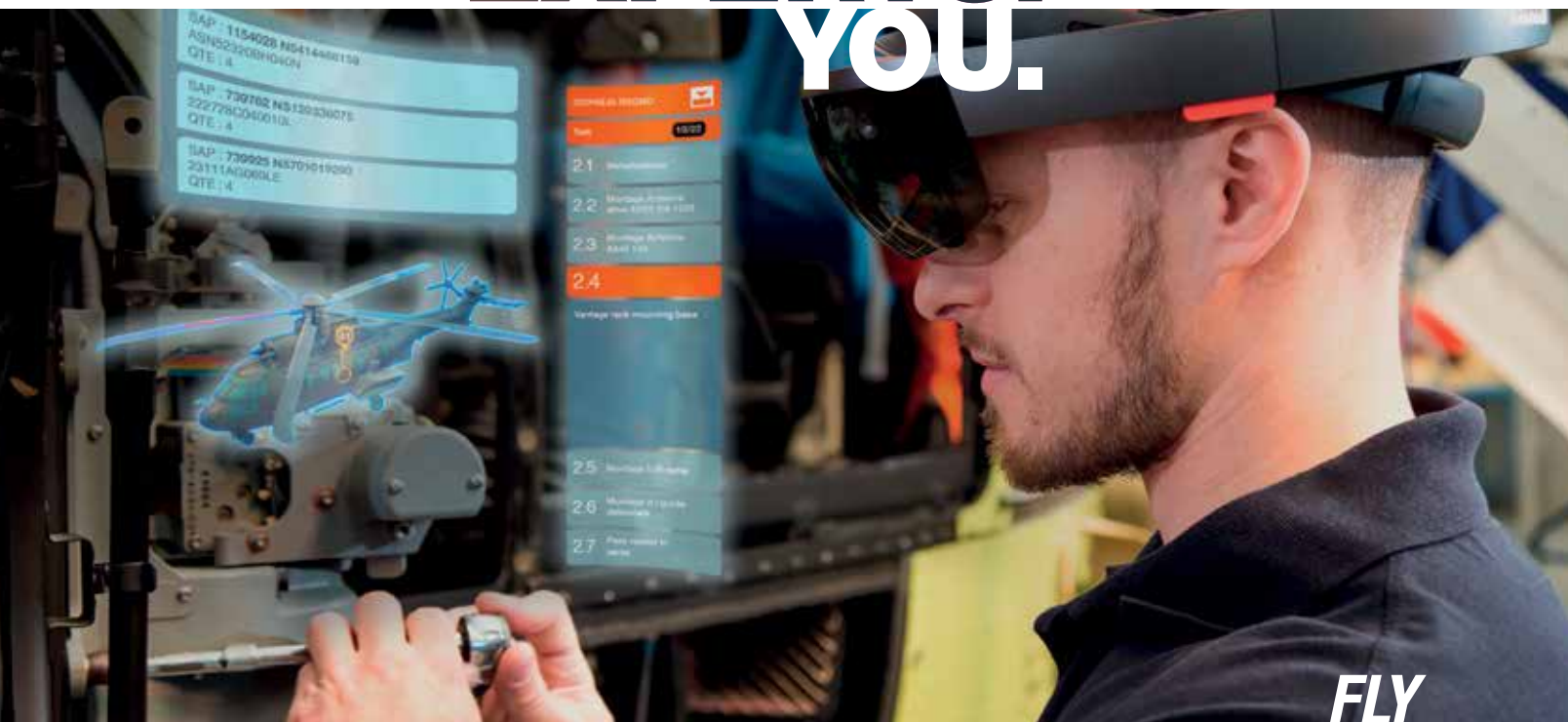
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TALKING POINT // IAIN HOLMES



There is a special balance between getting a new pilot fully operational and allowing them time to settle into their new position. Although the majority of pilots hired into the air medical transport industry have a significant amount of flight time, it does not mean they would feel comfortable performing the same flights as their colleagues who have five years of air ambulance experience. Providing time for new-hire pilots in any sector to become acclimatized to their environment is essential; for various reasons, this is even more important and potentially challenging in the air medical transport environment.

One large U.S.-based air medical transport provider, which predominantly operates single-pilot, has published its onboarding process. New pilots receive six days of ground school and six to 12 hours of flight experience before reporting to their base. At their base, they receive a couple of days with the base lead pilot reviewing the area and conducting a day and night familiarization flight.

While this organization boasts that it provides superior training compared to other U.S. air medical transport operators, its training program is only around a third as long as the training that major U.S. airlines provide to their new pilots. Beyond the onboarding period, airlines have other mechanisms to ensure gradual growth that are not available to single-pilot operators. These include not allowing pilots who are both new on the aircraft to operate together, and having some airports where only the captain can conduct the takeoff and landing.

While both major airlines and air medical transport companies have identified the need for comprehensive onboarding, there is one unique factor that should provide an advantage to the air medical transport industry: the framework for making high-functioning pilots

and clinicians is remarkably similar. In the late 1970s and early 1980s, on behalf of the U.S. Air Force, Stuart and Hubert Dreyfus researched how to train new airmen to become expert pilots. They determined there were five stages of skill acquisition: novice, competence, proficiency, expertise, and mastery.

At approximately the same time, nursing theorist Patricia Benner was looking into how nurses gain competence and become experts. She identified five remarkably similar levels of nursing experience (novice, advanced beginner, competent, proficient, and expert). The similarities didn't end there. Both the Dreyfuses and Benner believed that one needs to progress systematically through these stages, gaining experience, knowledge, and skills at each level before progressing. Likewise, both suggested that experiential learning, gained from functioning in the work environment and among colleagues, is essential for progression.

While the similarity of progression between these groups of professionals should benefit the air medical transport industry, there are some differences that make things more complicated for single-pilot operators. Unlike single pilots, clinicians working in a dyad have the benefit of being paired up, where an advanced beginner can work alongside an expert. However, there are ways to support single pilots even though their function is predominantly independent.

Many organizations that operate single-pilot require novice air medical pilots to utilize the assistance of the operational control center, especially when their risk stratification system suggests a higher-risk flight. Additionally, the Commission on Accreditation of Medical Transport Systems (CAMTS) recommends higher weather minimums for new or relief pilots as a way to mitigate risk for less experienced crewmembers. Approaches like these help single pilots grow into their positions, and all new hires should be educated and supported in the use of these tools.

As mentioned previously, master certified flight instructor Max Trescott has pointed out that accidents are correlated more strongly with experience by aircraft model than with total flight experience, and decrease after 100 hours on model (see p.6, *Vertical 911, AMTC 2018*). While this number is only a guide, it provides insight into the journey pilots take from novice to expert and should encourage operators to consider pilots with less than 100 hours on type, or new to air medical missions, as novices and treat them accordingly.

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to support single
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predominantly
independent.
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Considered properly, the similarities in professional development between flight operations staff and clinical staff can be an advantage for leadership teams in air medical transport companies. These fundamental similarities enable uniform communication, development of resources, and organizational culture, even with respect to two completely different skill sets. Another critical aspect of employee development, just culture, also lends itself to be implemented across skill sets.

As the International Civil Aviation Organization (ICAO) describes it, a just culture is “one in which all employees are encouraged to provide, and feel comfortable providing, safety-related information. It is an environment in which employees understand they will be treated justly and fairly on the basis of their actions rather than the outcome of those actions, in the case of positive, as well as negative safety events. A just culture recognizes that systemic factors (not just individual actions) must be considered in the evaluation of safety performance and interpretation of human behavior. A strong just culture in each aviation organization is perceived as the basis for a successful safety culture.” This is almost identical to the definition of just culture advanced by The Joint Commission for clinicians.

The similarities between developing expert flight and clinical staff in a manner that creates a robust corporate culture should be exciting to all of us in the industry. One goal should be for pilots to understand that their new clinicians will take longer to retrieve and load the patient, and for clinical crewmembers to provide the same grace when their new pilot requires longer to launch or assess the landing zone. Together we can onboard our teams in a manner that, with time and encouragement, will result in an industry full of experts performing their life-saving work, without undue risk to themselves and their patients. 🚑



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FOCUS ON PROFESSIONALISM // TONY KERN



“

Personal mastery requires a thick skin and the relentless pursuit of weakness across all areas of our lives. It is hard work.

”

A striking number of people — myself being one of them — begin each new year with a list of things they personally hope to accomplish over the next 12 months. Some call them *resolutions*, others simply *goals*. But no matter what you call them, there is one simple truth to help you achieve them. A truth so basic that it confounds me as to why it defies the common wisdom in our industry.

No one else can make you better.

Before all the mentorship and culture zealots demand my excommunication from the aviation church or pull out the torches and pitchforks to slay the infidel, let me expand on this just a bit. No one doubts that organizations, cultures, and mentors play a role in our development. They encourage, role model, support, and set conditions to allow us to grow. But at the end of that list sits each and every one of us who must consciously engage — or subconsciously surrender — to the call to get better.

The new year is a perfect time to develop this conscious engagement. Many of us have taken that vital first step, *goal setting*. But to achieve these laudable aspirations, we often have to change our mindset on what makes us better. Common myths abound.

We naturally get better with experience. This is only true if we seek to get better by rigorous and honest self-assessment. Finding the smallest of errors and correcting them. Or seeing a new technique and practicing it until it becomes a part of our normal routine. These are conscious actions that must overcome our egos, apathy, and complacency. In first response aviation, we encounter a new situation and challenge nearly every time out. Let's commit to making each of these a true growth experience.

Training will make me better. Training and learning are different things. For training to improve our performance, it must be taken seriously, internalized, and changes must be made to the way we do things, even how we *think* about how we do things. Repetition alone won't do it, and in fact can bake in bad habits if we don't root them out. I've recently reviewed a couple of fatal mishap briefs where trained personnel were unable to execute standard and emergency operating procedures at

the moment of truth. One wonders how seriously they took their last training session where these were practiced. There is a reason why we don't always take our training seriously.

I'm already good enough. This is the toughest nut to crack. Humans have a natural tendency to view themselves as better than they really are. We don't see the minor flaws (or major ones) and this personal performance blindness renders us impotent against backsliding. This can be especially true in first responders. You routinely save lives and have scores of positive outcomes. The success of the mission can inhibit our ability to look for the things we could have — and should have — done better. We tend to do this as a coping mechanism to avoid feeling negative about ourselves or our performance. In the absence of negative outcomes we tend to tell ourselves comfortable stories about our adequacy, and in the presence of positive outcomes, about our excellence.

Personal mastery requires a thick skin and the relentless pursuit of weakness across all areas of our lives. It is hard work. It requires great courage and even greater perseverance. It is the mark of true Level III and Level IV professionals, those who practice increasing levels of precision to grow where they are with the resources at hand, Level III, and upon reaching that level, give back to others as mentors and role models, Level IV (see p.6, *Vertical 911, Summer 2018*).

The ultimate payback for pursuing mastery might be another life saved, perhaps even your own and those of your crewmates. But there is also the personal satisfaction that comes with leaving no stone unturned and the willingness to look into the dark places of personal and professional weakness. A final benefit will come many years from now, when you look back at your career and see that you left a legacy of wringing every drop of excellence out of your potential and the wonderful opportunity we were given to be a part of this great industry.

Let's set one more goal for 2019. To embrace the simple truth that "if it is to be, it is up to me."

Happy New Year! 🍀

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HAA CORNER // BILL WINN



Many organizations could benefit from a clearly defined approach to transform their SMS from a statement of desired outcomes — such as “Safe Operations” or “Zero Harm” — to a set of concrete processes and actions designed to assure those desired outcomes.



The complex structure of the air medical transport system entails an equally complex set of physical and systemic risks that must be recognized and controlled to assure the safety of patient transport operations.

I think most air medical transport crewmembers would agree that they generally spend most of their time at the lower end of the total span of risk levels, performing patient transports that are somewhere between boring and only mildly challenging. That fact can be a major factor in breeding the complacency that leads to disaster when a flight crew unexpectedly encounters conditions at the higher end of the combined-risks scale.

An effective safety management system (SMS) begins by identifying each of the physical *and* systemic hazards that exist in our operational environment — along with the many ways that these hazards may combine to produce a higher, or even patently unacceptable, level of risk. The next step in designing the SMS is to identify effective controls to mitigate the individual hazards as well as likely combinations of hazards that may occur.

An important part of the process of evaluating and selecting controls is to also identify any obstacles that might interfere with the application of these risk controls. Obstacles for effectively applying controls may require diverse remedial actions in different domains of the organization. Such actions might include classroom training and simulations, along with effective use of available technology and attention to cultural elements such as communication, conflict resolution, event reporting, quality assessment, and improvement measures; with all elements under an umbrella of proactive management processes.

This partial overview of a safety management system is given to highlight the fact that, in its own way, an SMS can be nearly as complex as the system of risks that it is designed to mitigate. The process

of designing, implementing, maintaining, evaluating, and continuously improving the SMS can be overwhelming to any organization unless a carefully designed system of safety management processes is developed, implemented, and faithfully executed.

So, what does an effective SMS look like and how does it work? What are the components? What are the responsibilities of each person involved? Who oversees what? And most importantly, what are the concrete actions required to assure safe operations, and who is to perform which actions?

I fear that too many of us operate in environments that fall short of providing clear answers to these questions. Many organizations could benefit from a clearly defined approach to transform their SMS from a statement of desired outcomes — such as “Safe Operations” or “Zero Harm” — to a set of concrete processes and actions designed to assure those desired outcomes.

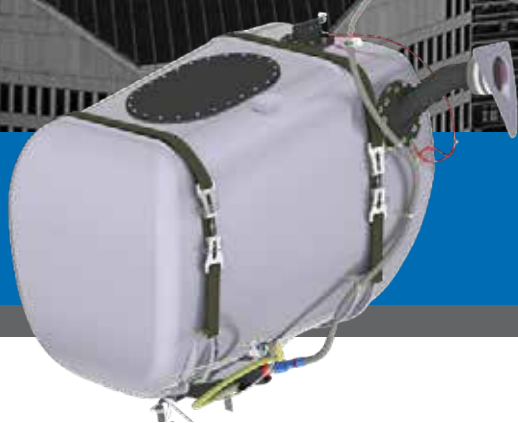
I recently reviewed a book that does an excellent job of defining the processes that individuals and organizations (including families!) must use to assure that the actions required to produce any desired outcomes are identified and implemented in a proper and timely manner. That book is *Getting Things Done: The Art of Stress-Free Productivity*, by David Allen. It describes a system for designing and completing critical projects that is a natural fit for taming the complex issues that are endemic to the air medical transport community.

In future HAA Corner discussions, I hope to outline the step-by-step application of this planning model to the design and application of an SMS model for air medical services. 🚑

Bill Winn is the general manager of the National EMS Pilots Association.

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It must be tough to be the director of operations (DO) or chief pilot (CP) of a helicopter company. My old friend and mentor Clark Kurschner — who was a long-time DO for Omniflight Helicopters and extremely Yoda-like — told me once that playing beach volleyball was his only escape from stress and worry.

