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ON THE COVER

A Bell 407GXP operated by Classic Air Medical (CAM) soars over Lake Powell. CAM has built its business on serving relatively small communities that see significant numbers of outdoor recreational visitors.

DAN MEGNA PHOTO

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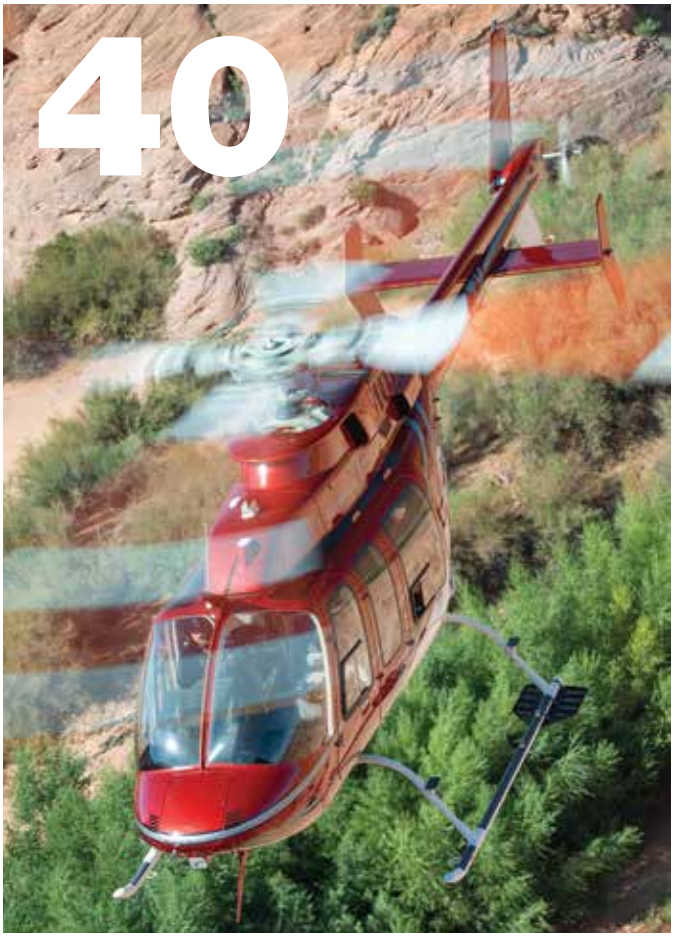

A CLASSIC ACT

How Classic Air Medical grew from humble beginnings into a major air medical provider.

STORY AND PHOTOS BY DAN MEGNA

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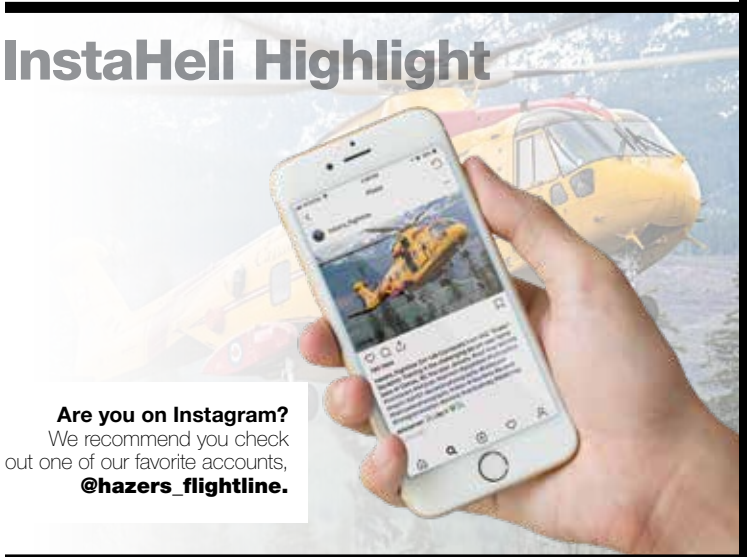

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Column

Talking Point // **Iain Holmes**

Tracking time to lift

In medicine there are many crucial events where rapid execution is essential for survival. The more notable ones are the golden hour for trauma, decision-to-incision for emergency cesarean sections, door-to-needle for strokes, and door-to-balloon for myocardial infarctions (MI). These time constraints have transferred to the helicopter air ambulance (HAA) industry with monitoring time to lift. One famous air ambulance service boasts a four-minute lift time, while an individual pilot shared that anything under two minutes was good, but his goal was 90 seconds.

It was while reading a 2012 editorial about decision-to-incision times for emergent cesarean sections by Dr. Frank Boehm in the *American Journal of Obstetrics and Gynecology* that I began to ponder if the HAA emphasis on lift times is in the best interest of all involved.

In 1982, the *Standards for Obstetrics and Gynecology* stated, "An obstetric service that generally cares for high-risk patients should be staffed and equipped to handle emergencies and be able to begin cesarean delivery within 15 minutes." In the following edition five years later, this number increased to 30 minutes. However, since that edition, research has shown that rushing to get all fetuses delivered quickly doesn't improve survival and in fact shorter intervals can have worse outcomes.

The pressure of time has proven fatal for many aviators and their passengers. On March 27, 1977, 583 people died on the Spanish island of Tenerife, when among other errors one pilot felt pressured to take off due to duty-time limitations. This pressure has been named and defined by the Federal Aviation Administration (FAA). "Hurry-up syndrome" is "any situation where a pilot's human performance is degraded by a perceived or actual need to hurry or rush tasks or duties for any reason."

In an FAA study reviewing Aviation Safety Reporting System (ASRS) reports, it was determined that 63 percent of errors occurred during the pre-flight/planning phase, while most of the incidents happened during the takeoff phase; the key times when we are asking our pilots to hurry up.

In various publications the FAA highlights dangers of having pressures to get airborne:

- Airman Information Manual 7-5-1: under the list of 10 causes for accidents is "Inadequate preflight preparation and/or planning."
- Helicopter Flying Handbook Chapter 14, "Operational Pitfalls": this list includes "neglect of flight planning, preflight inspections, and checklists"; "get-there-itis"; and "peer pressure" in which new pilots are compared against more seasoned pilots.
- Helicopter Flying Handbook Chapter 14, "Workload Management": highlights that "once information flow exceeds the person's ability to mentally process the information, any additional information becomes unattended or displaces other tasks and information already being processed. Once this situation occurs, only two alternatives exist: shed the unimportant tasks or perform all tasks at a less than optimal level."
- Helicopter Flying Handbook Chapter 14, "Risk Management": lists one of the four risk elements as "external pressures."

ASRS, National Transportation Safety Board and Concern Network reports indicate that errors occur in HAA operations from rushing to get airborne. On an all too regular basis, fuel caps are left off, maintenance equipment is left on the helicopter, the throttle is not set to FLY mode, helicopters are still attached to ground equipment on takeoff, etc.

Before putting pen to paper for this article I conducted an informal survey of other sectors of the aviation industry. The airline pilot I spoke to stated that his time to airborne is monitored for fuel planning purposes, but is de-identified so it is not linked to particular crews, equipment or bases. He stated there was no external pressure for them to start up or get airborne quickly.

When I shared the details of my article, he replied that even with 30 years and thousands of hours of professional flying experience, he would find being rushed through this critical phase of flight unnerving. With the exception of a military pilot, who reported that he regularly trains and is occasionally called to scramble, time to get airborne is a foreign and concerning benchmark in the aviation community.

Boehm suggested that decision-to-incision should be limited to only a few time-sensitive situations: "It would seem reasonable to maintain a 30-minute decision-to-incision rule; however, the rule should clearly state that it should only be the standard of care in those small percentage of cases that are considered to represent defined obstetric emergencies." The question we in HAA need to ask is, should we adopt a similar mentality where we maintain quick airborne time only for the small percentage of cases where time is critical for patient outcome? Boehm pointed out that when a true emergency presents, teams are more successful at meeting their benchmark.

If we go down such a route, HAA should review other parameters of when to utilize this benchmark. According to master certified flight instructor Max Trescott, "statistics have shown that accidents are correlated more with the number of hours of experience a pilot has in a particular aircraft model and not with his or her total number of flight hours," and decrease after 100 hours. Therefore should pilots with fewer than 100 hours on type be excluded from this monitored benchmark entirely? This should ultimately prevent accidents but also lends itself to the age-old adage: slow becomes smooth, smooth becomes fast.

As you read this article, there are Boeing 747-400 pilots with thousands of hours at Los Angeles International Airport, taking their time ensuring their airplane gets airborne safely, while in rural America, single HAA pilots, some with minimal experience on type, are racing to reach their company's benchmark. I believe it is time to ask questions. It appears the risks may be too high to be rushing to get the helicopter airborne, especially when, in my experience, for the vast majority of flights reducing the transport time by five or 10 minutes provides no clinical benefit.

> Sixty-three percent of errors occurred during the pre-flight/planning phase, while most of the incidents happened during the takeoff phase; the key times when we are asking our pilots to hurry up.

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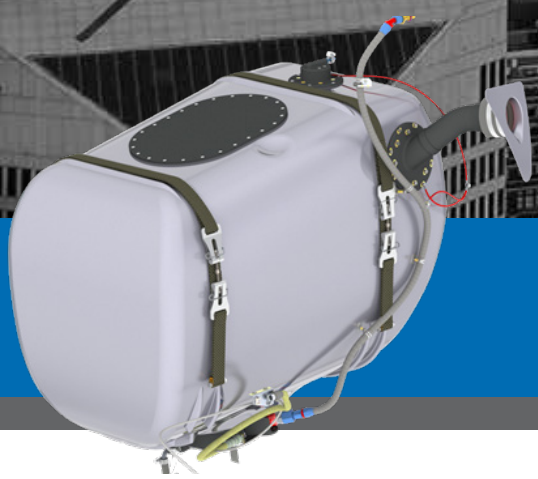

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Column

Focus on Professionalism // **Tony Kern**

Power to the Edge

First responders are the tip of the spear of public safety, and making risk decisions in a fluid environment is a part of our job description. Every single day, thousands of good decisions are made, but every so often, we hear of something that makes us ask ourselves, *"What were they thinking?"* In some cases, the person in question survives, so we might get to ask them. In others, we will never know.

The first response world is a tactical one, where each situation must be individually evaluated to achieve success in that unique set of circumstances. Of course, we have our training, regulations, standard operating procedures (SOPs), and best practices, but to a much greater extent than other aviation arenas (with the possible exception of combat) first response requires rapid situation assessment and flexibility. The penalties for failure are often draconian.

Power to the edge is a command-and-control concept developed by military strategists and now taught in business schools around the globe. At its center, it promotes the empowerment of individuals at the edge of an organization — where the organization interacts with its operating environment — to have an impact or effect on that environment, and hence outcomes. The concept fits tongue and groove with first response aviation.

To achieve a true *edge organization*, three things are essential: training, trust, and courage. Let's look at each briefly in reverse order. *Courage* comes into play at the management level, where supervisors and executives must be willing to release decision-making authority to front-line operators and resist second-guessing their tactical decisions (assuming compliance with SOPs) when the outcomes are negative.

This leads to the second prerequisite, *trust*. To be truly empowered, front-line operators must have faith in the system to support their decisions. The last thing a pilot or emergency medical technician needs in a rapidly developing situation is to worry about how their decisions or actions will be perceived by their bosses. The link between the courage of management to fully empower and trust their people, and the unwavering faith of the operator in the system that supports them, sets the stage for the final link to creating true power to the edge: training in how to make great and reliable decisions in highly fluid situations. Enter John Boyd.

John Boyd was a United States Air Force fighter pilot and military theorist of the late 20th century, whose theories have been highly influential in military, athletic, and business endeavors. His energy maneuverability theory basically changed aerial warfare from big and heavy (bombers) to small and fast (modern fighters). Along with this change in strategy came a critical need for real-time decision-making by those in the cockpits of those fighters.

Boyd's key concept was that of the decision cycle, what he called the "OODA loop," the process by which an entity (either an individual or an organization) reacts to any event in real-time operations. According to this idea, the key to victory is to be able to create situations wherein one can make appropriate decisions more quickly than one's opponent. Boyd maintained that all intelligent organisms and organizations undergo a continuous cycle of interaction with their environment. Boyd breaks this cycle down to four interrelated and overlapping processes through which one cycles continuously:

- Observation: the collection of data by means of the senses
- Orientation: the analysis and synthesis of data to form one's current mental model and situational awareness (SA)
- Decision: the determination of a course of action based on one's current mental perspective and SA
- Action: the physical playing-out of decisions

Of course, while this is taking place, the situation is likely changing, so the essential piece of this concept is the ability of front-line people to "stay in the loop," often requiring the need to cancel a planned action in order to meet the demands of the new situation. Boyd emphasized that the ability of a person to get comfortable *inside* the OODA loop was the essential skill in staying one step ahead of the situation, no matter how chaotic it became.

Power to edge can build greater resiliency, reliability, quality, and safety into first response operations. Many of the critical attributes for success are already in place in many of our organizations and operators, so this is a natural next step towards high reliability.

"To be truly empowered, front-line operators must have faith in the system to support their decisions. The last thing a pilot or EMT needs in a rapidly developing situation is to worry about how their decisions or actions will be perceived by their bosses.

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Column

HAA Corner // **Bill Winn**

HAA Risks and Controls, Part 2

In my previous HAA Corner discussion *(see p.8, Vertical 911, Summer 2018)*, I identified 20 risks that exist in air medical transport operations. To review the first five risks on that list, they include (1) minimal time allowed for flight planning; (2) pilot and crewmember fatigue due to circadian desynchrony; and (3) most flights being conducted in uncontrolled airspace, which entails (4) inadequate weather reporting, which increases the risk of (5) inadvertent encounters with instrument meteorological conditions (IIMC).

At the end of that previous article I promised to follow up with discussions of what I feel are the most effective controls for each of these risks. But first we should note that the most effective controls may vary between air medical programs due to differences in personnel and equipment, and the many ways that risks can combine in the actual conditions encountered during patient transport operations.

That being said, let's take a closer look at some of those risks and corresponding controls, beginning with (1) minimal time allowed for flight planning. To meet the standard for the quick response time that most air medical services set for their operations, an air medical pilot can do the following at the beginning of each shift, and hopefully before any flight requests are made:

a) Carefully evaluate the status of the aircraft, flight crew, and medical equipment to determine if there are any unusual conditions that could limit the ability to respond to any flight request in any way. This includes the status of specialized equipment that may be placed in the aircraft only for special situations or for patients with special needs.

b) If it is common practice to operate with reduced fuel to assure adequate aircraft performance for short-range transports, confirm with the dispatch facility the distance beyond which you must add fuel prior to takeoff.

c) Identify and communicate any limitations in response capabilities that may be related to unusual or temporary conditions associated with the aircraft status or the medical crewmembers or medical equipment.

d) Evaluate the current and forecast weather for all areas within the response radius of the aircraft. Then advise the dispatch facility of any areas that are un-flyable (below weather minimums) or any areas that could require additional evaluation or update of the weather conditions before accepting a flight into those sectors.