These positions within a certificate-holding aviation company are required by regulation, and for good reason. The gravity-like pull towards lower costs and greater profits could easily lead to a culture of cutting corners; the DO and CP have to stand up and hold the line for safety. Any company that can cut costs has a leg up on the competition for contracts and resources. One of the easiest places to cut corners is in the realm of training, and someone with a business background may not understand how important training is.

On the other hand, more — and more expensive — training isn't always better. While preparing for a leadership job in 2004, I learned that South Carolina demanded a helicopter air ambulance pilot have 25 hours of pilot-in-command flight experience in the make and model of any helicopter they would be flying within the state.

We were going to operate a Bell 230 and a Bell 206 and were looking at having to fly a tremendous number of non-revenue hours. I called the state's Department of Health and Environmental Control and asked where that rule came from. The state's guy had no idea, so I wrote a letter asking for relief from that rule so that we might more quickly offer life-saving services to the state's citizenry.

We got the hours required down to 15 per pilot per machine, and saved the direct operating costs of over 100 flight hours. None of us six pilots ever crashed because

of the hour reduction South Carolina permitted us. In fact, in the majority of instances when a pilot crashes an aircraft, it has nothing to do with their flight experience or technical proficiency. It most often comes down to how pilots *feel* about the situation they find themselves in. Even in instances of death by lack of skill, the situation that *required* the demonstration of the lacking skill was most often created by attitude.

Attitude is a non-rational mix of behavioral inputs from the cognitive and emotional components of our personalities. And to be sure, "the way we do things around here" drives attitude as well. As it turns out, many pilots (and business executives) are loath to delve into the touchy-feely world of feelings and attitudes. As a retired Delta pilot with whom I was recently sharing beers said, "That *stuff* don't matter!" Taking nothing away from our conversation and sharing of flying-lies, and his cold beer: I disagree. I believe to the extent that we can affect attitudes, *we can stop helicopter pilots from crashing helicopters*. And right after a crash is when it must *really* suck to be a DO or CP.



The good news is that shaping attitudes has zero direct operating costs, and you will never bang up a helicopter providing what the FAA calls 'soft skills' training.



As you prepare a training plan and budget for the pilots you employ, consider that the technical skills you seek to instill, reinforce, or verify in your team — while extremely important — are likely not going to be what prevents you from having to explain why your helicopter crashed and left dead bodies on the ground. While you must comply with what the rules require, and such compliance is very expensive, the good news is that shaping attitudes has zero direct operating costs, and you will never bang up a helicopter providing what the Federal Aviation

Administration calls "soft skills" training.

So where do you start? Well, first of all, if you aren't familiar with crew resource management (CRM) training, open up your mind and get with Google. Learn the basics: what works and what doesn't. Seek to understand group dynamics, the power of social settings, and the influence of charismatic leadership. Know that the relationship between CRM "facilitation" and attitudinal change is elastic.

If you *tell* me that the way I feel about something is wrong, even if you show me evidence and examples and valid information, I may well refute your efforts. And then, over time, I may come to see things differently — and that's what you want! We don't want a pilot to simply recite safety and success, we want a pilot to live and breathe safety and success, in the interest of living and breathing.

CRM "facilitators" don't try and tell others how to feel — facilitators let others evolve their own feelings at their own pace, because that's the only way it happens. I use the terms facilitator and instructor interchangeably, because a good one will seamlessly switch from one role to the other during a session, as the situation, level of understanding, and personalities demand.

You probably have people in your company who would be great CRM instructors, and they may or may not be pilots from your flight standards section. They may not even be pilots! My friend Randy Mains conducts CRM instructor training courses several times a year. His week-long preparation for the job is excellent, especially for someone unaccustomed to standing up and delivering to a group. Randy employs the crawl-walk-run style of learning, and it works magnificently.

I know this because after being a CRM instructor myself for several years I went and spent a week with him and several other students. I was part of the group dynamic. I was influenced by the social setting. And I experienced charismatic leadership as displayed by two young women just starting their careers as pilots. I influenced them, and they influenced me, and we were all better for it. Sami and Grace will doubtlessly make our industry more safe and successful thanks to their dedication to CRM principles.

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Norway AW101 accident report cites human, organizational factors



The Norway Accident Investigation Board found that ambitious timelines for the acquisition of Norway's new AW101 rescue helicopters created persistent time pressures for all parties involved. **Lloyd Horgan Photo**

BY GERRARD COWAN

The Norwegian Accident Investigation Board (Statens havarikommisjon for Forsvaret – SHF) has highlighted the role of human and organizational factors in an incident in November 2017, when a AW101-612 rescue helicopter rolled over during start-up.

The incident occurred on Nov. 24, 2017. It involved the first Leonardo AW101 Norway had received, part of 16 helicopters intended to replace the Westland WS-61 Sea Kings in service with the Royal Norwegian Air Force (RNoAF).

The aircraft was being operated by the

operational test and evaluation (OT&E) AW101 unit. Two pilots were seated in the helicopter when it rolled onto its right side outside a hangar at Sola air base, the SHF stated. While no one was injured in the incident, the platform suffered comprehensive damage.

According to the SHF, the incident occurred during a ground run of the helicopter's engines following a compressor wash. The investigation showed that the collective was in a higher position than usual when the rotor was accelerated. This meant that "the rotor blades were at an angle of attack capable of producing a significant amount of lift," the SHF stated. "Because the rotor was accelerated using

two engines rather than one, it achieved full rotational speed. The combined forces from the main rotor and the tail rotor were sufficient to make the helicopter roll over."

The report said that over time, ambitious timelines for the acquisition of the new rescue helicopters, combined with delays in the helicopters' development, "created a situation of persistent time pressure for all parties involved." This time pressure, as well as the ongoing development of the platform, the training aids, and documentation, "caused challenges in regards to the training that pilots and other personnel from OT&E AW101 received from the provider."

When combined with the fact that a number of the pilots lacked the experience and continuity that the training program was based on, this led to known and unknown shortcomings in the pilots' skills and competencies after completing training, the report stated. "The constant demand for progress negatively affected quality assurance in various parts of the organization, and contributed to elevated and unidentified operational risk," it added.

The report stated that no unknown or sudden technical malfunction contributed to the incident. It said that "a number of human and organizational factors contributed to the incident developing without anyone identifying or correcting the deviations," such as shortcomings in the crew's system knowledge and experience with the AW101-612, insufficient risk awareness, shortcomings in the training received, deviations from the checklist, and imprecise checklist wording.

After the incident, the RNoAF cancelled operations with the AW101 in Norway until further notice, and began an additional training program for OT&E AW101 personnel, the report said. Changes were made to the unit's organization, including the addition of two new crews. Planned, complementary training was given by the helicopter provider, while the RNoAF "took measures to clarify and strengthen the role of the Air Force part of the project organization in shielding, supporting, and supervising the activity of OT&E AW101."

Additionally, the country's Inspectorate of Air Operations gave increased priority to the AW101 by increasing staffing in the helicopter department and performing inspections of OT&E AW101.

The accident investigation board compiled a list of safety issues related to the incident and to the broader organization associated with the acquisition and operations of the AW101. It also made recommendations that could help improve safety in the armed forces, several of which have been addressed through the measures already taken.

There is still reason to consider additional measures for some recommendations, including — but not limited to — quality assurance of the technical documentation of the helicopter and the role of the defense sector in the project board, the report said.

ADAC TO TEST MANNED

MULTICOPTERS FOR EMS



ADAC Luftrettung will study the potential use of Volocopter eVTOL aircraft as shuttles for emergency doctors. **ADAC/Volocopter Image**

The German eVTOL company Volocopter has announced that the charitable air rescue organization ADAC Luftrettung will explore potential uses for manned multicopters in emergency medical services (EMS).

Starting this spring, the Institut für Notfallmedizin und Medizinmanagement (INM, Institute for Emergency Medicine and Medical Management) at Ludwig Maximilian University in Munich will use computers to simulate aeromedical missions using Volocopters in two regions in Germany. Volocopter and ADAC also intend to conduct initial research flights this year as part of their study on the feasibility of using multicopters for EMS.

Volocopter's eponymous multicopters, which are electric-powered and based on drone technology, are already being trialed as potential urban air taxis. Within the framework of the ADAC study, they will be specifically adapted as air shuttles for emergency doctors, with the object of getting the physician to the patient faster than can be done by rapid response vehicles.

"The Volocopter is based on a technical platform permitting its diverse and reliable use as an air taxi, heavy lifting drone, or in rescue missions," stated Florian Reuter, CEO of Volocopter, in a press release. "I firmly believe in the Volocopter's potential for large-scale use as an air shuttle for emergency doctors, and I look forward to our joint systematic validation with ADAC air rescue."

Frédéric Bruder, managing director of ADAC air rescue, described the study as the dawn of a new age in air rescue. "Fifty years ago, ADAC was among the first in Germany to field test the use of rescue helicopters. Consequently, it is only logical for us to be the first to lead German air rescue into the future with new technologies."

Scheduled for 1.5 years, the feasibility study will cost approximately €500,000 (US\$570,000). The charitable ADAC foundation is supporting the study in connection with its funding priority of rescue in life-threatening situations.

"Our goal in supporting this project is to improve emergency medical care, thereby making an important contribution to the future of the EMS system," stated Dr. Andrea David, managing director of the ADAC foundation. Scientific support for the project comes from the German Aerospace Center (DLR), which has collaborated with ADAC air rescue on previous research and development projects.

Volunteer coder helps Coast Guard respond to hurricanes



Software developed by volunteer coder Greg Sadetsky for Hurricane Harvey was also used by U.S. Coast Guard crews responding to Hurricanes Florence and Michael. **USCG AST3 Chris Hale Photo**

BY ELAN HEAD

When Hurricane Harvey slammed into Texas in August 2017, Lt. Nathan Shakespeare was one of the U.S. Coast Guard pilots called to respond. The H-65 Dolphin pilot — who currently serves as a standardization pilot at the Coast Guard's Aviation Training Center in Mobile, Alabama — was assigned to fly nighttime rescue missions out of Ellington Field in Houston, and he quickly realized what he was up against.

"It was super challenging flying," Shakespeare recalled of low-level flights through the obstacle-rich urban environment in darkness and driving rain. "We definitely recognized that flying at night was very high risk and we needed to iden-

tify high gain cases to warrant going out." But finding those cases wasn't easy. Sector Houston-Galveston's connection to the Coast Guard network was knocked out shortly after Harvey made landfall, and in the confusion attending the storm, Shakespeare suspected that some urgent rescue calls were slipping through the cracks. Awake in his hotel room at 3 a.m., Shakespeare, a self-described "computer guy," did an online search for "Harvey rescue map."

He found one. A loosely organized group of volunteer coders had developed bots to crawl through Facebook and Twitter, looking for calls for help from victims of Harvey. When they found them, the requests and corresponding location data were stored in Google Drive, and other coders were

using this information to create real-time maps. One of them was Greg Sadetsky, a Canadian software developer who co-founded a mapping startup that was later sold to Apple (and whose software was used for the NORAD Tracks Santa website, among other projects).

"It was really cool because it was so aggregated," Shakespeare said. "I was sitting in my hotel room watching cases come in and they were very clearly high gain."

Shakespeare reached out to Sadetsky, initially to ask whether he could convert the position data he was using from a decimal degrees format to the degrees decimal minutes format used by Coast Guard aviation. But when Sadetsky volunteered to help even further, the two began collaborating on a custom, cloud-based mapping

solution for Coast Guard flight crews that could be accessed from tablets and other mobile devices.

“We added a lot of organizational elements,” Shakespeare explained. For example, the Coast Guard was initially sending flight crews out on medevac missions with printed lists of hospitals, from which they had to determine the closest or most appropriate facility for the patient. Not only was this difficult to do on the fly, “version control was a major issue,” Shakespeare said.

Sadetsky developed a hospital layer for his map that showed crews at a glance where they were in relation to local medical facilities. Unlike printed lists, this layer could be updated in real time; if a certain hospital reported that it had run out of pediatric beds, that information would instantly be pushed to all users of the map.

Other layers showed the locations of safe landing zones and no-fly zones. “Radio comms for managing 37 helicopters instantly got a ton easier,” Shakespeare recalled. Sadetsky also helped the Coast Guard implement a real-time list of air-borne helicopters and their current tasks, helping dispatchers keep tabs on flight crews and assign missions appropriately.

Between Aug. 28 and Sept. 1, 2017, the mapping tool was used to coordinate more than 700 aircraft sorties that resulted in the safe evacuation of more than 1,700 people, in addition to critical patient transfers and blood deliveries to overstrained hospitals. In May of this year, Sadetsky was honored for his contributions with the Distinguished Public Service Award, the highest public recognition awarded by the Coast Guard.

In presenting the honor, Rear Adm. Michael Haycock described Sadetsky’s contributions as “an absolute game changer. His software dramatically improved situational awareness.” Meanwhile, Shakespeare, Auxiliariast David Hoffman, and Lt. Cmdr. Andrew Greenwood were recognized with the Coast Guard’s Innovation Award in the Operations or Readiness category, thanks to their contributions in implementing the cloud-based mission management platform for the response to Harvey.

But the story doesn’t end there. As Hurricane Florence approached the coast of North Carolina in September, the Coast Guard crews who were preparing to respond to it reached out to Shakespeare

for more information about the mapping system. With Sadetsky’s help, they were able to have a solution up and running by the time rescue efforts began.

“As cases came in we were ready to go,” Shakespeare said, noting that because the system was cloud-based, the Coast Guard was able to readily share access with National Guard helicopter crews who were operating in the same area. Just a few weeks later, the system was also deployed in response to Hurricane Michael in Florida. Building on his previous work,

Sadetsky added some new features to his product this year, including the ability to draw polygons of any shape to define operational areas, and a method for detecting duplicate calls based on GPS coordinates.

For Sadetsky, his volunteer work for the Coast Guard is something that he has been “proud and happy” to undertake — and he hopes that his software can help save even more lives in the future.

“I’d love for it to become something that’s part of the Coast Guard arsenal,” he said.

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Air Methods senior mechanic honored by HAI after 5 decades of service



Air Methods airbase lead mechanic Thomas "TJ" Hall has dedicated five decades to supporting the helicopter industry. **Air Methods Photo**

BY DAYNA FEDY

Each year, Helicopter Association International (HAI) recognizes several individuals for their positive contributions to the helicopter industry.

This includes the personnel who work on the front lines, the pilots and instructors who spend most of their time in the air, and those who work behind the scenes to keep aircraft flying.

HAI's Excellence in Helicopter Maintenance Award, sponsored by Rolls-Royce, is awarded to an individual for longstanding excellence in helicopter maintenance, maintenance instruction or supervision, or a single significant contribution to helicopter maintenance.

This year, Thomas "TJ" Hall, airbase lead mechanic at Air Methods, has been honored with the award. An industry veteran, Hall has dedicated five decades to supporting the helicopter industry, and over two-and-a-half decades to helicopter maintenance on the air medical side.

"I'm standing here thinking about all the years that have been put into this and wondering, 'How many people really put 50 years into one career in their life?'" said Hall. "It's an honor to receive this award."

Hall started his career in aviation at 20 years old when he joined the U.S. Marine Corps at

the height of the Vietnam War in 1968. After going through school with the Marine Corps, he spent 12 years as a helicopter mechanic and crew chief with the force.