With respect to (2) pilot and crewmember fatigue, especially during night shifts, consider these controls:

a) All crewmembers should comply with a standard for crew rest that requires at least 10 hours of off-duty time prior to each shift.

b) If a crewmember is unable to get adequate rest prior to a shift, he/she should inform the other members of the crew of their lack of rest so that those crewmembers can be alert to the actions of the tired crewmember during any flights performed during that shift.

c) There should be a policy that a flight crew that has experienced a particularly busy night shift can declare themselves out of service for a designated rest period when any crewmember (and especially the pilot) feels too tired to safely perform their duties in flight.

As for (3) flight in uncontrolled airspace, which is associated with (4) inadequate weather reporting and an increased chance of (5) IIMC, suggested controls include:

a) All flights in uncontrolled airspace must comply with the minimum en route cruise altitudes specified in Federal Aviation Regulations (FAR) 135.615.

b) A protocol like the Enroute Decision Point (EDP) advocated by the National EMS Pilots Association should be included in the organization's general operations manual. The EDP specifies that any time the ceiling or flight visibility would force the pilot to descend below the limits of FAR 135.615, or to slow the aircraft speed to less than 90 knots, then the pilot must either divert to better flight conditions if possible, or transition to instrument flight rules (IFR) to continue the flight, or land the aircraft and call for ground transportation for the med crew and patient.

Many experienced air medical transport crewmembers reading this article may have other controls that they use to counter these risks.

It doesn't take much imagination to realize that the design and implementation of a truly effective safety management system (SMS) is a complex task that only begins by identifying all possible combinations of risks along with their controls. The SMS must also acknowledge and mitigate the many human factors that may exacerbate the risks and provide controls for those also. It is also necessary to recognize the ways in which the culture of an organization can affect the efficacy of risk controls, as well as the level of compliance in any of the functional domains of the organization.

If effect, the task of designing, implementing and refining a truly effective safety management system hinges on the prior creation of a *specific process* of SMS design to be recognized and used by all concerned.

Rather than continue to just list the risks that may be encountered in air medical operations, in the next few HAA Corner discussions we will take a careful look at the *process* of designing a truly effective SMS.

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

> The design and implementation of a truly effective SMS is a complex task that only begins by identifying all possible combinations of risks along with their controls.

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Column

Focus on Safety // **Dan Foulds**

Collective Mindfulness

Why do helicopters crash?

Read most National Transportation Safety Board (NTSB) reports on crashes and you might think it's primarily the pilot's fault. But perhaps there's more to the story.

Earlier this year, I had the chance to sit in on a presentation by Dr. Kathryn Kellogg on "high reliability organizations" (HROs) and the steps her hospital system has taken to become highly reliable. In healthcare, high reliability means the absence of avoidable events of harm to a patient.

This is a big deal to hospitals, as it significantly affects their bottom line. It's a moral issue as well. Decent people do their best to prevent events of harm, employing any strategy that works.

According to the Agency for Healthcare Research and Quality (AHRQ), "high reliability organizations operate in complex, high-hazard domains for extended periods without serious accidents or catastrophic failures." Today, few large American helicopter emergency medical services (HEMS) companies can lay claim to high reliability. And there is room for improvement in other sectors of the helicopter industry as well, including tours, utility, and offshore work.

Kellogg related several cases from within her hospital system. Events occurred with adverse outcomes (sometimes patients died) but instead of going about the investigation the old-fashioned way — finding the perpetrators and punishing or firing them — she and her team investigated *all* of the circumstances surrounding the event. And in each case Kellogg brought to light systemic factors that were significant enough to absolve the individuals of blame.

Instead of punishing or firing the people involved, the leaders redesigned the systems involved. On the path to high reliability, they decided to do things differently. What did they discover? The new way works better than the old "find them and fire them" method did. The organization is more reliable today than it was before.

This got me thinking. Could we helicopter people benefit from this? Medicine has borrowed many tactics and techniques from aviation, like using checklists, holding mission briefings, and incorporating crew resource management. Perhaps we in aviation should return the compliment and look at what medicine is doing to reduce adverse events.

PREDICTABLE FAILINGS

According to high reliability theory, when an adverse event occurs, it is imperative to determine what role the "system" plays as opposed to simply blaming and shaming one or a few select individuals. What behavioral inputs does the company's or the industry's culture impart upon the actors? If you simply fire or bury the perpetrator, tomorrow there will be another incident that will look very similar to today's.

Here's an excerpt from an NTSB report on a HEMS crash in 2016: "The National Transportation Safety Board determines the probable cause(s) of this accident to be: The *pilot's* decision to perform visual flight rules flight into night instrument meteorological conditions, which resulted in a loss of control due to spatial disorientation…" (emphasis added).

Here's an excerpt from the report on another crash that occurred in 2009: "The National Transportation Safety Board determines the probable cause(s) of this accident to be: The *pilot's* decision to continue the visual flight rules flight into an area of instrument meteorological conditions, which resulted in the pilot's spatial disorientation and a loss of control of the helicopter..."

Is the problem the individual? Or is the problem the system?

According to the AHRQ, "Medicine has traditionally treated errors as failings on the part of individuals, reflecting inadequate knowledge or skill. . . . The systems approach, by contrast, takes the view that most human errors reflect predictable failings in the context of poorly designed systems. [We must] design systems that anticipate lapses in human vigilance in the face of long work hours or predictable mistakes on the part of relatively inexperienced personnel faced with cognitively complex situations."

The same could be said of aviation. If something adverse happens once, *maybe* it's the person. If the same adverse event happens repeatedly, it's the system. In HEMS we tend to see the same types of events over and over. We experience a crash, wait for the report, and — guess what — it was the pilot's fault! Nothing changes.

I watched a HEMS operator that I worked for transition from focusing almost exclusively on safety to, as our community-based programs increased, increasing the emphasis on flight volume. At first, we made money from hospital contracts and got paid whether we flew or not, so there was no need to take any chances and no tolerance for risky behavior. Safety was a selling point.

As we changed operating models, pushing the weather became a way to capture more flights for some of our pilots. And some of our business development managers were OK with this. It wasn't long before we had a crash as a result of this change of mindset. Our organizational culture had undergone a risky shift.

Now, not all HEMS operations are the same, and I don't want to unfairly paint the entire industry with the same broad brush. But the shifting cultural landscape that I witnessed with that employer has become more widespread. There is a way the HEMS industry — or at least a large swath of it — does things. And there is an opportunity for improvement, for those willing to see things differently.

As described by the AHRQ, high reliability theory is built around four ideas:

First, there is a *preoccupation with failure*. Everyone within the organization *knows* that failure lurks around every corner, and there is an enhanced state of *collective mindfulness*. Near misses are viewed as chances to learn rather than evidence of safety. People who sound the alarm about a hazard are singled out and given positive recognition: "Good catch!"

Next, HROs resist simple answers. "People resist simplifying their understanding of work processes and how and why things succeed or fail in their environment." There is more to a mishap than "the pilot did it." This is the *reluctance to simplify*.

The third HRO characteristic is *sensitivity to operations*. "People in HROs strive to understand how their work affects — and is affected by — the operations of the larger organization." Think of this as big-picture situational awareness. I believe that we in HEMS could reduce incidents of harm, to ourselves and our patients, by learning more about the functions of others involved. As well, we should spend more time learning from the mistakes that others have made to enable *pattern recognition*. These are basic tenets of crew resource management.

Finally, deference to expertise manifests when senior leaders understand that the people who often know the most about the work to be done are the ones doing it. Anyone involved with operations is empowered — indeed, expected — to point out hazardous situations. The rank and file are encouraged to do this. Any person can *stop operations* when they feel a catastrophe is developing, and do so without fear of reprisal. The overarching objective is to learn as much as possible about *every* threat from *every* person involved. This trumps status or position within the organization.

We can't underestimate the importance of transformative leadership and integrity, honesty, and transparency. Collective mindfulness must start with the senior leaders in the organization. It must flow from them to the lowest level in the company. When leaders must *share accountability for the failures* that occur on their watch, then — and only then — will things improve.

In HROs, "dedication to the common goal of collective performance [takes] precedence over the usual processes of jealous specialization, hoarding of information, intergroup competition, and conflicts among administrators, managers, and operators," according to researchers Gene Rochlin, Todd La Porte, and Karlene Roberts. Did that just describe where you work? If so, start talking high reliability. It has worked splendidly for hospitals all across America. It could work for you, too.

We must become one team with one objective: helping people without hurting people.

> If something adverse happens once, *maybe* it's the person. If the same adverse event happens repeatedly, it's the system.

U.S. Air Force selects Boeing MH-139 to replace Twin Hueys

The Boeing MH-139 selected by the Air Force is a variant of the Leonardo AW139, and will be assembled at Leonardo's plant in Philadelphia. **Fred Troilo/Boeing Photo**

In a contract award valued at up to $2.4 billion, the U.S. Air Force has selected the Boeing MH-139 helicopter to replace the more than 40-year-old UH-1N Twin Huey helicopters used to protect America's intercontinental ballistic missile bases.

The MH-139 is a variant of the AgustaWestland AW139, the popular civil medium helicopter sold by Leonardo Helicopters. Leonardo teamed with Boeing on its offering to the Air Force, and will assemble the helicopters at its plant in northeast Philadelphia, Pennsylvania, with Boeing integrating military-specific components at its facility south of that city. The contract encompasses up to 84 helicopters, training devices, and associated support equipment.

"We're grateful for the Air Force's confidence in our MH-139 team," stated David Koopersmith, vice president and general manager, Boeing Vertical Lift, in a press release announcing the contract award. "The MH-139 exceeds mission requirements, it's also ideal for VIP transport, and it offers the Air Force up to $1 billion in acquisition and lifecycle cost savings."

William Hunt, CEO of AgustaWestland Philadelphia Corporation, stated, "We are happy that the U.S. Air Force has selected our team to deliver a new fleet of Philadelphia-built MH-139s. Our Air Force deserves the best tools; this is the right helicopter for their mission. The more than $125 million investment made by Leonardo in the Philadelphia facility demonstrates that we are fully prepared to execute in support of this contract. We look forward to working with Boeing on this program and we're committed to deliver according to expectations of the prime contractor, the U.S. government, and taxpayers."

The Air Force awarded the first portion of the contract on Sept. 24. Valued at approximately $375 million, it covers the first four helicopters and integration of non-developmental items that "will ensure the helicopters are ready to meet warfighter needs upon delivery," according to an Air Force press release. The first operational helicopter delivery is anticipated in fiscal year 2021.

Secretary of the Air Force Heather Wilson stated that "strong competition drove down costs for the program, resulting in $1.7 billion in savings to the taxpayer." The Air Force originally estimated that it would cost $4.1 billion to replace its aging fleet of Twin Hueys.

Other competitors included Lockheed Martin's Sikorsky — which offered the Air Force the HH-60U, a modified version of its UH-60M Black Hawk — and Sierra Nevada Corporation (SNC), which proposed acquiring UH-60A Black Hawks through the U.S. Army's Black Hawk Exchange and Sales Transaction program, converting them into UH-60L models, and then supplying additional upgrades including a Garmin G5000H avionics suite.

The contract award was delayed by several months when Sikorsky filed a pre-award protest with the Government Accountability Office (GAO) on Feb. 12, 2018. Among other things, Sikorsky contended that the Air Force was overreaching by requiring offerors to deliver software source code and give the Air Force at least government-purpose rights to that code, in excess of what is permitted by regulation.

Although the GAO eventually dismissed this aspect of the protest, that is only because the Air Force issued a clarification letter to all offerors on March 8 confirming that the contract would not require the provision of government-purpose rights in either noncommercial computer software or detailed manufacturing and process data developed at private expense.

Sikorsky also contended that the Air Force was treating offerors unequally, based on the fact that Sierra Nevada had not approached Sikorsky to secure the intellectual property (IP) licenses that Sikorsky believed the contract would demand. The GAO dismissed this element of Sikorsky's protest as premature in advance of a contract award.

The selection of an aircraft based on a commercially available model sidesteps many of these IP concerns. It's also a significant defense contracting win for Leonardo, which waged a bitter multi-year court battle in an attempt to prevent the U.S. Army from acquiring more Airbus UH-72A Lakota helicopters for training purposes. Instead, Leonardo wanted the Army to hold an open competition to replace its fleet of Bell TH-67 training helicopters, arguing that its AW119Kx would be a more appropriate and cost-effective trainer than the Lakota.

Leonardo finally abandoned its legal challenge in February of this year, after Airbus Helicopters, Inc. president Chris Emerson cast Leonardo as a reckless actor that threatened to upset the entire U.S. defense procurement process by pursuing its protests through the slow-moving legal system, rather than through the established system for protesting defense contract awards with the GAO.

At press time, Sikorsky and SNC had not yet indicated whether they intended to protest the Air Force's selection. SNC told news outlets it was "disappointed by the announcement" and would "review the notification letter" before elaborating further.

Steve Callaghan, Sikorsky VP for Strategy and Business Development, also expressed disappointment but said that Sikorsky remains confident that the HH-60U Black Hawk is the "strongest, most capable solution" for the Air Force.

"Adding Black Hawks to the Air Force's existing fleet makes sense from both a sustainability and cost savings perspective by leveraging the commonality of the Air Force H-60 fleets. We remain committed to delivering superior helicopters to the Air Force in our existing and future contracts," he stated.

Sikorsky already has a contract with the Air Force for the HH-60W Combat Rescue Helicopter, which will replace the aging HH-60G Pave Hawks the Air Force uses for combat search-and-rescue and personnel recovery. On Sept. 18, Sikorsky announced that the final assembly of the first HH-60W weapons system and operational flight trainers is underway, supporting the entry of the aircraft into the Air Force fleet in 2020.

Sikorsky's current contract with the Air Force for the engineering, manufacturing, and development (EMD) phase of the program includes delivery of nine HH-60W helicopters as well as six aircrew and maintenance training devices, and instructional courseware designed specifically for the HH-60W aircraft. The program of record calls for a total of 112 helicopters.

RotorBits

Leonardo performs TH-119 avionics 'power on'

The TH-119 is based on the AW119. **Leonardo Photo**

With an eye toward another defense contract, Leonardo has announced a milestone in the certification process of the TH-119 single-engine helicopter with the first "power on" of new Genesys Aerosystems avionics.


The TH-119's Genesys Aerosystems avionics. **Leonardo Photo**

The TH-119 is a dedicated variant of the Leonardo (formerly AgustaWestland) AW119 specifically designed for military training customers, primarily to meet the U.S. Navy requirements. Leonardo is billing it as "the only full-spectrum training helicopter," capable of training students on a spectrum of tasks: from basic flight maneuvers including full autorotations, to flight under instrument flight rules (IFR) and night vision devices (NVDs), to advanced missions including hoist and cargo hook operations and shipboard landings.