He then transitioned to the civilian side, obtaining his Airframe and Powerplant (A&P) certificate and going to work on a contract at Naval Air Station Whiting Field in Florida. From there he was hired by Era Helicopters to work in the oil industry, and eventually made his way into the air medical industry in 1992 after joining Air Methods, where he remains today as a base lead mechanic.

"There's a certain populace of people that do EMS work, especially the field mechanics. . . . We're out here by ourselves and we have to be able to think on our feet, troubleshoot whatever issue is at hand and put a fix to whatever we find to get aircraft back into service in a safe and economical manner [to] provide the service for the industry and the hospitals," Hall said.

Hall believes this award gives him a voice to speak about the changes he's seen in the air medical industry over the last 26 years — how it has advanced and how maintenance safety practices have changed to date.

"When an aircraft went out of service, you started working on that aircraft and you didn't leave until you were finished," he explained. "[Whether] it was 24 hours or 36 hours — whatever it took to get the aircraft back into flying status. . . .

"Nowadays, we're restricted to a 14-hour day [with permission]. But after about 14 hours your body doesn't function as well and your thought process and your mental processes are diminished drastically."

Through his 50-year career, working on roughly 18 to 20 different airframes and over 100 helicopters total, Hall has seen first-hand the technological advances with rotorcraft over the years.

"From the old aircraft that I worked on in the Marine Corps compared to the aircraft I've been working on now... the electronics and the computerization — there's a world of difference in the aircraft today than when I started out 50 years ago."

The opportunity to continuously learn about the aircraft and the trade is one thing Hall loves about his job. "I always tell the guys, 'If I don't learn something every day or I cease to learn, I need to get out of the industry.'"

Mike Allen, Air Methods' president and chief operating officer, commented: "TJ is more than deserving of the Excellence in Helicopter Maintenance Award from HAI, and we are honored to have him as a part of the team.

"TJ's dedicated his life to helicopter maintenance, which alone is a testament to his character, but moreover he continues to be as committed to our mission as the day he joined the team. His resolve to ensuring that our patients have the safest and best care in the air is an example of teamwork for others around the industry."

In addition to the support of his teammates at Air Methods, Hall acknowledged that his many years of service to the helicopter industry would not have been possible without a supportive family.

"A lot of people don't understand what our families miss throughout the years — missed anniversaries, birthdays, [and] holidays. If it weren't for a supporting family, this would be a dead-end position for a lot of people."

Hall told *Vertical 911* what a special honor and privilege it is to receive the Excellence in Helicopter Maintenance Award. He added, "To represent the other mechanics that I work with and the EMS industry is a big feather in everybody's cap."

The awards will be presented at HAI's Salute to Excellence Awards luncheon at this year's HAI Heli-Expo in Atlanta, Georgia, March 5 to 7.



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Although the platform is now 40 years old, the Sikorsky Black Hawk stays ahead of modern-day cyber threats through a series of cyber-hardening techniques. **Lockheed Martin Photo**



Confronting the cyber threat

BY GERRARD COWAN

Cybersecurity is now a top priority for companies in the military helicopter space. The aim is not just to protect platforms against attack, but to ensure they can continue operating even after an intrusion, according to industry experts.

As with other military domains, cyber has expanded as a business focus in the helicopter sector over the past decade, said Rimas Guzulaitis, who was director for platform systems at Raytheon Intelligence, Information and Systems at the time of speaking to *Vertical 911* and is now senior director, surveillance and targeting systems in the company's Space and Airborne Systems business. The company has worked on cyber solutions for a wide range of military helicopters, including the Sikorsky HH-60G Pave Hawk and the Bell-Boeing V-22 Osprey. Raytheon's cyber work covers different aspects of the platforms, said Guzulaitis, though it has a particular focus on protecting avionics systems from intrusion.

While cyber is a concern for the defense sector as a whole, there are unique challenges in airborne platforms, Guzulaitis said.

"If an adversary was to shut off the navigation system of a ground vehicle, one can

just stop the vehicle and potentially abort the mission and not suffer loss of life," he told *Vertical 911*. "If a similar situation occurs in an airborne platform, obviously there's a lot more danger for the crew."

While Guzulaitis could not detail the various ways in which an attacker might infiltrate a helicopter's avionics, he said the vast majority of threats are actually encountered on the ground. For example,

malware or other malicious software could be introduced deliberately or accidentally while uploading map data to the navigation system.

Helicopters are built to last for decades, and so are regularly upgraded with new technology. That introduces challenges of its own, said Bridgette Townsend, technology development manager at BAE Systems FAST Labs, which works on a range of cyber threat detection technologies that can be applied to military helicopters and other aircraft. Any new or updated technology must undergo rigorous research and testing to ensure it does not introduce any risks, she explained.

"We have to think about how we mitigate the risks of introducing new threats into legacy systems," she said.

Dave Woolrich, technology area director for cyber resilience and defense at FAST Labs, said that while routine upgrades and maintenance work could introduce threats to the system, they also provide necessary opportunities for cyber hardening.

"If we're working on a system that's decades old and was developed before cybersecurity was even a term, we can take steps to ensure that the upgraded system is more secure, because we now have a much better understanding of the threat landscape."

Cyber hardening involves building in several layers of protection to lower the risk of a successful attack, said Greg Sweeney,



Today, a priority of cyber hardening is to ensure that an aircraft can complete its mission even if it comes under cyber attack. **Skip Robinson Photo**

senior manager – cyber innovations at Lockheed Martin Rotary and Mission Systems. He said his company takes this approach for a range of aircraft produced by its Sikorsky subsidiary (such as the UH-60M Black Hawk), among other platforms. However, while cyber hardening is important, “we place just as much, if not more focus on building in resiliency at the onset of a system’s development, rather than relying on the bolt-on approach.”

A focus on resiliency could mean that even if an attack penetrates a helicopter’s defenses, the system can continue to operate in a degraded mode, with a path to recovering its full capability. Historically, “hardening” meant protecting the confidentiality of the information processed, stored, and/or transmitted by the aircraft, Sweeney explained. However, as cyber resilience becomes more mainstream, it has expanded to also mean protecting the integrity and availability of information, as well as the hardware and software, so that the helicopter can complete its mission despite being attacked.

Antonio Silva, head of system/software engineering and software technology for Leonardo Helicopters, also underlined the importance of resiliency in the event of a successful attack. Computers are now an integral part of the aircraft, he said, constantly exchanging information on the ground — during maintenance, for example, or when uploading flight plans or software updates — or in mid-air. Leonardo has sought to develop solutions to avoid malicious intrusions, based on standard authentication methods or software security, which also “allow the software to continue to function correctly or execute previously established safety procedures, even when subject to a malicious attack,” Silva said.

The area is growing more complex, said Guzulaitis, pointing to the increasing use of portable devices carried onboard helicopters, which could introduce new threat vectors if they exchange data with the platform’s systems. This complexity will only deepen with the rise of the “Internet of Things” in a military context, he added, with many different systems capable of being networked.

“This drives connectivity to scales that we’ve never even thought about before, but it also presents a threat if you don’t have the right architectures in place to protect the systems.”



Sikorsky and Boeing released the first photos of the SB>1 Defiant high-speed, rigid-rotor coaxial helicopter in late December. **Sikorsky/Boeing Photo**

SIKORSKY AND BOEING REVEAL SB>1 DEFIANT PROTOTYPE

Sikorsky and Boeing have drawn the curtain back from their SB>1 Defiant, the high-speed compound helicopter that the companies have been developing together for the U.S. Army’s Joint Multi-Role Technology Demonstrator (JMR TD) program.

The companies released the first photos of the aircraft on Dec. 26. However, those photos showed the aircraft on the ramp, not in flight, as the company missed its target for first flight before the end of 2018.

In a media call on Dec. 12, Sikorsky and Boeing told reporters that the discovery of “minor” problems to unnamed components during the first of several trial runs on the powertrain system test bed (PSTB) would delay first flight to early 2019.

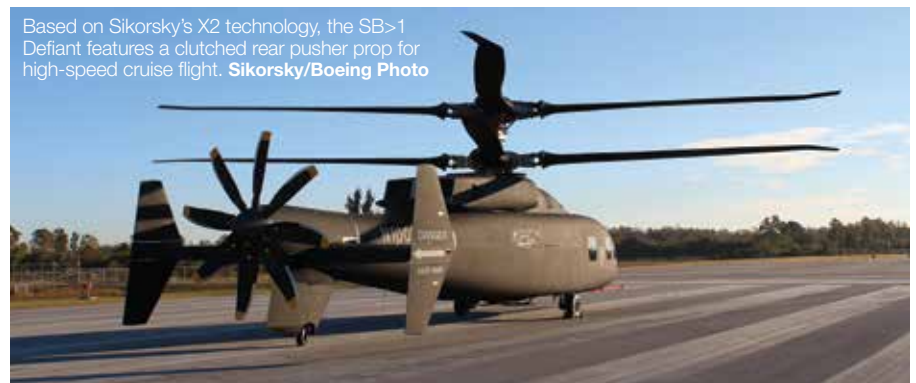
“We expect these sorts of things to come up when you run a configuration for the first time,” said Rich Koucheravy, Sikorsky’s director of business development for the Future Vertical Lift (FVL) program. “That is the purpose for building

the PSTB, so you discover it off the aircraft and are able to implement the fix. Our goal will be to get the PSTB back in operation shortly.”

The Defiant, a high-speed rigid rotor coaxial rotorcraft, is one of two medium demonstration helicopters for JMR TD, which is anticipated to lead into the U.S. Army’s Future Vertical Lift program in the mid 2030s to replace the Sikorsky UH-60 Black Hawk and Boeing AH-64 Apache. The other is the Bell V-280 Valor tiltrotor, which has been flying since December 2017.

The completely built Defiant is based on Sikorsky’s cutting-edge compound technology, which has only previously flown in two smaller experimental aircraft, the X2 and S-97 Raider. The Defiant is much heavier at over 30,000 pounds (13,600 kilograms), according to Koucheravy.

Chris Thatcher contributed reporting to this story.



Based on Sikorsky’s X2 technology, the SB>1 Defiant features a clutched rear pusher prop for high-speed cruise flight. **Sikorsky/Boeing Photo**

A CH-53K helicopter recently completed degraded visual environment flights at the U.S. Army Yuma Proving Ground in Arizona. **U.S. Navy Photo**



CH-53K helicopter program delayed by technical issues

BY ELAN HEAD

Technical problems have put the Sikorsky CH-53K “King Stallion” program behind schedule, but parent company Lockheed Martin maintains it can still meet the target for first operational deployment of the heavy-lift helicopter in 2023-2024.

Bloomberg reported on Dec. 19 that the \$31 billion program for the U.S. Marine Corps will likely miss a key milestone — initial combat capability by the end of 2019 — due to technical flaws discovered during testing. Development flight testing is now expected to continue through May of next year.

In a statement provided to *Vertical 911*, Naval Air Systems Command spokesperson Greg Kuntz confirmed that “discovery of technical issues later than expected and inadequate rate of their closure resulted in a flight test efficiency rate that was less than projected.”

As of early January, “we are evaluating requirements to the program but have not yet made a formal determination on IOC [initial operational capability] or IOT&E [initial operational test and evaluation] dates,” he stated.

According to Bloomberg, the technical flaws include “exhaust gas sucked back into the engine, limited service life for parts for the main rotor gearbox, deficiencies with the tail rotor and driveshaft, and late deliveries of redesigned parts.”

However, Sikorsky CH-53K program director Bill Falk said that “the current technical issues are solvable and resolutions are in process.” For example, with respect to the exhaust gas re-ingestion issue discovered during flight testing, he said that Sikorsky engineers are “confident” they have a solution to correct the issue with minimal impact on ongoing flight tests and production.

“We have completed prototype designs, 3D printed prototypes, and have identified suppliers for rapid prototyping,” Falk told *Vertical 911*. “We anticipate a demonstrated solution in 2019 that will be incorporated into production aircraft build.”

Meanwhile, he said, Sikorsky and Lockheed Martin continue to advance their efforts with two potential sources for thin wall castings. As noted in a report to President Trump last year, the single U.S. supplier of large thin wall

castings for rotary-wing gearboxes filed for bankruptcy in 2016, impacting the CH-53K as well as the Boeing AH-64E Apache and Bell-Boeing V-22 Osprey programs.


Because of the critical nature of these castings, Trump signed a presidential determination that allows the Department of Defense to make special investments in suppliers under the Defense Production Act.

“We continue to work with our military customers to invest in strengthening our existing supply chain and to explore multiple sources for components to build the King Stallion aircraft,” Falk said.

Despite the program’s struggles, Falk said the CH-53K had a successful summer of flight testing, nearly doubling its flight rate and achieving significant accomplishments in high-altitude, degraded visual environment, electromagnetic environmental effects, and continued envelope expansion testing, in addition to flights behind an aerial refueling tanker. To date, the program has achieved over 1,200 flight hours.

According to Falk, flight test objectives for 2019 include shakedown testing for propulsion, handling qualities and flight controls; and airworthiness testing for propulsion, avionics, and aeromechanical stability. Other priorities include expanding the aircraft’s operating temperature and capabilities envelopes, and shipboard integration.

Sikorsky has delivered two aircraft to the Marine Corps. One is at Marine Corps Air Station New River, North Carolina, for logistics demonstration, “where the maintainers are meticulously taking the aircraft apart and putting it back together,” Falk said. The second was delivered in October for ballistics testing at China Lake, California.

The Marines intend to purchase a total of 200 CH-53K aircraft, the successor to the CH-53E Super Stallion. Although visually similar to the E model, the CH-53K is a clean-sheet design that will carry three times as much as the Super Stallion in hot and high conditions. 

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WAR MOMENTS


Photographer and author Ed Darack recently published his latest book, *War Moments: Images & Stories of Combat in Iraq, Afghanistan & Beyond*, a collection of his 118 best images created while embedded in Iraq, Afghanistan, and during military training operations. Each image is accompanied by a short “story behind the image” so that readers can both see and learn about a moment of war. Over a fourth of the images in the book are photographs of military rotorcraft. Here are a few from *War Moments*, with abbreviated captions composed exclusively for *Vertical 911*. For the full experience, get *War Moments* — available in both the U.S. and Canada at all chain, independent, and online booksellers. Learn more at www.warmoments.com.





“YODAVILLE AT NIGHT” from page 33 of *War Moments* — This is a view of the urban target complex called “Yodaville” near Marine Corps Air Station Yuma, Arizona, during nighttime urban close air support training. A Marine Corps “mixed section” (a Bell AH-1W SuperCobra and Bell UH-1N Twin Huey working in concert with one another) attacked the mock city under starlight. First the SuperCobra would come in and fire its 20-mm gun and then some 2.75-inch Hydra 70 rockets; then the UH-1 would hit targets with rockets and a high-speed Minigun. It was a sight (and lots of loud sounds) to behold.



 **“EXPENDING FLARES”** from page 9 of *War Moments* — This was not an easy shot to get! I was embedded with Marine Heavy Helicopter Squadron 362, “The Ugly Angels,” based out of Al Asad Airbase in Western Iraq’s Al Anbar Province. At the time (2007), the squadron flew the venerable (and old) Sikorsky CH-53D Sea Stallion. Just after launch on a formation flight, “dash-2,” or the second aircraft, tested its flare system, and I was able to grab this shot of the moment.