According to Leonardo, features of the TH-119 include a unique cabin configuration with an additional 180-degree adjustable trainer observation seat; NVD-compatible cockpit and cabin with high-visibility cockpit doors and a low-profile instrument panel to ensure maximum visibility from the cockpit; reinforced skids with replaceable skid shoes to support multiple repetitions of essential touchdown training maneuvers; cargo hook and hoist options supporting advanced training events; and a pressure refueling port and five fuel cell option that provides more than five hours of flight time.

Like the commercial AW119, the TH-119 will be built at the company's existing manufacturing line in Philadelphia, Pennsylvania. The TH-119 is expected to perform its maiden flight in fall 2018 and to achieve Federal Aviation Administration (FAA) certification in the first quarter of 2019.

With respect to the avionics power on, William Hunt, CEO of AgustaWestland Philadelphia Corporation, stated, "This event marks a major step forward in the integration of the all-new avionics into the only IFR operations-capable single-engine helicopter, as we get close to more extensive ground and flight testing activities towards FAA certification early next year. I congratulate the whole team and partners for this achievement aimed at offering U.S. naval aviators the best, most cost-effective U.S.-made solution for their future basic and operational training."

Sea Kings retire from U.K. military service

Three of the Royal Navy's last remaining Sea Kings performed their final flight on Sept. 26, marking the retirement of the model after nearly 50 years of service to the U.K. military. **Greg Caygill Photo**

BY GREG CAYGILL

In September, Britain's armed forces finally waved good bye to the Sea King helicopter, which served the country for almost 50 years in various roles. Ushering it out of service was 849 Royal Naval Air Squadron, which had operated the Airborne Surveillance and Control (ASaC) Mk7 version of the aircraft.

Two of the last four operational Sea King helicopters performed a farewell flight over Cornwall and Devon on Sept. 19. Determined that the retirement should not go unmarked, the crews managed a three-hour flypast out of Royal Naval Air Station (RNAS) Culdrose in conditions of rain and fog, gratifying the many people who braved the weather to see the historic flight.

On Sept. 26, three of them took their final flight from RNAS Culdrose, refueled at RNAS Yeovilton and then flew over the Leonardo (formerly Westland) factory in Yeovil where the Sea King helicopters were made, before arriving at the Royal Navy shore base HMS Sultan.

All were equipped with the Thales Cerebrus mission system and Searchwater 2000 multi-mode radar that had kept the ASaC Mk7 relevant long past the Sea King's expected service life. Since 2003, the Sea Kings of 849 Squadron have contributed to a number of operations, including Operation Telic in Iraq, Operation Herrick in Afghanistan, Operation Ellamy in Libya, and, back home, Operation Olympic for the 2012 Summer Olympics in London. Recently, the Sea Kings were deployed in the Middle East in support of Operation Kipion, a combination of Royal Navy activities that serve a deterrence and presence function in the Gulf region.

With the retirement of the Sea Kings, this type of surveillance responsibility will pass on to Leonardo AW101 Merlin HM.2 helicopters equipped with the more advanced Crowsnest system, which includes a 360-degree radar fitted to the mid-fuselage of the aircraft. The Merlin already performs a number of important roles for the Royal Navy, including detecting submarines and undertaking humanitarian aid duties.

According to Commander Chris Hughes, 849 Squadron's commanding officer, when two new carriers are operational, the Merlin will be essential for providing a "ring of steel" around them, "making sure that we have got an absolutely fundamental understanding of what is out there and threatening the carrier out to a decent range."

Lockheed Martin, as the prime contractor for Crowsnest, will integrate the selected Thales solution onto the Merlin. This work will be supported by Leonardo Helicopters, which will modify the fleet to fit Crowsnest. Eventually, this system should have connectivity with the U.K.'s Lockheed Martin F-35 fighters, Hughes said.

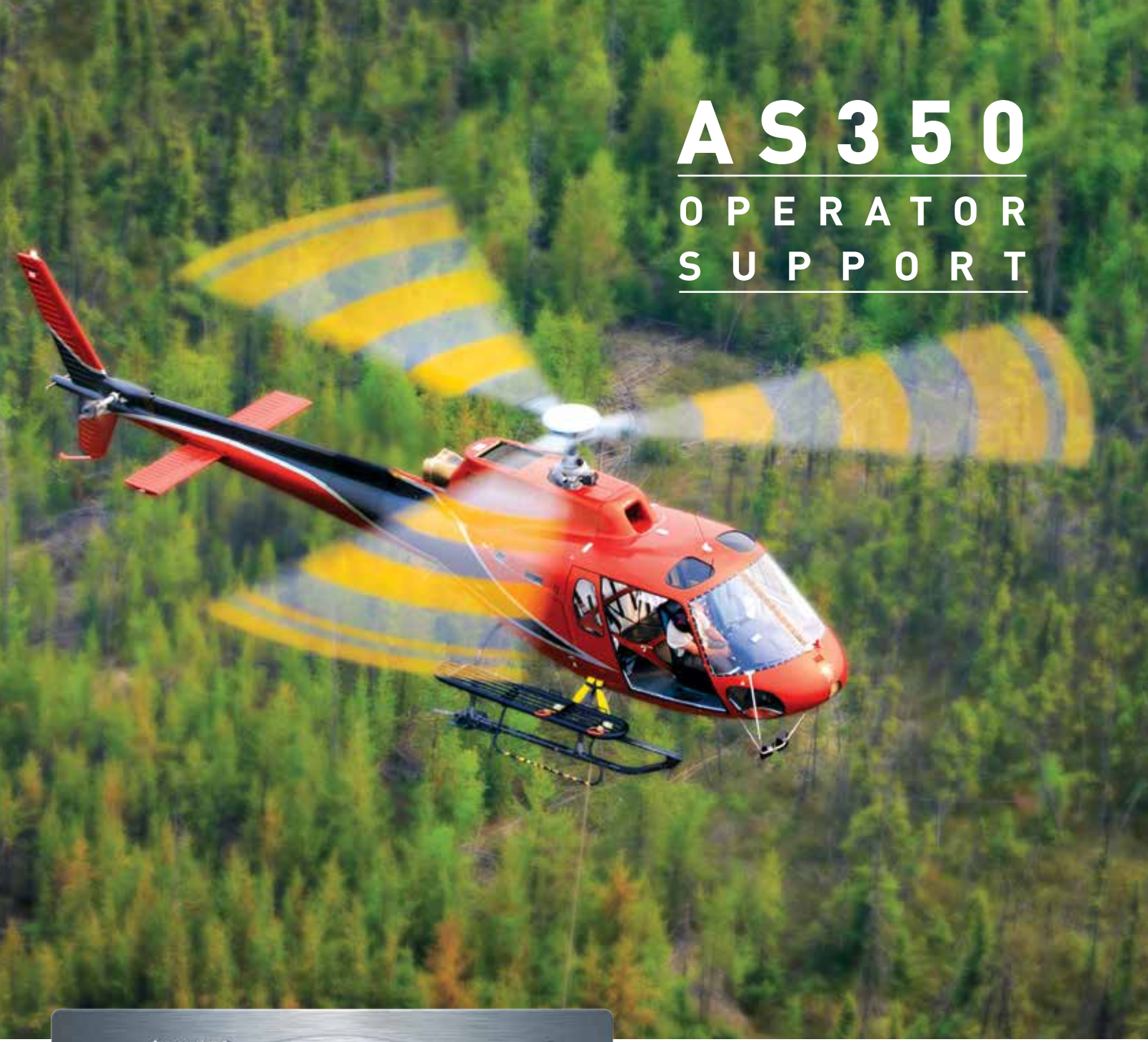
With the upgrade from the aging Sea King platform, Hughes said, "We're taking the opportunity by taking capability across to the Merlin Mk2 to upgrade that as well, and so there is an increase in performance, detection ranges and there's a vast improvement in operator interoperability with the kit. So there's a whole host of things that we are improving as we go into the Merlin Mk2 Crowsnest."

During this transition, 849 Squadron will shrink to a small team, who will later regrow the squadron as the capability comes online and the program matures. In the meantime, it's a fond and reflective goodbye for the Sea King's crews.

"The Sea King will be one of, if not the, last truly pilot's aircraft. There is no automation or computers in the front, you have to fly it where you want it to go and it is an absolute pleasure," said Lieutenant Commander "Tank" Murray, a pilot who has logged more than 8,200 flight hours in the model. Murray was at the controls of one of 849 Squadron's last Sea Kings for their very final flight on Sept. 26 — only six weeks short of the 30th anniversary of his first flight in one.

"She has taken me round the world and occasionally past the limits of her published performance, but has always brought me and my crew back safe and sound," he said.

AS350 OPERATOR SUPPORT



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Scenes from Red Flag-Alaska

Missions flown from Ladd Army Airfield during Red Flag-Alaska 18-1 often consisted of mixed formations.

Crews had limited time to prepare for their missions, adding to the realism of the exercise.

BY ERIK BRUIJNS
PHOTOS BY AMIT AGRONOV

Just 20 miles northwest of Eielson Air Force Base, almost tucked inside the city limits of Fairbanks, Alaska, is Fort Wainwright, home of the "Arctic Warriors." This large U.S. Army complex includes Ladd Army Airfield and is home to the United States Army Garrison and units of U.S. Army Alaska (USARAK), including the 1st Stryker Brigade Combat Team, 25th Infantry Division (1-25th SBCT), the USARAK Aviation Task Force, and the Medical Department Activity-Alaska.

Helicopter assets at Fort Wainwright include Sikorsky UH-60A/L Black Hawks and Boeing CH-47F Chinooks operated by three companies with the 1st Battalion, 52nd Aviation Regiment (1-52nd AVN); and Boeing AH-64D Apaches flown by the 1st Battalion, 25th Aviation Regiment, or 1-25th Attack Reconnaissance Battalion (ARB).

In late April and early May this year, Red Flag-Alaska 18-1 provided these helicopter units with an opportunity to participate in the multi-national exercise, which provides joint offensive counter-air, interdiction, close air support, and large force employment training in a simulated combat

The distinctive skis on these helicopters help them land in muskeg, a type of swamp or bog that is common in their Arctic operating environment.

Missions undertaken by Fort Wainwright's helicopters during Red Flag-Alaska 18-1 ranged from close air support to troop insertion and extraction.

environment. All four of the units — 1-25th ARB with its Apaches; A/Company 1-52nd AVN with its Lima-model Black Hawks; B/Company 1-52nd AVN with its F-model Chinooks; and C/Company 1-52nd AVN with its Alpha-model Black Hawks — flew daily missions in support of the exercise.

Requests for specific missions came in to the units on an ad hoc basis. This meant that crews were informed of their specific missions only on the day before, giving them minimal preparation time, but adding to the realistic feel of the exercise. Preparation for each mission was done the night before each flight, with crews then showing up three hours in advance of each mission to get updated information and weather.

The assigned missions ranged from close air support to troop insertion and extraction, including picking up and moving multiple joint terminal attack controllers (JTACs) to a landing zone close to a live firing range. Missions often consisted of mixed formations and were flown from Ladd Army Airfield directly.

The exercise highlighted the versatility and flexibility of the units and their diverse aircraft. And it was only one of four Red Flag-Alaska exercises planned for this calendar year, all designed to help the U.S. and her allies prepare for a range of constantly evolving international threats.

Pro Flight Gear offers physiology and ALSE training to aircrews


Pro Flight Gear offers instruction in a variety of topics related to aviation medicine and life support equipment. **Pro Flight Gear Photo**

BY DAYNA FEDY

Pro Flight Gear, headquartered in Marana, Arizona, is providing aircraft operators with physiology and aviation life support equipment (ALSE) training designed to improve the safety and efficiency of their operations.

The company currently has three certified instructors who teach courses on topics such as spatial disorientation, situation awareness, aviation nutrition, fatigue management, and high altitude acclimation, to name a few.

"We adjust [the courses] for the organization," said Kevin Divers, staff physiologist at Pro Flight Gear. "They hire us, and we learn more about exactly what they do — it's highly tailored."

Pro Flight Gear's spatial disorientation courses focus on identifying the ways in which different flight profiles can cause the body to become disoriented; for example, when pilots experience flicker vertigo from hovering with the sun directly overhead. Instructors suggest ways to prevent these issues through mission planning before flight, as well as procedures to minimize the effects in flight once a pilot recognizes the situation.

"A lot of it is reminding [pilots] to trust their instruments and [give] the controls to another pilot if possible," Divers said.

Situation awareness is another focus of Pro Flight Gear's training; Divers defined it as "how well your training and prep is helping you maintain the proper picture of what is going on around you" (distinguishing it from situational awareness, which he described as "a pre-action to a task"). With the variety of glass screens available in cockpits today, the company offers courses on strategies for preventing information overload from screens while maintaining a proper scan outside the windscreen. The courses are designed to improve pilots' ability to maintain a full picture of what is going on around them while behind the controls.

And, to ensure that pilots are well equipped to handle any in-flight issues, the company helps organizations determine peak performance times for aircrews. This comes down to observing a pilot's workload, when they tend to get called in, their normal sleep hours, and diet. Based on this information, Pro Flight Gear can assist with schedules to best accommodate pilots' peak performance times.


Pro Flight Gear provides pilot students with strategies for enhancing their situation awareness and avoiding information overload in flight. **Pro Flight Gear Photo**

"These are things I would do for B-2 crews and Navy Seals to help them have peak performance on missions," Divers said, adding that the company's services are equally relevant to medevac or utility operators.

Pro Flight Gear also specializes in ALSE training on any type of equipment a company operates with. "We recently went out to the Delaware State Police, and we taught them how to do maintenance on the three different types of helmets they have," Divers said. "We had them take apart and put back together helmets, we talked about common failures and how to fix them, and then we worked with the person in charge of helmets overall to talk about record keeping — just tailoring it to what they can handle."

This type of training offers a cost-efficient solution for companies to keep equipment relevant, Divers said. "We know an organization is sometimes stuck because that year all they could afford was a certain helmet, so we do everything we can that is cost savings to the user."

Divers said the company customizes ALSE training based on the equipment an organization carries in its shop, encompassing anything from harnesses to night vision goggles. And for operators in search of new ALSE, Pro Flight Gear sells a variety of equipment designed to improve comfort and safety, including Alpha Eagle helmets, in-ear systems, and helmet liners and bladders.

The demand for aviation life support equipment has recently inverted from civil aviation to the military sector, with military operators being the company's biggest customers right now, Divers added.

"Right now it's mainly getting our foot in the door and showing [organizations] the capabilities we have."

RotorBits

AMS Heli Design's lightweight interior was selected as an ideal fit for SARCAMS' multi-role operations. **AMS Heli Design Photo**

AMS Heli Design delivers AW119Kx helicopters to SARCAMS

AMS Heli Design, LLC has announced the delivery of two Leonardo AW119Kx helicopters outfitted with the AMS Heli Design lightweight emergency medical services (EMS) interior to South African Red Cross Air Mercy Service (SARCAMS).