➤ **“OSPREYS AT NIGHT”** from page 64 of *War Moments* — One of my all-time favorite photographs of mine from war, I made this image while embedded with Marine Medium Tiltrotor Squadron 261, which operates the Bell-Boeing MV-22 Osprey. This was the very first deployment of the MV-22 Osprey to Afghanistan, and I was fortunate to be able to fly in the jump seat in the cockpit, as well as in the rear of the craft. I also was able to photograph the aircraft from the ground. I captured this moment as a line of Ospreys spun up for nighttime operations at Camp Bastion in Afghanistan’s Helmand Province.



➤ **“ROCKET AND GUN RUN”** from page 62 of *War Moments* — I shot this photograph of a Marine Corps Bell UH-1N “November” Iroquois helicopter during close air support (CAS) training in the Chocolate Mountain Aerial Gunnery Range in southern California. Atop Observation Point Feets, I photographed the helicopter as it did gun and rocket run after gun and rocket run. This was my favorite, as it was banking hard just after expending flares.



“YANKEE LAUNCH” from page 123 of *War Moments* — I was embedded with a Marine Corps infantry squad during a combat operation outside the city of Marjah, in southwestern Afghanistan’s Helmand Province, when I got word that a Bell UH-1Y “Yankee” Venom helicopter was inbound to drop off some troops. I was there during the very first combat deployment of the Yankee, the latest iteration of the storied UH-1 “Huey” airframe, and wanted to get an up-close shot of a mission. Laying flat on the ground, I got this shot as it leapt into the air after dropping off the troops.



“OUT OF THE DUST STORM” from page 68 of *War Moments* — I shot this image while embedded during a large training exercise in California’s Chocolate Mountain Aerial Gunnery Range. This Marine Corps Bell-Boeing MV-22B Osprey was supporting a Marine Corps ground element integrated into the exercise (at one point, I counted 42 aircraft in the air at one time). This was one of my favorite images from the shoot: the Osprey launching from an unimproved desert landing zone. Those proprotors kick up a lot of dust during launch and landing, as anyone who has been around the pioneering tiltrotor can attest!





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FOR THE CHILDREN



Helinet has added a Sikorsky S-76C+ to the Alan Purwin Emergency Transport Program, continuing its longstanding mission of supporting Children's Hospital Los Angeles.

STORY & PHOTOS BY SKIP ROBINSON





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Helinet has dedicated two Sikorsky S-76 helicopters to serving CHLA. This S-76C+ is the most recent addition to the fleet, replacing an older S-76A.



Today, the CHLA helicopter transport program is dedicated to the memory of Helinet founder Alan Purwin, who made the decision to launch the program two decades ago.

Imagine providing the children's hospital in your city with the largest, fastest, and most capable helicopters for transporting critically ill patients — and at no cost to the hospital or the patient's family. That's what Los Angeles-based Helinet Aviation has done for over two decades.

Since 1999, Helinet has served the Southern California region as the sole helicopter air ambulance provider for Children's Hospital Los Angeles (CHLA). The program operates 24 hours a day, seven days a week, 365 days a year, using two specially equipped helicopters to transport infants, children, and teenagers from outlying medical facilities to CHLA for the highest quality pediatric care in the region.

The CHLA helicopter emergency transport program started in 1999 with Helinet's donation of a Sikorsky S-76A; it added a second, more powerful and capable aircraft, an S-76B, in 2011. Recently, the long-serving A model has been retired and replaced with a more advanced S-76C+, which like the B model is a 155-knot machine with the performance needed to operate at high altitudes on hot summer days. The program averages more than 475 patient transports every year, with Helinet continuing to provide the helicopters, pilots, insurance, and aircraft maintenance all at no cost to the hospital.

The Helinet/CHLA partnership began when CHLA's manager of emergency services, Judy Sherif, approached Helinet founder Alan Purwin. Sherif explained that the nonprofit hospital — which draws patients from across Southern California and beyond —

was interested in starting a regional helicopter transport program but was simply unable to shoulder the financial commitment necessary to develop and maintain such a service.

Purwin agreed to fund the program and provide the helicopter. Helinet would bill patients' insurance providers when it could, but otherwise, it would cover the operating costs itself. Although it was a huge commitment, Purwin and his wife, Kathryn, felt it was worth the investment to provide this valuable service to their community.

Kathryn Purwin assumed the chief executive role at Helinet after Alan died as a passenger in a plane crash in Colombia in 2015. The hospital renamed the program the Alan Purwin Emergency Transport Program shortly after. Now, 20 years after the program started, her commitment to it is unwavering.

"Alan gave back in many ways, but what was always most meaningful to him was his commitment to Children's Hospital Los Angeles," she said. "Today, Helinet's most important mission is to keep that commitment alive and the two CHLA Sikorskys sitting on our ramp are the most meaningful members of our 17-helicopter fleet."

THE AIRCRAFT

The very first helicopter used for the CHLA program was an AgustaWestland (now Leonardo) A109C, but this quickly proved to be undersized for the specialized medical equipment and crews required for these flights. So, Helinet replaced that aircraft with



The fast cruise speed of the S-76 helps keep transport time to a minimum in situations where every minute counts.



For Helinet CEO Kathryn Purwin, supporting CHLA remains a top priority.



The new S-76C+ boasts a medical interior by Spectrum Aeromed.



CHLA provides the medical team for each flight, tailoring personnel and medical equipment to the patient's needs.



The program has four dedicated S-76 pilots, and two back-up pilots.

the S-76A, which had a more spacious cabin to accommodate the program's needs.

Pilots liked the speed and reliability of the Sikorsky product, although they found it underpowered for some of the hospitals they were sent to. With calls coming from all over Southern California — and sometimes as far away as San Francisco or Las Vegas — the program's operating area encompasses many hot and high landing zones (LZs). The A model would do the job, but without much performance margin.

In 2011, Helinet decided to procure the much more powerful S-76B to serve as the program's primary helicopter. Equipped with two Pratt & Whitney Canada PT6B engines, the 11,700-pound (5,300-kilogram) gross weight B model has a higher rate of fuel burn and less endurance than the S-76A. However, it was a trade-off that Helinet was willing to make for the power to more safely venture into the mountains and desert, even on hot days.

More recently, Helinet decided to upgrade again, to a much newer S-76C+. Fitted with two Safran Helicopter Engines Arriel 2S1 turbines, the aircraft has the same 11,700-lb. gross weight as the B model, with both the power and the endurance the program requires. It is also equipped with a modern, state-of-the-art medical interior by Spectrum Aeromed, and a Stryker stretcher that allows for patient transfer from a local airport or LZ if the referring hospital doesn't have a helipad.

The CHLA helicopters are based at Helinet's headquarters at the Van Nuys Airport, and are also serviced there. Helinet understands that transporting children is a massive responsibility, so maintaining the aircraft to the highest standards is a top priority. All inspections are done in-house, and factory-trained mechanics are available on call seven days a week, ensuring that the aircraft can be attended to immediately if an issue arises.

Although Helinet tries to keep both aircraft available as much as possible, having a back-up machine allows the program to maintain coverage even when one S-76 is down for heavy maintenance. Planning maintenance for the aircraft can be a challenge, but it is a juggling act that Helinet is well adapted to.

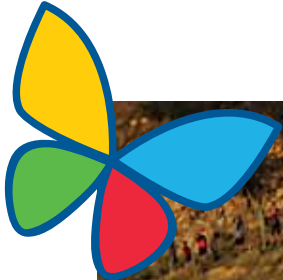
THE TEAMS

Helinet operates the CHLA aircraft with four dedicated S-76 pilots (two additional pilots are available as back-ups). Each pilot undergoes annual recurrent training in full flight simulators at CAE's training center in Morristown, New Jersey.

The pilots work 12-hour shifts, from 7 a.m. to 7 p.m., with handovers occurring before the start of each shift. Each pilot starts their shift with a thorough aircraft pre-flight inspection and weather briefing. Then, the pilot will do a call-in briefing with the CHLA Access Center and Transport Team to discuss staffing, weather, temporary flight restrictions, and any operating limitations such as a closed hospital pad that might delay a transport.

When a flight request comes in from CHLA, the pilot is not given any information on the patient's age or condition. The goal is to remove emotions from the pilot's flight planning and "go/no-go" decision-making process, making for a safer flight for everyone. The Alan Purwin Emergency Transport Program does not perform scene calls; instead, it transports patients only from smaller or less specialized facilities that lack the expertise to treat very sick babies and children.

CHLA provides the medical team for each flight, drawing on a core group of physicians, registered nurses (RNs) and registered respiratory therapists (RRTs) with specialized training in neonatal, pediatric, and cardiothoracic intensive care. These clinicians are based at CHLA, approximately a 15-minute response time from





Helinet's new S-76C+ has both the power and endurance that the Alan Purwin Emergency Transport Program requires.



the airport. After they have alerted the pilot of a flight, completed their preflight responsibilities, and assembled the medical equipment needed for the transport, they head up to the helipad where the helicopter awaits their arrival.

On each flight, the configuration of the medical team is tailored to the patient, which can range from a premature infant to a teenager with trauma head wounds. One flight might carry an RN, RRT, and a physician; another might have an RN and RRT with a supporting emergency medical technician (EMT). Specific medical equipment also varies by patient — for example, the smallest patients may need an incubator capable of warming or cooling the newborn, specialized ventilation, and delivery of specialized inhaled gases, among other features.


In addition to their medical training, all of the clinicians involved with the program are trained on helicopter operations and



Alan gave back in many ways, but what was always most meaningful to him was his commitment to Children's Hospital Los Angeles.



helicopter safety. Crew resource management (CRM) receives special emphasis, and all team members are encouraged to speak up about any concern that might have a bearing on the safety of flight.

All of these team members can take satisfaction in the valuable role they play in helping some of the most vulnerable patients. According to Kathryn Purwin, "Helinet transported 475 children to CHLA in 2018, playing a small but, we feel, very important part of helping these children get the care they need from some of the best doctors and surgeons in the world. Alan's legacy lives on in each and every one of these flights." 



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.

The Alan Purwin Emergency Transport Program provided a vital transportation link for 475 CHLA patients last year.



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A "patient" is carried toward an RCAF Chinook during a medevac training mission near Gao, Mali. Canada and its partner nations conduct such exercises regularly, simulating the real thing as closely as possible.





MISSION IN MALI

CANADA'S NEW FORWARD AIR EVAC CAPABILITY IS MAKING A DIFFERENCE FOR UN PEACEKEEPERS IN WEST AFRICA.

BY ELAN HEAD // PHOTOS BY LLOYD HORGAN



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Canada's medevac package consists of a Chinook and two Griffon escort helicopters, with the lead Griffon pilot serving as mission commander.

In Mali, the environment is not your friend. That is true for many people in this West African nation, which encompasses vast swaths of the brutally hot Sahara desert and semi-arid Sahel region. But it is especially true if your task is to operate aircraft on complex missions at a moment's notice. Such is the case for approximately 250 members of the Canadian Armed Forces who are currently in Gao, Mali, to provide a forward aeromedical evacuation capability to the United Nations (UN). The UN established the Multidimensional Integrated Stabilization Mission in Mali (MINUSMA) in 2013 with the aim of stabilizing the country after the previous year's Tuareg rebellion; since then, it has recorded more than 175 fatalities, making it the UN's most dangerous peacekeeping mission. Yet, even with militant Islamist groups continuing to stoke tensions, the environment itself poses as much of a threat to aircrews here as insurgents on the ground. First there is the heat, which is relentless and suffocating. Temperatures of 45 C (113 F) or higher are routine, taxing aircraft performance and pushing avionics to their operating limits. The heat is oppressive under any circumstances, but for aircrew going about their duties in full Nomex and body armor, it is infernal. There are special risks for maintainers, as fluids and metal parts can remain near their operating temperatures hours after a flight.



For Task Force Mali commander Col Chris McKenna, "there's a lot of pride" in wearing the UN's blue beret. In January, McKenna handed over the reins in Mali to Col Travis Morehen.



Despite the extreme heat in Mali, the complex avionics on the CH-147F Chinooks have been “performing flawlessly,” said avionics technician Cpl Matthew Marchand.



The CMERT model provides for treatment of up to three critically injured patients, and potentially four other patients who are in better condition.

According to Royal Canadian Air Force (RCAF) avionics systems technician Cpl James Hope, “Some of us have already gotten burns on aircraft that have been shut down for three or four hours.”

Then there is the dust. Unlike the omnipresent dust in Afghanistan, which tends to be powdery and fine, the dust around Gao is like coarse grit on sandpaper. A Boeing CH-147F Chinook landing off-airport creates an enormous dust cloud that overtakes the helicopter from the rear, first obscuring the visibility of the loadmaster on the ramp, then spitting sand into the cabin before finally boiling up at the nose of the aircraft, turning the view out the cockpit windscreen brown at the most critical phase of flight.

At night, the coarse sand striking the rotor blades creates a visible halo of sparks in a phenomenon that has been dubbed the “Kopp-Etchells effect” (after two soldiers who were killed in Afghanistan in 2009). It is surreally beautiful to witness, but so intense as to be distracting under night vision goggles. The dust chews at aircraft seals and erodes paint off helicopter rotor blades, disrupting their track and balance. On the Chinook, it even grinds down the safety wires on the main rotor blade tips. “If you take a look, you can see the metal is becoming thin and brittle and we have to keep replacing them,” Hope said.

To arrive at these everyday challenges, the RCAF had to overcome



For the medevac mission, the Chinooks are equipped with a specially designed wet floor that contains bodily fluid spills to prevent aircraft corrosion.



Chinook pilot Capt Jackie Ruis flew on one of Canada's first actual medevacs in Mali.

an even greater hurdle: standing up a forward aeromedical evacuation capability that is brand-new to Canada, then deploying it nearly 5,000 miles (8,000 kilometers) away, all on less than five months' notice. Canada announced on March 19, 2018, that it would be sending helicopters to Mali as part of Operation Presence, its first large-scale deployment for the UN in nearly 15 years. By Aug. 1, Task Force Mali had achieved initial operating



Medical specialist Maj Andrew McLaren was in Mali leading one of three four-person medical teams.

capability (IOC) in theater. It declared final operating capability — with a total of three CH-147F Chinooks and five Bell CH-146 Griffon helicopters — just two weeks later.

"I'm really proud of our people," said task force commander Col Chris McKenna when *Vertical 911* visited Gao in October. "They didn't have a lot of time to prepare for this, but I'm always amazed at the Canadian Forces being able to be so adaptable and flexible and jump into a mission set like this with not a lot of warning."

DEVELOPING A CAPABILITY

The RCAF pulled off something similar a decade ago, when it stood up the Joint Task Force Afghanistan Air Wing to support Canadian soldiers in Kandahar province. When Canada acquired six CH-47D helicopters from the U.S. Army in 2008, it had been 16 years since it had sold its previous Chinooks to the Netherlands — an epoch in organizational terms. Yet the RCAF managed to train a new generation of Chinook pilots and maintainers and deploy to Afghanistan in less than a year, remaining there until the withdrawal of Canadian troops in 2011.