The helicopters, formerly operated by REACH Air Medical, were retrofitted with the lightweight EMS interior at the company's hangar facility in Denison, Texas. Other services provided to SARCAMS included structural repairs associated with the removed medical interiors, routine maintenance, disassembly for overseas transport, and containerized delivery.

The installation of the lightweight interior resulted in a significant weight savings of 103 pounds (46 kilograms), while at the same time providing an oxygen bottle with 35 percent more capacity and an articulating stretcher for improved patient handling.

SARCAMS is a non-profit organization that provides both fixed- and rotary-wing aeromedical services, along with helicopter external load operations and health outreach support services, to communities in both rural and urban areas across South Africa.

AMS Heli Design CEO Andrea Girolin said the lightweight medical interiors are an ideal solution for SARCAMS' multi-role operations in hot-and-high environmental conditions.

"I was grateful to receive this challenge since I know the value of our kit," Girolin stated. "It adds incomparable operational advantages through the seat allocation and articulating stretcher, and the weight saving is amazing thanks to the use of new materials and interior arrangements."

Airbus delivers the first of 100 H135s for China

The first of 100 H135 helicopters destined for China will perform HEMS missions in Qingdao and the surrounding area. **Airbus Helicopters Photo**

Airbus Helicopters has delivered one H135 to the Health Commission of Qingdao in the Chinese province Shandong, making this helicopter the first of 100 H135s to be delivered to China per a framework agreement signed in June 2016.

The H135 was delivered in a helicopter emergency medical services (HEMS) configuration and will perform life-saving EMS missions in Qingdao and the surrounding area. It is the first H135 to be delivered to China with Airbus's latest generation Helionix avionics suite, developed to increase safety and decrease pilot workload.

At a ceremony marking the delivery on Sept. 28, United General Aviation Industrial Development Co. Ltd. (UGA), Airbus Helicopters' distributor in China, signed a contract with Eastern General Aviation Company for two H135s. UGA has also previously secured a framework agreement with Qingdao Huatong Financial Leasing Co. Ltd. (Huatong Leasing) for six H135s.

The first five H135s of the order for 100, including the one delivered on Sept. 28, are being assembled in Donauwörth, Germany, where Chinese final assembly line (FAL) employees have been receiving on-the-job training from their German counterparts since April 2018. The remaining 95 will be assembled in Qingdao on the H135 FAL, which broke ground in 2017. The construction of the FAL is expected to be complete by the end of 2018 and will enter into operation in early 2019, on schedule.

"This delivery represents the first of many milestones supporting our commitment to serve the Chinese market with H135s made in Qingdao," said Bruno Even, CEO of Airbus Helicopters. "We are proud of our ambitious 50-year partnership with China and cannot imagine a better way to kick off our next 50 years together."

Airbus Helicopters claims to hold the leading position in the Chinese civil and parapublic helicopter market. As of August 2018, there were approximately 280 Airbus helicopters flying in China serving 75 customers.

Airbus said it is committed to working hand-in-hand with Chinese administration, private operators and industrial partners to meet the rotorcraft needs of this growing market, which has experienced annual growth of 20 percent in recent years.

Stars aligned for L.A. County Fire helicopter rescue

The crew of the L.A. County Fire Department's Copter 14 rescued a stranded adult man from the Dillon Divide area above Tujunga, California, on Sept. 17.

BY ELAN HEAD
PHOTOS BY CURTIS MORGAN

Curtis Morgan was in the right place at the right time.

On the evening of Sept. 17, the director and cinematographer was in the Angeles National Forest north of Burbank, California, when he helped set into motion a helicopter rescue by the Los Angeles County Fire Department.

As he recounted on his personal Instagram, Morgan had traveled into the mountains along with the film composer Cyrus Reynolds to do some drone light testing, away from the cultural lighting of the L.A. metropolitan area.

"We had everything ready to go when the cries burst out," he wrote, describing "faint cries for help blended with the howls of wolves and roars of lions."

According to Morgan, a local man who was in the area scouting for a deer hunt pulled up on his motorcycle and began visiting with them. The man explained that the animal sounds were coming from a private animal sanctuary in the valley below.

"So that case was closed but what about the cries for help?" Morgan wrote. The man who was scouting for deer used his binoculars to scan the surrounding hillsides, discovering a vehicle that was stuck along the fire road.

After further searching and calling, the group identified a man who appeared to have fallen down a ravine and was crying for help and water.

While the local man went to aid the victim, Morgan and Reynolds "were about to race down the mountain to get cell service to call search-and-rescue when a fire marshal comes driving by . . . I flagged him down and told him what was going on," Morgan wrote.

Los Angeles County firefighters were dispatched to the call, as was the crew of Copter 14, a Bell 412 based at the Barton Heliport, which was only a five-minute flight away.

Senior pilot Mike Sagely was at the controls of the aircraft, with crewmembers Ron Massie and Ken Miller in the back. It was dark at that point, and Sagely and Massie, the hoist operator, were wearing night vision goggles.

"A night [rescue] is always a little more complicated. . . . We have to spend a little more time doing the reconnaissance," Sagely told *Vertical 911*. "There was a very large set of power lines just down canyon from where we were doing the rescue."

However, Sagely was able to position the aircraft safely and descend to within 100 feet of the ground for the hoist. Because he was close to rising terrain, he had good visual references, which made it "easier to hold the aircraft steady," he said.

Miller was lowered on a hoist cable to the victim, who had been stranded for several days. While the man was dirty and thirsty, he was also "coherent and responsive," and "doing well enough that we didn't have to do any intervention right then," Miller said.

Miller placed the man into a "screamer suit," then Massie hoisted them into the aircraft. The patient was transported to a nearby hospital for medical attention. Although he was initially described in news reports as between 70 and 80 years of age, in fact he was somewhat younger than that, Miller said.

Watching and photographing the rescue from the ground, Morgan — who is best known in the helicopter community as the director of *The Art of Flight* — was impressed with the precision of the operation.

"It was amazing to see the pilot come in," Morgan told *Vertical 911*. "He was extremely surgical. He quickly assessed the power lines and the terrain and committed to his line; moments later he was gone with the man safely secured inside. For him it was probably a walk in the park but from the ground, from my perspective, it was heroic."

For his part, Sagely said, "As far as a lot of the rescues that we have, this one was reasonably routine from my perspective." He added, however, that no hoist mission can be taken for granted, because there are so many different things that can go wrong — especially for the crewmembers at either end of the hoist cable.

"Our [crewmembers] are just phenomenally experienced . . . They've done hundreds and hundreds of these rescues, and they are very good at recognizing problems early in the process, which allows the hoist operator to stop any potentially unsafe condition before it becomes dangerous or life threatening," he said. "It's a very comforting feeling as a pilot, because we can't see what is happening in the back."

For Morgan, witnessing the successful completion of the rescue was "so divine and so epic," he said. As for being in the right place at the right time?

"I would like to say it was more than a coincidence," he told *Vertical 911*.

If you would like to submit a press release or if you have a new product or service that you believe is newsworthy, please email our news editor at news@verticalmag.com.

Curtis Morgan and his friend had been setting up for drone light testing when they heard cries for help.

A fire marshal who happened to be driving by was able to call for reinforcements to effect the rescue.

Responding to Florence

In mid-September, Hurricane Florence made landfall near Wilmington, North Carolina, dropping more than 35 inches (89 centimeters) of rain in some parts of the state and causing widespread flooding both inland and along the coast. By press time, at least 48 deaths had been attributed to the storm, which was estimated to have caused more than $38 billion in damage.