McKenna, then a major, commanded Canada's Chinooks in Afghanistan. From 2014 to 2016, he served as the commanding officer of 450 Tactical Helicopter Squadron in Petawawa, Ontario, where he helped re-establish the RCAF's Chinook capabilities using its new fleet of 15 CH-147F models. It took a while, he said, but the RCAF is "now much further ahead than we were in Afghanistan," particularly with respect to how the Chinooks interact with their escort helicopters, CH-146 Griffons. From a tactical perspective, he said, "I think now what we've arrived at after five years of capability development is a much more adaptable and robust package, which allowed us within about a two- or three-month period to adapt it to Mali."

However, one capability that was conspicuously lacking within the RCAF was a dedicated forward air evac capability (in Afghanistan, Canada relied on allies for medevac support). Recognizing this deficiency, the RCAF began laying the groundwork for a forward air evac capability around a year before Canada committed to MINUSMA.

One Chinook and two Griffons are on standby for medevac missions at all times. Crews are tasked with responding within 30 minutes of a call during the day, and 60 minutes at night.



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Troops prepare to board a CH-147F Chinook for a tactical airlift mission.





Inside the cabin of a CH-146 Griffon during a range training mission.



Members of the Canadian Armed Forces deployed to Mali pose for a group photo on their ramp in Gao. **DND Photo**



WATCH VIDEO



Canadian aviators regularly travel to Twentynine Palms, California, for training in brownout landings, experience that is proving especially valuable in Mali. “We were able to leverage all of that currency and roll it right into the mission, which was perfect,” said Col Chris McKenna.

According to McKenna, “we sent our experts all over the world to consult with folks who had done this mission set, to make sure that we were going to adapt best practices.” However, these research and development efforts were largely siloed within aviation, medical, and procurement divisions.

“Without a tasked mission, to invest all of the time, money, and resources into collating them into a cohesive package — that had not occurred at the time of the [March 19] announcement,” he said. “So that was really our focus post-announcement, to take these individual lines of effort that were ongoing and smash them together . . . to be able to come here to do this job safely.”

The forward air evac teams operating in Mali comprise not only RCAF flight crews, but also medical personnel from the Royal Canadian Medical Service and Canadian Army soldiers from the Royal 22nd Regiment, or “Van Doos,” who provide a force protection component. A key integration exercise occurred in May, when they all convened in Wainwright, Alberta, to validate forward air evac concepts. “Wainwright was the first time we were all together, and it worked pretty seamlessly right off the bat, which was really great to see,” said Capt Jackie Ruis, a Chinook pilot.

With the concepts proven, the next challenge was to package everything up and transport it to a remote airfield in West Africa. Complicating matters was the fact that the runway in Gao — which also serves the French-led counterterrorism effort Operation Barkhane — was under construction at the time of Canada’s deployment, making it impossible to land large transport planes there until the work was completed. So, instead, the first helicopters were flown via Boeing C-17 (or CC-177 in the RCAF’s designation) to Ouagadougou, Burkina Faso; reassembled; then flown over 250 miles (400 kilometers) into Gao.



We sent our experts all over the world to consult with folks who had done this mission set, to make sure that we were going to adapt best practices.





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LCol Chris Morrison, commanding officer of 408 Tactical Helicopter Squadron, described Mali as “probably the most demanding theater I have flown in.”



Force protection is provided by Royal 22nd Regiment “Van Doos” out of Valcartier, Quebec. The francophone soldiers have an advantage in Mali, where French is the official language.



The Chinook carries a crew of 13 on forward air evac missions: two pilots, three rear crew, four medical personnel, and four force protection soldiers.

When the runway finally reopened, it saw heavy use as the Canadians flew in the thousands of tons of materiel needed to sustain a year-long deployment. The task force established an operational support hub over 1,100 miles (1,800 kilometers) away in Dakar, Senegal, where it based a CC-130J Hercules that still flies regular sustainment missions. But for the initial push, it also used the CC-177 and a contracted Antonov An-225 (for flights from Trenton, Ontario, to Dakar) and Ilyushin Il-76 (from Dakar to Gao).

“Some days we had an Il-76, a C-17, and a Herc all landing within an hour of each other,” recalled McKenna, pointing out that simply handling so much materiel is a daunting task in itself. As task force commander, the biggest problem he had was determining how to prioritize loads in order to meet the deadline for IOC. “Thankfully our Herc teams in Dakar were unbelievably flexible. They were able to re-prioritize loads within hours for us, to ensure that the next gateway was going to be met. . . . And we were able to get it all done,” he said.

A FLYING TRAUMA BAY

Canada hasn’t skimped on the service it’s providing to the UN, neither from an aviation perspective, nor a medical one. Its forward air evac program, called the Canadian Medical Emergency Response Team (CMERT), is based on the British MERT model, and like that model takes full advantage of the Chinook’s spacious cabin to deliver a sophisticated medical capability.

“CMERT aims to bring essentially a resuscitation room right to the point of injury,” explained Maj Andrew McLaren, a medical specialist who in October was leading one of three four-person medical teams, each composed of a critical care physician or anesthesiologist, a critical care nurse, and two medical technicians. “We load multiple patients in and we treat it like a trauma bay in a hospital, where we can take all of the technology that we would in a hospital, but moving rapidly towards, say, a surgeon, which is what a patient needs.”

Of course, it’s not exactly like a trauma bay in a hospital. For one thing, it’s hotter. “Just operating in temperatures of 40 or 50 degrees [C] in the back here, with 50 to 60 pounds of armor on, it can be very restrictive,” McLaren continued. “Operating as a resus team at home is difficult at times already, but now we have the body weight, and weird body positions, and we’re on our knees, and we’re in 50 degrees of heat, and we’re tethered to a moving platform. And so all of that is stuff that is not taught in medical school, or taught at hospitals at home.”

The four core medical personnel — already a large team for a helicopter — are further supplemented by four force protection soldiers with basic medical training. These soldiers ride near the ramp of the Chinook, and are the first to egress on a scene call, clearing the way for the medics. However, after the aircraft lifts with a patient, “we incorporate them into the team, so now we’re a team of eight, and that allows us to more thoroughly apply the technology and treat more patients,” McLaren said.

Meanwhile, the Chinook is always escorted on medevac missions by two armed CH-146 Griffons, one of which serves as an on-scene commander while the other scans for external threats. According to McKenna, that differs from the approach taken by the Germans who previously provided forward air evac to MINUSMA using NHIndustries NH90s, and who used Airbus Tiger escort helicopters only as threat conditions warranted.

“Our view was that we always wanted our Griffons, and that medevac package is a coherent package of Chinook and Griffon,” McKenna said. “To be able to do this safely, we assess having that Griffon there as an on-scene commander, as a top cover, as a potential to provide fire and provide illumination. . . . So that’s very Canadian, and we were able to get that all put together and exercised in a short amount of time.”

By late January, nearly six months into its deployment, Task Force Mali had performed six medevac missions, transporting a total of 21 patients. The Canadian teams had also conducted many realistic training missions, in cooperation with ground forces from partner nations. These regular exercises simulate the real thing as closely as possible, from the initial scramble of the crews, to the transfer of volunteer “patients” into waiting ambulances back at the airfield.

The Griffons are equipped with Dillon M134 Miniguns. Four out of five also have GAU-21 .50-cal machine guns (another has a C6).



On Jan. 20, 2019, three CH-146 Griffon and two CH-147F Chinook helicopters launched from Gao to Aguelhok, Mali, around 270 miles (430 km) away, in response to an attack on UN peacekeepers. The helicopters evacuated 15 wounded soldiers and delivered water, food, and ammunition to peacekeepers who remained in Aguelhok. “Our deployed contingent professionally worked through an extremely complex and demanding day, supporting one another and those who were the target of this horrible act of violence,” stated Canadian Armed Forces spokesperson Cpt Christopher Daniel.

And they have paid off, according to Ruis, who was a pilot on one of Canada's first actual medevacs.

"Our training has been so good, it just felt like I was going on another flight," she said. "It's a really good feeling knowing that if someone needs us, we're here to help."

PRIDE IN THE MISSION

While the tempo of medevac operations in Mali is relatively low compared to theaters like Afghanistan, the Canadians' mere presence is a mission enabler for partner nations like Germany, which contributes ongoing intelligence support to MINUSMA.

A German officer responsible for force protection, who wished to be identified only as David N. for security reasons, explained that German troops rarely venture farther from camp than a distance that would allow them to return a critical trauma patient during the so-called "golden hour." During the month-long gap between the cessation of Germany's forward air evac operations, and the start of Canada's, this distance shrank to just 30 miles (50 kilometers) in a rainy season that turned dirt roads into muddy obstacle courses. With the Canadian capability now up and running, "we are basically able to operate in a circle of around 200 kilometers,"

he said. "Without the helicopters, without forward air capability, we cannot fulfill our mission."

Canada is also using its spare capacity to support MINUSMA with tactical airlift operations, including the insertion and extraction of troops and their gear. In September, for example, the task force used its Chinooks to transport German soldiers to a populated island in the wide, braided Niger River. According to David N., the island had not been visited by UN forces in more than three years, and "the capacity of these helicopters gave us the [ability] to stay there overnight" while conducting intelligence missions. Sgt Maj Sebastian Hoek, a Dutch officer who works with the task force to coordinate tactical airlifts for the Netherlands' Long Range Reconnaissance Patrol (LRRP) Task Group in Mali, praised the Canadians not only for their capabilities, but also for their "can-do mentality."

"They're here to fly, and in everything they do, they show it," he said. "When they see something come up that could be a snag, they think with us, how could we work around this so everything is in order and the mission can go ahead?"

McKenna suggested that the development of a forward aeromedical evacuation capability and the skills being honed during

Members of Operation Presence-Mali pose for a group photo with a CH-147F Chinook at the small arms range near Gao in January. **Cpl Ken Belwicz Photo**





Green fields along the Niger River create a striking contrast to the surrounding desert.

“

As we return to Canada, we have a capability here that we can apply to many other theaters, or even domestically in a disaster.

”

this deployment will have lasting benefits for Canada, both at home and abroad. “As we return to Canada, we have a capability here that we can apply to many other theaters, or even domestically in a disaster,” he said. “I think this is just another really good tool in the toolbox for tac aviation in Canada and the RCAF.”

In the meantime, he said, Canada’s advanced CH-147F Chinooks and capable flight and medical crews are making a real contribution to an expansive, under-resourced theater that’s badly in need of their services. El Salvador is supporting MINUSMA with six armed MD 500E helicopters, but there are no other helicopters



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currently assigned to the UN mission — for an area of operations that is many times the size of Kandahar province.

“I think Canada is providing something here that’s really tangible for the force, and hopefully is being seen as very relevant and helpful,” he said. “There’s a lot of pride in having such an important mission set and being relied upon by so many, and there’s a lot of pride I think in wearing the blue beret here, and being able to help our partners in West Africa.”

MINUSMA’s vast area of operations makes the tactical airlift support provided by Canada especially valuable. “Being able to take a platoon of say infantry or reconnaissance troops, and then push them 80 miles from Gao into a village that hasn’t seen a UN flag for potentially months or years, and do a needs assessment on that village, engage with the leadership of that village, understand what their humanitarian needs might be, and then connect them with local program resources or other humanitarian resources — this is really powerful,” said Col Chris McKenna.



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





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A FIGHTING CHANCE

How an Air Evac Lifeteam crew survived a pilot incapacitation event, and what happened next.

STORY BY ELAN HEAD // PHOTOS COURTESY OF AIR EVAC



The first sign of trouble came in the form of a question.

"Where are we going?"

It was Jan. 12, 2018. The Air Evac Lifeteam helicopter had just lifted from a scene call near its base in Kinder, Louisiana, north of Interstate 10 between Lake Charles and Lafayette. The patient was a frail, elderly woman who had been sedated and intubated on scene.

In the back of the Bell 206L LongRanger, flight nurse Tara Coupel and flight paramedic Lane Abshire were attending to the patient when the pilot's voice came over the intercom: "Where are we going?"

"Lafayette General," Abshire replied, referring to Lafayette General Medical Center, around 50 miles (80 kilometers) to the southeast.

"OK, where?" the pilot asked.

Abshire and Coupel thought at first that there was a problem with the intercom system. They unplugged their helmet cords and plugged them back in; tried telling the pilot again. But he repeated, "OK, where?"

The helicopter was now about 800 feet over the ground. Abshire asked Coupel to get out of her seat and tell the pilot where they were headed. She unbuckled her seatbelt, removed her helmet, and moved forward to tap on the pilot's shoulder.

"Lafayette General!" she shouted at him. Although she was disconnected from the intercom, she could see him mouthing the words beneath his mic boom, "OK, where?"

Coupel returned to her seat, put on her helmet, and plugged in. "Lane, something's going on," she said. It was around that time that Abshire realized they were flying in the wrong direction.

"We were in a left-handed bank, and we were flying in a left-handed circle," he recalled. "And I'm like, something's wrong."

There's not much room in the back of a LongRanger equipped as an air ambulance. In Air Evac's medical interior configuration, the stretcher is positioned on the left side, with the patient's feet in the position that would normally be occupied by the co-pilot's seat. A structural metal bar extends over the patient, behind where the co-pilot's shoulders would be.

As Abshire explained later, "on any other given day in south Louisiana, it's nothing for us to transport 200-pound, 250-pound patients." But their patient that day was a scant 85 pounds (40 kilograms), giving him just enough room to squeeze between the patient and the bar once he removed his helmet.

"I managed to crawl [over] her and get all the way to the front of the aircraft. And when I got to the front of the aircraft, I hit [the pilot] on his shoulder, and when he looked at me, my heart just went in my throat. Because he looked straight through me — he had that thousand-yard stare."

It was now apparent to Abshire that the pilot was having a serious medical emergency. When he looked back at Coupel, she realized from his expression that they were in trouble. She was terrified.

"That split second after he turned and looked at me with that look, I thought we were crashing," she said. "I thought that was it. I actually pulled out my phone, texted my mom 'I love you,' and put it back in my flight suit."

"She was emotional, and I was trying to hold it together," Abshire recalled. Because he had removed his helmet, he had to shout at Coupel over the noise of the engine and rotor.

"I yelled at her, 'Call mayday . . . get on the radio and call mayday, this is happening,'" he said.



Like many air medical crewmembers, Lane Abshire had wondered in the past what might happen if his pilot were to have a medical emergency in flight, but had never considered it a serious possibility. "And then to actually be living it . . . I [had] to convince myself it was actually happening," he said.

“You know, you always talk about calling a mayday, but when it got down to that point, I had to convince myself that it was actually happening. You talk about it all the time, you practice it, but like, no — this is for real.”

AN UNPRECEDENTED CALL

More than 500 miles away in O’Fallon, Missouri, Tim Cincotta was sitting at his desk in Air Evac’s operations control center (OCC). Cincotta is a commercial fixed-wing pilot who has worked for the company as an operations control specialist since 2010, tracking flights and weather and evaluating line pilots’ risk assessments.

That Jan. 12, nothing he had seen in his eight years on the job had come close to what was happening in Kinder.

Air Evac’s headquarters in O’Fallon includes a central communications center, or “cen comm,” as well as the OCC. Typically, cen comm specialists are the ones who liaise between dispatching agencies, the company’s aircraft, and receiving hospitals, and are therefore the ones monitoring radio communications at all times.

But on this day, another OC specialist happened to be monitoring the specific “tower” frequency that allowed the ship from the Kinder base, Air Evac 125, to communicate with headquarters via radio over internet protocol.

“He said, ‘Hey, I think I heard a mayday call from 125,’” Cincotta recalled. Cincotta opened up the tower frequency and spoke to Coupel, who reported that their pilot was unresponsive. “I’m thinking, ‘Oh gosh...’”

Pilot incapacitation is never a good thing, but in a light helicopter flown by a single pilot, it is close to a death sentence. A standard LongRanger certified for visual flight rules (VFR) has no stability

augmentation system (SAS), no autopilot, none of the inherent stability of an airplane. If the pilot ceases to actively fly the aircraft, control will be lost within seconds.

Fortunately, this was not a standard LongRanger. Air Evac had recently completed the multi-year process of equipping its fleet with Genesys HeliSAS stability augmentation systems and autopilots, along with Garmin GTN 650 GPS units and G500H glass cockpits. All of these were on the aircraft in Kinder.

According to Air Evac director of safety Tom Baldwin, when the company made this substantial investment in autopilot technology, its primary concern was inadvertent flight into instrument meteorological conditions (IFIMC). An autopilot can be a lifesaver when a VFR helicopter pilot wanders into the clouds, and from that perspective alone, he said, “the technology has paid off in spades.”

Now, Cincotta recognized that the HeliSAS also represented the crew’s best chance of survival on this clear sunny afternoon in south Louisiana. He asked Coupel whether the autopilot was engaged; back in the helicopter, she shouted the question at Abshire.

“I wasn’t aware at the time how to actually tell on the controls if the autopilot was engaged . . . but I felt like [it was] because we were holding a steady attitude,” he recalled. “So I was comfortable in assuming that the autopilot was engaged.”

By that point, Cincotta had already concluded that the HeliSAS was functioning; otherwise, the aircraft never would have flown so long with an unresponsive pilot. As he put it, “had the autopilot or SAS not been engaged, they probably never would have called.”

But HeliSAS was still new to the company, and the OC specialists had never had a reason to learn the system intimately. They



This photo of a typical Air Evac medical interior shows the metal bar that Abshire had to climb under to reach the cockpit.

scrambled to find maintenance controllers and simulator instructors who could advise them; nevertheless, Cincotta felt increasingly pessimistic about the crew's chances.

"I'm thinking that if this pilot is deceased or can't come back, this is not going to end well," he recalled. "I honestly thought, 'I'm talking to a lady that's about to lose her life.'"

'THERE'

Meanwhile, in the cockpit, Abshire was desperately trying to get through to the pilot.

"I was trying to get him to go back to our base, trying to just spark some kind of familiarity with him, and he just wasn't doing anything," Abshire recalled. "Then I was trying to get him to land in every field we flew over, and he just kept looking at me and staring at me and he's like, 'Where?'"

Although the HeliSAS was engaged, the pilot's right hand was still on the cyclic, and the aircraft kept banking to the left. Abshire put his hand on the pilot's cyclic hand and helped him level the aircraft. They were still flying, but Abshire didn't have an endgame.

"There was a point in the flight where my brain had legitimately accepted the fact I was going to die," he said. "I started thinking about my family and my kids, and I just kept asking God, please don't let me suffer. I don't want my family to see me suffering. If this is going to happen, just make it quick."

Then, randomly, the pilot looked away from Abshire and toward an open field in front of them. "There," he said.

"Yeah!" exclaimed Abshire. "There! Put it down there, just nice and easy."

The pilot went for the collective and the helicopter began to descend. Abshire yelled at Coupel, "This is it!" He knew that the autopilot would disengage as they slowed and approached the ground, and his anxiety was intense. His hand was still on the pilot's cyclic hand, helping to correct for left drift.

Alone in the back, Coupel was surprisingly calm; the familiar feeling of a smooth, controlled descent put her at ease. "Which is crazy, if you think about it . . . no big deal, when this is essentially the moment that's going to decide what our fate is in this aircraft," she said.

But the smooth control continued all the way to the ground. In fact, she said, "that probably had to be the most controlled, gentlest landing I've had thus far in an aircraft — it was just perfect."

Abshire later speculated that the experienced pilot, who had retired from the U.S. Army, drew on "muscle memory from all those years of dedication to excellence" to make his "miraculous" landing. (Air Evac declined a request to interview the pilot for this story.)

At the time, however, all that Abshire could think about as they settled into the muddy ground was the possibility of dynamic rollover. He desperately wanted out of the aircraft, and as he began the emergency shutdown procedure he screamed at Coupel to get out herself. "It made no sense for me to tell her to jump out of an aircraft with rotors still spinning," he admitted. "But in that survival mode, it was just go, go, go."

Coupel ignored him, remaining in her harness and exiting from the left side of the helicopter only after Abshire had completed his shutdown procedure: rolling down the throttle and turning the fuel and battery switches to OFF. In the time it took her to walk around the front of the aircraft, the pilot, still in an altered mental state, had managed to flip the switches back on.

She turned them off again, then physically pulled the pilot from his seat and stood between him and the aircraft as they waited for the emergency response. Abshire peeled himself backwards



A view of the cockpit area in a typical Air Evac helicopter.



Tim Cincotta was the operations control specialist who communicated with Coupel during the event.



Having survived his experience, Abshire believes that the most important thing to do in an emergency is create and maintain a "task orientation" to keep from locking up.



Coupel and Abshire had been working together for about a year before the event, and had "a great relationship," Coupel said. That "mutual respect" formed the basis of their air medical resource management in flight.

In addition to their in-depth training, Air Evac's OC specialists now have this poster to reference when talking a crewmember through a pilot incapacitation event.



out of the cockpit and began attending to the patient — who, of course, was still on life support.

“As soon as we landed, it wasn’t five minutes before we had agencies from all over the place coming to make sure we were OK,” Abshire recalled. “9-1-1 had actually sent out that it was a helicopter crash, so everybody was coming.”

Among the first to arrive was the ground ambulance team that had handed off the patient to begin with. They loaded up the pilot, and Coupel rode with him to Lafayette General. Meanwhile, Air Evac’s helicopter based in Opelousas, Louisiana, landed at the scene to intercept the patient, and also continued on to Lafayette General. (Today, the pilot is no longer flying, but has reportedly made a substantial physical recovery. Air Evac was unable to provide further details about the patient’s outcome for privacy reasons.)

Abshire learned later that the entire incident — from the time the pilot developed altered mental status until the skids touched the ground — lasted only eight minutes.

“You could never have convinced me of it,” he said. “It felt like three days.”

WHAT NOW?

Back in O’Fallon, Air Evac’s leadership team was stunned by what had transpired. Within 36 hours, key managers were on the ground in Kinder, “just to give us hugs and make sure we were OK,” Abshire said. But it would take the company much longer to determine an organizational response to the incident.

“We had never dealt with anything like this, and there was really no playbook that was applicable for this type of event,” recalled Tom Baldwin. The first priority, he said, was to debrief the flight

crew and OC specialist to understand exactly how the incident had played out from each of their perspectives. But that still left the problem of how to explain what had happened to the rest of the company’s employees.

“We had just had a sentinel event, it was a big deal, and we weren’t sure how to communicate this in the right way,” Baldwin said. “What we were worried about was getting there too early, and having flight crews come back and say, ‘Well, how are you going to protect me? How are you going to keep me safe if this happens to me?’ We didn’t have that answer.”

The leadership team considered the possibility that there was no answer — that perhaps pilot incapacitation was simply an inherent, unavoidable risk of single-pilot operations. But according to Baldwin, “none of us bought into that, none of us believed that. We said, there’s something we can do to give our flight teams a fighting chance if this were to ever happen again.”

Once they had developed a rough plan, Air Evac president Seth Myers recorded a video message to employees describing what had happened, and how they intended to prepare their teams to handle such events in the future. Over subsequent weeks, the company developed a training program in two parts.

The first part encompassed autopilot familiarization training for medical crewmembers: how to engage the HeliSAS, how to use it to hold heading and altitude, how to set it up to fly an approach to the nearest airport.

The simple two-axis autopilot in the HeliSAS won’t fly the aircraft all the way to touchdown, but it can take it close to the ground in a controlled runway environment, where fire rescue and emergency medical services can be standing by. The idea, said Baldwin,

is to “go from a crash that is almost going to guarantee loss of life, to a hard landing.”

This video-based training has now been provided to all of Air Evac’s current nurses and paramedics, and has been integrated into initial training for new hires. According to Abshire, if he had had the training before his event, he would have known immediately how to tell that SAS and heading control were engaged. He would have known, too, that instead of counteracting the pilot on the sensitive cyclic control, he could have simply removed the pilot’s hand to have the HeliSAS auto-level the aircraft.

Most importantly, he said, knowing from the outset that there was something he could do would have instantly created the task orientation that is so critical in an emergency.

“When I got to the front of the aircraft, I was just going up there to fight, because I knew I wasn’t going to die sitting in a seat,” he recalled. “I didn’t have any idea what I was going to be doing.”

The second part of Air Evac’s training program was developed with and for its OC specialists, who now have clear, scripted guidance for talking crewmembers through a pilot incapacitation event.

“After the event, we felt we had dodged something there,” said OCC manager Brian Allison, a former U.S. Army Apache helicopter pilot who was a pilot recruiter for Air Evac before moving into his current role. OC specialists were given in-depth training on the HeliSAS system, then worked with the company’s flight simulator instructors to write and test the step-by-step procedure for responding to pilot incapacitation.

The procedure evolved through multiple iterations, but now “I feel we have perfected it,” Allison said. He noted that comm specialists with no flight experience have been talked through the procedure in the simulator with successful outcomes. And it’s not

only medical incapacitation events where the procedure could be needed — it would also be relevant if a pilot were to be incapacitated by a bird or drone strike.

“It’s like practicing an autorotation or an engine-out procedure,” said Allison. “You may never ever see that, but when you do, you want to be ready.”

WORKING THE PROBLEM

According to Baldwin, there’s no question that the autopilot technology on board the aircraft was vital to the successful outcome in Kinder. He emphasized, however, that another factor was just as important — Abshire and Coupel’s effective use of air medical resource management (AMRM).



Coupel, center, and Abshire, right, pose with their program director, Corey Miller.



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COPING WITH A CRITICAL INCIDENT

The type of delayed stress response experienced by Tara Coupel and Lane Abshire is common among first responders, according to the trauma specialist who treated them, Tania Glenn.

Based in Austin, Texas, Glenn focuses on treating post-traumatic stress disorder (PTSD) and has devoted her career to serving veterans, first responders, and their families. She has contracts with Air Evac Lifeteam and several other helicopter air ambulance and airborne law enforcement operators to help their employees cope after critical incidents.

Glenn explained that a delayed stress response is one of two possible reactions to a traumatic event — the other being an acute stress response at the time of the event. Because first responders tend to be practiced at controlling their emotions under pressure, they may not experience the “fight or flight” symptoms of a stress response until a triggering event occurs weeks or months later. For Coupel and Abshire, that trigger was hearing the recording of Coupel’s radio calls and re-living the experience during the debriefing process.

“A lot of people are like, ‘I don’t know why this is happening now, because I’ve been fine,’” said Glenn. “What I explain to them is, ‘Hey, I know it’s not pleasant. But your brain is just telling you that it’s now ready to deal with it.’”

Glenn uses several different therapy modalities in her practice, including eye movement desensitization and reprocessing (EMDR). The goal of the therapy is to transform destabilizing trauma into more manageable “bad memories,” she said. “The difference between trauma and bad memories is, bad memories don’t trigger you and haunt you all day long, but traumas do.”

This is often combined with progressive desensitization. For flight crewmembers who have had a bad experience in the air, that may mean getting back in the helicopter with Glenn for a confidence-building flight.

Glenn said that recognizing and treating the symptoms of a stress response early, as Coupel and Abshire did, can be extremely effective in preventing progression to PTSD. Peer support teams like Air Evac’s can be very helpful in this respect, by alerting their colleagues to symptoms to watch for and encouraging them to seek treatment when they need it.

“It really facilitates trust and confidence, and a willingness to sit down with a shrink, which isn’t hugely popular,” she said. “A lot of people who have had peer support in the aftermath of an incident will say, ‘I don’t know how I could have done this without this team.’”

However, if you’re struggling with symptoms of trauma, the absence of a peer support team shouldn’t stop you from seeking help on your own — and Glenn emphasized that it’s never too late. She recommends seeking out a therapist who specializes in trauma and PTSD; apart from that, she said, the key is to find someone with whom you feel comfortable on a personal level.

“You may have to educate your therapist on aviation, and flight, and what all that means. But it’s worth it to do that groundwork if you get in with someone you trust,” she said.

When Coupel first realized the gravity of their situation, she panicked. But as soon as Abshire tasked her with calling mayday, they were back on the same page, practicing what Baldwin identified as the fundamental principles of AMRM: communication, teamwork, and attention to detail.

“That would have been a very, very inefficient team had they not worked the problem together,” Baldwin said. “Had they not been able to do that, I’m not sure what the outcome would have been.”

Abshire has no doubt on the matter. “If it wasn’t for AMRM,” he said, “on that day, that incident does not go the same. We die on that day. If you don’t have that ability to communicate with your partner, if you don’t have that sense of trust between you and your partner, on a day like that, somebody’s just going to be sitting in a seat locked up, waiting for the inevitable.”

That professional rapport and personal friendship came into play weeks after the incident, too. Immediately after the event, Air Evac’s peer support team contacted Abshire and Coupel to offer their assistance. But as Coupel recalled, they were still riding an adrenaline high at the time. After all, they had survived the experience — why would they need help?

The true gravity of what they had been through didn’t strike home for them until weeks later, when, during their debriefing session, Air Evac’s senior leaders played the recording of Coupel’s radio calls.

“You can hear the pure fear in my voice,” said the Pierre Part, Louisiana, native. “You might not be able to understand anything I say because my accent’s so thick, but you know that I’m scared.”

After that, Coupel realized that she had been on edge lately, and hypersensitive to her surroundings. “Anytime somebody complained about this little inconvenience, I just wanted to snap and be like, ‘Yeah, well I almost died, so maybe you could just wait until your soup cools off before you burn your mouth on it. Just random stuff like that was so irritating.’”

When Coupel confessed how she was feeling to Abshire, he said he felt the same way. So they sought help from Air Evac’s peer support group and contract psychologist, Tania Glenn, who helped them process their delayed stress response. “I was thankful for the fact that we both figured out we needed to take care of ourselves before we just let it go,” Coupel said.

Abshire reflected, “I think the whole mental side of our industry is something that people readily ignore, because we’re all Type As. And we’re used to: ‘Pick your head up, keep moving, you’re going to see bad things, you’re going to have bad days, but the tones are still going to drop, people are still going to be dying, and you’ve still got to go help.’”

“So there’s no time to sit around and mope about our bad day, because we’ve got to keep going,” he continued. “And it just got to a point where we had to step back and realize, we can’t keep going, not like this.”

Since then, Abshire and Coupel have both joined Air Evac’s peer support team to offer help to other crewmembers coping with traumatic incidents. In October, they also shared their story at the 2018 Air Medical Transport Conference (AMTC) in Phoenix, Arizona. Abshire said he hopes that an event like the one he experienced never happens again. But if it does, he hopes the lessons learned will give another crew that fighting chance.

“Maybe it gives them the courage to not lock up in a seat and just die scared . . . to die fighting if that’s what’s going to happen,” he said. “I hope it at least gives them the courage to get up there and know that something can be done.” 🚑

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Aviation history recognizes the first helicopter hoist rescue as having been performed off the coast of Connecticut on a stormy morning in November 1945. Isolated far from shore in Long Island Sound, two crewmen of an ill-fated oil barge were plucked from their shipwrecked vessel after being battered by weather and high seas. The barge had been cast upon a rocky offshore reef, and sending other water craft to aid the men was deemed to be too dangerous.

Upon exhausting traditional means to effect the rescue, police called the nearby Sikorsky helicopter factory and explained the dire situation. A young company test pilot and a U.S. Army Air Force captain assigned at Sikorsky agreed to fly out and assess things. Using an R-5 helicopter that had only recently been equipped with a hydraulic hoist intended for experimental testing, the pilots were ultimately successful in rescuing the two men.

At the time, hoist rescue by helicopter was a new concept, having been first demonstrated just months earlier by the U.S. Coast Guard in a public display. This instance was the first time it had ever been attempted in an actual emergency. Now, nearly 75 years later, military, commercial, and public safety operators around the globe have adopted helicopter hoist operations, using a wide variety of aircraft and working in extreme environments to conduct highly specialized missions in addition to rescues.

Collins Aerospace is one of the leaders in today's helicopter hoist rescue community, offering roughly 40 different models of Goodrich hydraulic and electric rescue hoists and cargo winches. The company estimates it presently has over 7,000 airborne hoists placed throughout the global fleet.

The Goodrich hoist and winch business was originally created in the mid-1970s as a subsidiary of century-old Western Gear Corporation (WGC). In World War II, WGC manufactured propulsion gearboxes for large merchant and military ships.

RISING TO THE CHALLENGE

Now part of the new aviation technology giant Collins Aerospace, the Goodrich hoist and winch business is actively shaping the future of hoist operations.

STORY & PHOTOS BY DAN MEGNA

Goodrich rescue hoists are critical mission equipment for a growing number of military, commercial, and parapublic operators. Here, Orange County (California) Fire Authority crews execute a hoist evolution with a Goodrich hoist. **Skip Robinson Photo**



Technician Kyle Hill is hands on during the assembly of an external rescue hoist at the company's main assembly and MRO plant in Brea, California.



Bert Domingo and Christina Amato inspect a rescue hoist fairing in the quality clinic.



Engineer Bejan Maghsoodi tests and evaluates a Pegasus rescue hoist prototype in the engineering R&D lab.

In the years that followed, a series of mergers and acquisitions would see Goodrich become affiliated with a number of large aerospace firms: Lucas Aerospace, TRW Inc., and UTC Aerospace Systems (UTAS). Today, it is part of a relatively new aviation technology giant: Collins Aerospace, created in late 2018 when United Technologies acquired Rockwell Collins and combined it with UTAS.

A CRITICAL EVENT

In 2013, an incident occurred in Europe that caused the company and the global helicopter hoist community to take pause. During a maintenance check flight with a Goodrich hoist installed on an MBB BK117 C2 helicopter, a “dummy load” of 552 pounds (250 kilograms) was picked up to conduct a “maximum load test cycle” on the hoist.

As the European Aviation Safety Agency (EASA) airworthiness directive (AD) that resulted from the incident describes it, “the cable reeled out without further command of the operator, causing the test dummy load to impact the ground.” Initial speculation

focused on the possibility of issues with the hoist clutch.

EASA issued a series of ADs which were quite restrictive and affected a large number of makes and models of helicopters with a specified Goodrich part number installed. The Federal Aviation Administration and Transport Canada followed suit with ADs which, although less restrictive, imposed testing requirements prior to hoists returning to service.

Collins responded immediately, launching comprehensive testing, evaluations, and fault tree analysis to determine the cause of the incident and corrective actions. The investigation concluded that the incident was the result of “sustained overloading of the hoist.”

Collins mechanical engineer Bejan Maghsoodi explained, “The results are most likely explained by a prolonged high-energy event; an excessive dynamic load on the hoist for a sustained amount of time. The clutch slipped, protecting the aircraft from an excessive structural load or a broken cable. The high-energy event resulted in the glazing of the clutch friction material and loss of torque capacity.”

In 2014, Collins initiated a second round of testing and

assessments related to the incident. The company wanted to understand the condition of the hoists working throughout the fleet and determine what improvements could be made to support these legacy models. One revelation: legacy hoist clutches (known as “population 1” or “pop 1”) manufactured over the previous 20 years could be improved through the implementation of modern manufacturing practices and critical parts controls.

As a result, the company launched a program to manufacture an improved clutch, while maintaining the legacy design. This clutch, referred to as “pop 2,” has standardized materials, parts, manufacturing controls, assembly, and testing for retrofit throughout the fleet. “It was an immediate method to homogenize the hoist fleet with a standardized configuration,” said Maghsoodi.

In parallel development with the pop 2 clutch, the company began development of a new product — the high performance clutch (HPC). This is an entirely redesigned clutch with improved performance to handle unexpected events outside of normal operating parameters. Associate director of business development Nick Demogines explained, “One area the regulatory agencies had talked to us about was what we call ‘arrestability’: the capability [of the hoist] to decelerate and hold the load, after an overload event occurred.”

According to Maghsoodi, “The HPC was developed with new technology as an enhanced ‘drop-in’ or retrofitable replacement clutch. So, just like we removed the pop 1 clutch and installed the pop 2 clutch, you could remove a pop 2 clutch and install an HPC.”

The HPC provides the operator several performance and operational improvements. First, those hoists that are affected by the AD, even those with the pop 2 clutch, are currently de-rated at lower air temperatures, meaning the load capacity is reduced. The HPC is unaffected by temperature or operating environment, so there is no expected de-rating of the hoist under any environmental conditions. It’s also a more robust clutch with improved dynamic capacity to improve arrestability, with improved cooling to increase safety margin and reduce risk of friction disc glazing.

The HPC has completed development and is undergoing customer qualification testing, expected to result in certification by mid-2019. It will be offered as a product improvement to replace any clutch in the fleet.

LOOKING FORWARD

In 2015, the company also embarked on a global “voice of the customer” campaign, reaching out to customers, operators, maintainers, and aircraft manufacturers, encouraging honest, direct one-on-one conversations. Collins wanted to understand the “good, the bad, and the ugly” as it related to product improvement, optimization, customer service, and technical support in the real world.

“We realized, you can never over-communicate,” said Demogines. “People are always starved for information. What we found was, we were not communicating as well or as effectively as we could have been. Our communication efforts have improved but we recognize the need to better communicate.”

Collins’ rescue hoist operators conferences are one example of the company’s commitment to keeping the lines of communication with operators in the field open and information flowing. Presently, two conferences are held annually, typically

The California Highway Patrol operates 12 Airbus H125s equipped with Goodrich rescue hoists for SAR missions throughout the state.



coinciding with HAI Heli-Expo in the U.S. and Helitech in Europe (or the Vertical Flight Expo and Conference as it will be known in 2019).

It was through these conversations that Pegasus, the company's new fifth-generation hoist, was inspired. "After a long period of product improvements, we initiated a new clean-sheet hoist design," said Maghsoodi. "The last three generations of hoists shared similar architecture and many common components. The purpose of Pegasus was to develop a high performance next-generation hoist incorporating innovative technologies into a new architecture driven by decades of knowledge and lessons learned from customer experience. The system is planned to be retrofittable, meaning backwards compatible, with existing platforms. So any operator can remove their legacy hoist and install a Pegasus hoist."

The company took the best features from its external and internal hoists and incorporated improved features and new technologies. The Pegasus architecture is designed around a much improved traction drive, cable handling, and level-wind system. This reduces stress and increases life of the cable and components. Risks of mis-wraps and cable knifing have been significantly reduced, enhancing hoist reliability. Pegasus is faster, lighter, and smaller than the hoists it's designed to replace, as well.

New features include digital displays of load weight and fleet angle, a clutch slip indicator and a health and usage monitoring system (HUMS) that will record data such as maintenance information, hoist cycles, loading, temperatures, oil level, and environmental conditions. A modular gearbox cartridge, motor, and controller have also been designed to simplify maintenance.

Pegasus is presently in full prototype testing mode and expected to be in production by the first quarter of 2020. Collins expects to have a working prototype of Pegasus on display at HAI Heli-Expo 2019.

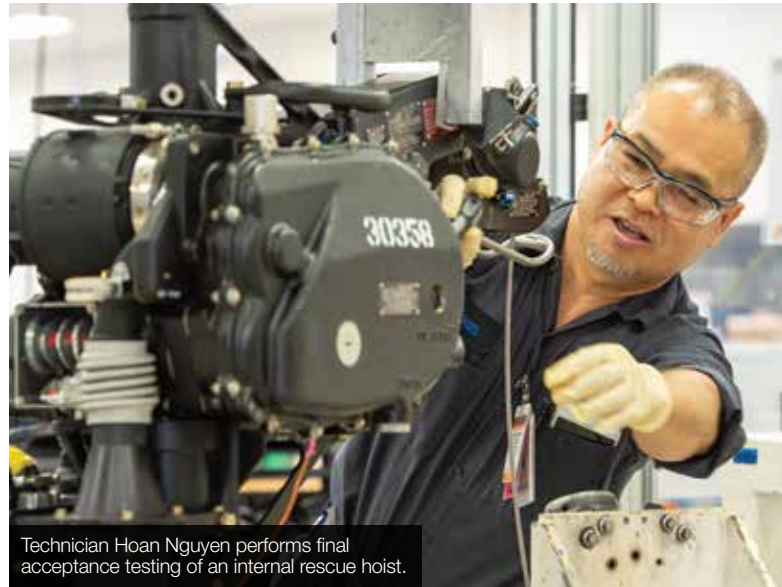
Another take away from these conversations has been a ramp-up of maintenance, repair and overhaul (MRO) capabilities. "That's another area where we recognized a strong need for improvement," said Demogines. "And we can readily and openly admit it. Before the clutch incident, our MRO turnaround times were poor. Whether that was due to parts shortages or no communication, we were just doing a poor job in responding to the customer from an aftermarket and MRO standpoint."

Collins has placed great emphasis on improving hoist MRO globally and has significantly reduced turnaround times, by more than 50 percent on average. The company now has a hoist MRO facility on the east coast of the U.S. in Monroe, North Carolina; one in France; and another recently opened facility in China. It also has designated overhaul facilities in Japan, Singapore, the U.K., and Switzerland, with others coming online in the future. The company's main hoist engineering, production, and MRO facility is located in Brea, California, near Los Angeles.

THE PEOPLE WHO COUNT

Nearly 12 years ago, after having operated another brand of hoist for many years, the Los Angeles County Fire Department (LACFD) moved over to Goodrich hoists. According to Dennis Blumenthal, a pilot with LACFD for 20 years who is now the chief of helicopter maintenance, "It was evident very quickly that it was a superior hoist for our needs. It's a little bit quicker, much less maintenance was required, and the operations guys were really happy with the speed and how it performed. And I've always felt the customer service has always been superior."

Derek Everett has over 20 years' experience as a search-and-rescue (SAR) technical air crewman and paramedic working in



Technician Hoan Nguyen performs final acceptance testing of an internal rescue hoist.



Jimmy Picache assembles a "Pop 2" clutch.



Nasi Tehrani manages rescue hoists in for repair and overhaul at the assembly and MRO plant in Brea.

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Side by side comparison of the Goodrich legacy clutch, left and the company's new high performance clutch, right.



some of the most extreme and demanding conditions imaginable. For the past 16 years, he has been with CHC Helicopters working onshore and offshore SAR from a base in Ireland. Their missions range from coastal and mountain environments to long-range offshore SAR into the Atlantic.

"I have been using the Goodrich hoist from my very first flight with the Irish Air Corps," said Everett. "From 2002 to 2012, I operated from the Dublin base on an S-61N SAR-configured helicopter. During this 10-year period, CHC Ireland constantly upgraded the hoist fleet in order to provide the best solution."

Since 2012, CHC Ireland has operated five Sikorsky S-92A all-weather SAR helicopters on contract to the Department of Transport, all fitted with the Goodrich 44311 dual hoist system.

According to Everett, "CHC Ireland SAR technical aircrew put the 44311 dual hoist system through some of the toughest, most rigorous rescues anywhere in the world. The dual hoist system is identical in both cable length and safe working load. Its ergonomic design allows for seamless transition from the inboard to the outboard hoist. The speed of the 44311 hoist of 325 [feet per minute] allows winch operators to respond to the condition below the helicopter. In the words of Oddball from *Kelly's Heroes*, 'We like to think we can get outta trouble quicker than we can get into it.'"

Sam Mehta is president of Collins' Mechanical Systems business unit, which includes the Goodrich hoist and winch segment. He sees the pace of change and innovation rapidly increasing throughout all aspects of the aviation industry and now just beginning to influence hoist technology (see p.76).

"When you think of the legacy design of the hoist and winch technology, it has been pretty static for the last 40 years," he said. "And now we have an opportunity, with Pegasus and the next generations of Pegasus, where we'll delve more into the digital and real-time diagnostics. We're going to get to a point where the hoist is no longer going to be considered a component anymore. It's going to be an extension of the aircraft." 🚫



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 Sacramento PD's new Bell 505, foreground, flies alongside one of its older OH-58s. The latest evolution of the JetRanger is bringing new capabilities to the unit.





NEW TO **THE BEAT**

We check in with the first law enforcement operator to fly the Bell 505 Jet Ranger X, the Sacramento (California) Police Department.

STORY & PHOTOS BY SKIP ROBINSON

Based out of McClellan Airport in Sacramento, California, the Sacramento Police Department (SPD) Air Operations team provides aerial support for ground-based law enforcement operations in the city of Sacramento and surrounding region. It's a significant task, with the SPD having around 650 sworn officers to support a city of 500,000 people.

The SPD started helicopter operations with the acquisition of seven U.S. Army surplus Bell OH-58A+ Kiowa helicopters in 1995 and 1996. Two of these were refurbished and equipped for the law enforcement mission, while the other five were kept for spare parts. The two OH-58s entered service at the beginning of 1997 and have been flying ever since, accumulating more than 30,000 flight hours between them in the last 22 years.

Over that period, the helicopters proved themselves to be an excellent force multiplier for the department. As Sgt Randy Van Dusen of SPD Air Support observed, "We really couldn't have picked a better initial aircraft. The OH-58 has been a proven design that has kept our operating costs in line. It's easy to fly, comfortable, not extremely loud, and for our operational area [near sea level] has adequate performance except on the hottest summer days that can easily reach 100 degrees [F]."



While the OH-58s were a cost-effective solution for many years, operating costs have been rising with the need to overhaul timed-out components and obtain new parts such as main rotor blades. Eventually, it became apparent that acquiring a new airframe would be in the best financial interest of the city.

"We were happy with Bell products, and after looking at different replacement airframes decided the Bell 505, with the addition of air conditioning, best fit our requirements," said Van Dusen. Equipped with a Safran Helicopter Engines Arrius 2R turbine, the Bell 505 has a useful load of 1,500 pounds (680 kilograms), giving it an edge over the SPD's OH-58s.

"We will continue operating in a patrol environment, so with [the Bell 505's] additional payload we can extend our flight a bit further out, especially on hot days," Van Dusen said.

ENHANCED CAPABILITIES

When the SPD took delivery of its 505 at the Bell plant in Mirabel, Quebec, it became the first operator of the model in a law enforcement configuration. SPD pilots flew the aircraft back from Canada over four days. The unit then brought its new aircraft to Hangar One Avionics in Carlsbad, California, to complete the process of adapting it for police missions.

"With a long history of police helicopter platform completions, Hangar One did a terrific job on our 505 and went as far as adding rear seat back pockets, cup holders, and coin matting to make the cockpit even more comfortable and lessen fatigue on our longer flights," noted Van Dusen.

The completed aircraft is compatible with night vision goggle (NVG) operations and boasts an L3 Wescam MX-10 HD camera, Churchill Navigation augmented reality mapping system, Macro-Blue 15-inch monitor, Trakkabeam A800 searchlight, Technisonic TDFM-9300 radios, LoJack stolen vehicle recovery system, AEM Corp public address system, Cradlepoint IBR900 cellular modem for onboard Wi-Fi, and high skid gear from Bell.

"The 505 and its mission equipment vastly improve the crew's ability to operate," said SPD pilot Josh Frey. When searching for a suspect's warm body, he said, "the Wescam MX10 camera has excellent heat detection capabilities, which prevents ground units from having to unnecessarily clear large search areas. The 505 itself has not shown any issues and we do enjoy the increased seat comfort and cockpit ergonomics."

The 505's increased performance is one of its most significant advantages over the OH-58s. Frey noted, "The 505's available power became very evident during the cross-country back from



The new Bell 505 is equipped with a full suite of mission equipment, including the L3 Wescam MX-10 HD camera visible on the nose of the aircraft.

Canada. The crew was able to climb to 12,500 feet over the Rocky Mountains with four average-sized crew members on board and about 60 percent fuel. The pilot upon reaching that altitude noted stable MGT [measured gas temperature] and was surprised at the low torque setting and Ng [gas producer RPM] required."

For the time being, SPD Air Operations will continue to operate its OH-58s alongside the new Bell 505. Will the unit obtain another 505? Van Dusen told *Vertical 911*, "If the 505 continues to perform as it has, we would definitely like to expand the fleet. This will be a few years down the road, once we time out the OH-58s' blades and engines."

He emphasized that since taking possession of its new aircraft, the unit has been nothing but pleased with its performance. "The power and climb rate of the 505 are a pleasant surprise and eclipse what we were able to do with our 58s. The start and shutdown procedures are extremely pilot friendly, and the overall visibility from the cockpit and rear seats allow us to easily patrol and assist ground units."

Moreover, he said, the open cabin of the Bell 505 helps with tactical flight officer (TFO) training, as a TFO trainee in the rear middle seat has a clear view of everything going on up front.



SPD Air Operations provides critical support for the approximately 650 sworn officers in the department.

The unit does most of its flying from late afternoon into the night and early morning hours, when criminal activity is highest. It files a cooperative schedule with the Sacramento Sheriff's Department to balance coverage.



THE TEAM

SPD Air Operations is currently staffed by two pilots and three TFOs. Because the unit also operates a Cessna 172XP airplane, both pilots hold dual commercial ratings for helicopters and airplanes. One of them, Frey, is a certified flight instructor – instrument (CFII), while the other pilot is currently working toward his CFI rating.

Additionally, three SPD officers are currently training for pilot ratings in fixed- and rotary-wing platforms, with the goal of increasing available crewmembers for the unit. SPD outsources basic flight instruction to local flight schools, then an SPD instructor provides the unit's new pilots with mission-specific and NVG training.

TFOs are required to have advanced ground patrol/tactical experience prior to applying to Air Operations. "We want them to already understand what the ground guys need and require in order to enhance their safety and ability to give them the support they need," explained SPD lead TFO Chad Eggen.

New TFO candidates must complete a formal in-house TFO training program and within a 90-day probationary period demonstrate proficiency in navigation and operating the helicopters' mission equipment, as well as knowledge of safety concerns associated with operating around helicopters. Each TFO must

additionally obtain and maintain a Federal Aviation Administration (FAA) second class medical certificate, as well as a Class B driver's license to operate the unit's fuel truck. TFOs also attend the Los Angeles Police Department's well-known TFO course for additional insight into the role.

Once established in the unit, TFOs become an essential part of each mission, taking over responsibilities including communicating with ground units, setting up perimeters, looking for threats to the ground units, and serving as a second set of eyes for the pilot. Their education continues with monthly safety training, and they are also given basic flight and emergency procedures training to enable them to fly and land the aircraft if the pilot were to become incapacitated in any way.

According to Eggen, the new Bell 505 is proving to be a great addition for the TFOs, too.

"The Churchill ARS mapping system aids the TFO's situational awareness during a fast-moving and dynamic call for service due to the displayed street and parcel overlays," he noted. "As the suspects flee, whether on foot or in a vehicle, the TFO has the ability to relay locations immediately to the ground units. The police equipment in our OH-58 is usable, but like using the first Apple iPhone — it still works, but it just doesn't have the advanced technology."

For maintenance, SPD Air Operations contracts with Advanced

The city of Sacramento has a population of around half a million. SPD Air Operations supports law enforcement activities both within and outside the city limits.



The Bell 505 has a fully integrated glass flight deck with the Garmin G1000H avionics suite. SPD has added a Macro-Blue monitor and Churchill mapping system for the TFO.

The unit is currently staffed by two pilots and three TFOs.



Helicopter Services in Woodland, California, about a 15-minute flight from McClellan Airport. For light maintenance, Advanced will send a mechanic over to the SPD hangar, while the unit flies its aircraft to Woodland for more intensive inspections and servicing.

Advanced's Adam Burriss said that with its proven dynamic system and well-known engine, the 505 is shaping up to be a straightforward aircraft to keep flying. "The current fleet of OH-58s are a reliable and safe platform," he said. "However, as the mission equipment continues to evolve, it doesn't make sense to upgrade the veteran OH-58A platforms. The 505 is the natural choice for performance, cost, and ease of maintenance."

PROACTIVE POLICING

SPD Air Operations flies seven days a week, with a focus on the times when criminal activity is the highest, from late afternoon into the night and early morning hours. To balance its coverage, the unit flies a cooperative flight schedule with the Sacramento County Sheriff's Department Air Operations Bureau, which works well, Van Dusen said. SPD Air Operations also assists outlying law enforcement agencies in both Yolo and Placer counties.

Additionally, the unit works regularly with California Highway Patrol (CHP) helicopter and fixed-wing units to assist on patrol calls in the city and county. Because the SPD does not have any hoist-equipped aircraft itself, it occasionally calls on a CHP

The Bell 505's increased performance is a major advantage over the OH-58.



 WATCH VIDEO





SPD Air Operations takes a proactive approach to patrolling. The presence of a helicopter overhead can help de-escalate some situations faced by officers on the ground.

hoist-equipped Airbus H125 helicopter to assist with rescue calls. “Our relationship with the local air support units is close and we really work as an integrated team to maximize flight coverage,” said Van Dusen.

SPD Air Operations has a patrol support mission, and attempts to be proactive whenever possible. “For example, if we see a

ground unit on a traffic stop, we might circle a few times to make sure everything is OK,” Van Dusen said, noting that the presence of the helicopter can often de-escalate a situation a ground officer might be experiencing. During their daily flights, SPD crews also survey local rivers, parks, and open areas for people who might be in trouble or up to no good.

The unit supports the California Office of Emergency Services by conducting regular homeland security checks of certain high-value locations. It also conducts patrols of the large water levee systems in Sacramento, using an infrared camera to identify any potential breach. These inspections are particularly important after heavy rains or earthquakes.

Reflecting on Air Operations’ more than 20 years of continuous service, Van Dusen said he believes the unit is well positioned to continue supporting the SPD and larger community.

“Our command staff enjoy the safety we provide to our ground units and know they will have an enhanced view of any tactical situation including mapping and the infrared camera,” he said. “In the next few years, we hope to be able to retire the last of our legacy OH-58s, obtain another Bell 505, and continue serving the City of Sacramento.” 🇺🇸

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Final Approach

Interviewed by Dan Megna



SAMIR MEHTA,
PRESIDENT OF MECHANICAL
SYSTEMS, COLLINS AEROSPACE

Samir Mehta is a lawyer by training who was hired by Sikorsky's legal department but soon moved to the business side of the house, working his way up to president of Defense Systems before leaving to join UTC Aerospace Systems (UTAS) in 2017. He is now on the leadership team of Collins Aerospace, created by the combination of UTAS and Rockwell Collins in late 2018.

VERTICAL 911: CAN YOU TELL US ABOUT A FEW MOMENTS IN YOUR 17-YEAR CAREER AT SIKORSKY THAT REALLY STAND OUT TO YOU?

SAMIR MEHTA: One of the best things about working at Sikorsky was that any time I turned on the TV, I could see the company's products at work. Whether it was soldiers defending our country or the Coast Guard saving people during natural disasters, I could see the impact Sikorsky had on operators and those they were working to serve every day. I also met many people whose lives had been saved by Sikorsky products. That's a powerful feeling, and one that continues for me today with the mission-critical products we make at Collins Aerospace.

V911: TELL US MORE ABOUT COLLINS AEROSPACE AND SOME OF THE PRODUCTS MOST RELEVANT TO OUR INDUSTRY.

SM: Collins Aerospace combines the strengths of our legacy companies, UTC Aerospace Systems and Rockwell Collins, along with those of our parent company, United Technologies. It represents a trans-

formative moment for rotorcraft. With new technologies like autonomy taking hold and decades-long programs like Future Vertical Lift coming to fruition, we're on the doorstep of a rotorcraft revolution. Collins has the scale, strength, and technical resources to redefine rotorcraft. Our portfolio includes a number of commercial and military rotorcraft products, such as Goodrich hoists (see p.56), cargo systems, actuation, vehicle management computers, and health and usage monitoring systems (HUMS), among others.

V911: WHAT ARE SOME OF THE WAYS IN WHICH GOODRICH, IN PARTICULAR, WILL BENEFIT FROM THE AFFILIATION WITH COLLINS?

SM: Now that we are Collins Aerospace, we have access to a whole new array of technical resources that we can use to further strengthen the design and engineering behind our hoists, and accelerate our development cycles. We will also use the new relationships and employee talent that legacy Rockwell Collins brings to the table. For example, they have a strong presence in South America that could provide an opportunity for us to expand there in the future.

As we begin to see the hoist as an extension of the helicopter itself, we can adeptly and efficiently create specific technologies and innovations to support that vision because of the combination of our legacy companies. Transmission of real-time diagnostic information from the hoist to the operator is a good example. Going forward, you can expect to see many improvements around predictive health maintenance (PHM). We want to make sure our customers have maximum uptime with their aircraft, and we want to increase reliability while decreasing maintenance costs. Our newest Pegasus hoist, which is currently undergoing prototype testing, will be equipped with a HUMS that will collect data on maintenance information, hoist cycles, loading, temperatures, oil level, and environmental conditions. That is just the beginning.

V911: HOW DO YOU SEE HELICOPTER MANUFACTURERS USING THESE NEW TECHNOLOGIES?

SM: The PHM improvements to our hoist product will allow operators to really understand how they are using the hoist and how often they need to perform maintenance. At the end of the day, we want to provide higher reliability in operational environments and lower cost of

ownership, which will in turn enable more customers to have the technology.

We are constantly working with the regulatory agencies to improve our products, and they are driving higher requirements as hoists are being used in more industries. Take, for example, the use of hoists on wind farms for human external cargo. Now you're talking about having someone on the hoist for longer than you typically would in a rescue situation and, really, using the hoist for a new purpose.

V911: WHAT ARE SOME OF THE BIGGEST CHANGES THAT YOU SEE AHEAD FOR THE HELICOPTER INDUSTRY, AND WHERE DO YOU THINK WE'RE HEADING IN THE FUTURE?

SM: Future changes in the rotorcraft industry will be driven by technical innovation. For instance, today a conventional helicopter flies at 140 knots, but we now have OEMs envisioning helicopters that could travel at 300 knots. Imagine what that would mean for search-and-rescue, where minutes count. How many more lives could the Coast Guard save if they had helicopters that traveled twice as fast as those they're using today?

The development of electric and hybrid-electric rotorcraft is another exciting trend to watch, and the industry could see disruption from smaller manufacturers who are exploring these capabilities. With technologies like eVTOL, we could also see a kind of democratization of rotorcraft. At one time, airplanes were solely for the privileged few, yet now they are widely accessible the world over. That kind of shift hasn't come to rotorcraft, but eVTOL could usher in a new era. Ten years from now, will we simply say, "Traffic's bad, let's call a helicopter." Who knows?

V911: WHAT ADVICE DO YOU HAVE FOR THOSE LOOKING TO ENTER THE HELICOPTER INDUSTRY IN THE NEXT FIVE OR 10 YEARS?

SM: I see the rotorcraft industry as being significantly robust for the next 30, 40, 50 years, so I would encourage anyone who has an interest to become involved in it. For those who enter the industry, I think their success will be driven less by their education and past experiences, and more by their ability to operate in a highly dynamic, changing environment. That means being flexible, anticipating and embracing disruption, and finding opportunity even in risk. ➔

This interview has been edited and condensed.



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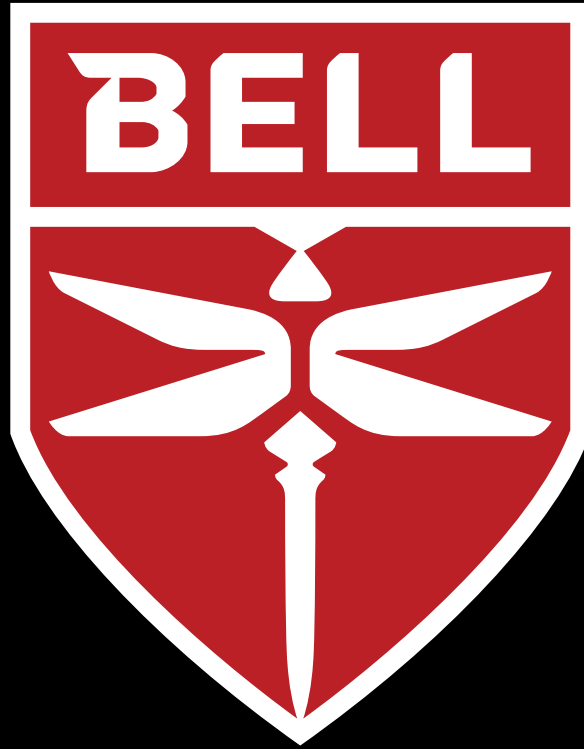
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