As ever, helicopters played a critical role in responding to the storm, both in rescuing victims of flooding, and in transporting emergency personnel and critically needed supplies. Here are photos of some of the helicopters and crews that were involved in those operations.

An Air and Marine Operations Black Hawk flight paramedic prepares equipment for search-and-rescue efforts needed in the aftermath of Hurricane Florence in South Carolina on Sept. 18. **U.S. Customs and Border Protection/Ozzy Trevino Photo**

U.S. Customs and Border Protection, Air and Marine Operations Black Hawk crew from Tucson, Arizona, rescue two adults and a dog from the Cape Fear waterway while on a search-and-rescue mission that originated in Raleigh, North Carolina, during the early evening hours of Sept. 17. **U.S. Customs and Border Protection/Jaime Rodriguez Sr. Photo**

An MH-60T Jayhawk helicopter crew from Coast Guard Air Station Elizabeth City evacuates residents from Rocky Point, North Carolina, due to flooding caused by Hurricane Florence. A total of 26 adults, 11 children, seven dogs and four cats were evacuated from the neighborhood. **U.S. Coast Guard/Petty Officer 2nd Class Dustin Williams Photo**

Waterway Conservation Officer Anthony Beers, with Pennsylvania Helicopter Aquatic Rescue Team, looks out the side of a UH-60 Black Hawk helicopter to identify citizens in need of assistance at Myrtle Beach, South Carolina, Sept. 17. **Pennsylvania National Guard/Capt. Travis Mueller Photo**

A UH-60 Black Hawk helicopter operated by soldiers with the South Carolina National Guard parks on a blocked roadway outside the Horry County emergency operations center in Conway, South Carolina, on Sept. 17. The road was blocked due to flooding. **Pennsylvania National Guard/Capt. Travis Mueller Photo**

A Coast Guard Air Station Clearwater MH-60 Jayhawk aircrew searches for survivors of Hurricane Florence in North Carolina on Sept. 18. Coast Guard air stations from around the country sent aircraft and personnel to Air Station Elizabeth City, where response efforts were coordinated.
U. S. Coast Guard/Auxiliarist Trey Clifton Photo

A Coast Guard Air Station Clearwater MH-60 Jayhawk aircrew searches for survivors of Hurricane Florence in North Carolina on Sept. 18.
U. S. Coast Guard/Auxiliarist Trey Clifton Photo

U.S. Army soldiers from the Alaska National Guard's 1-207th Aviation Medevac Detachment offload a UH-60 Black Hawk helicopter from a C-17 Globemaster III cargo aircraft on Sept. 17. The medevac team from Joint Base Elmendorf, Alaska, arrived at McEntire Joint National Guard Base, South Carolina, to assist with search-and-rescue and relief efforts during the aftermath of Florence. **U.S. Air National Guard/Senior Airman Megan R. Floyd Photo**

The latest AW101 variant benefits from more than 30 years of design maturation.

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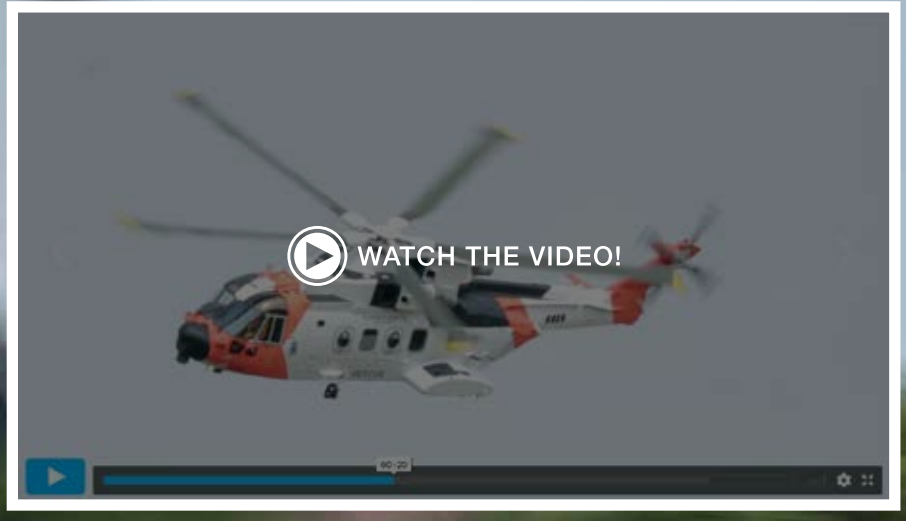
AN INVESTMENT IN CAPABILITY

As our test pilot discovered, the Leonardo AW101-612 SAR helicopter offers some impressive upgrades over its predecessor.

By Robert Erdos | Photos by Lloyd Horgan



If you're planning to become hopelessly lost, my advice is to do it in Norway.

That was the author's conclusion after *Vertical 911* was invited to the Leonardo Helicopters facility in Yeovil, England, to fly the latest variant of the AW101 search-and-rescue (SAR) helicopter.

The machine was brand new, pending delivery to Norway, but represented a configuration that Leonardo has proposed to the Royal Canadian Air Force (RCAF) as an upgrade solution for Canada's fleet of CH-149 Cormorant SAR helicopters.

The CH-149 Cormorant entered RCAF service in 2002. While not an old airframe by Canadian standards, the subsequent evolution of the model has left this version somewhat dated, and Leonardo maintains that obsolescence issues are beginning to adversely affect operational availability.

Team Cormorant is an industry consortium composed of Leonardo Helicopters, IMP Aerospace & Defence, CAE, GE Canada, and Rockwell Collins Canada.

The group's unsolicited proposal to the Air Force is intended to guard against creeping obsolescence and ultimately to reduce the cost of operating the helicopter. Under Team Cormorant's proposal, the RCAF would also acquire a training facility with a modern full-mission simulator, likely to be installed at 19 Wing Comox, British Columbia.

The machine on offer to Canada is an extensively upgraded version of the RCAF's existing airframe, based upon the AW101-612 configuration; 16 of which are destined for Norway under its Norwegian All-Weather SAR Helicopter (NAWSARH) program.

Team Cormorant's proposal to Canada also seeks to take advantage of nine former VH-71 Kestrel airframes from the

1 // The NAWSARH cockpit is configured with a state-of-the-art five-screen Rockwell Collins avionics suite, including a modern AMS with a trackball interface. **2 //** Leonardo senior test pilot Richard "Russ" Grant demonstrated the AW101's handling for the cameras. **3 //** Russ Grant, foreground, with chief AW101 FTE Andy Cotton. **4 //** *Vertical 911*'s test helicopter was the sixth production machine destined for Norway.

cancelled U.S. presidential helicopter program, acquired by the RCAF in 2011. These would be used to augment the Cormorant fleet from the current 14 — widely acknowledged as inadequate for Canadian SAR requirements — up to potentially 21 machines.

Enhanced fleet size would allow the RCAF to base the Cormorant at 8 Wing Trenton, Ontario; a move that would improve SAR capability in the vast Trenton SAR region.

Compared to in-service CH-149 Cormorants, the upgrades on offer include new, more powerful, full-authority digital electronic-controlled (FADEC) General Electric CT7-8E turboshaft engines; a more modern Rockwell Collins cockpit and avionics suite; improved aircraft management system (AMS); and a newly designed, four-axis dual-duplex digital automatic flight control system (AFCS).

The sensor package promises the biggest capability upgrade, and includes an electro-optical surveillance system; a multi-mode active electronically scanned array (AESA) radar; cell phone detection and tracking system; and marine automatic identification system (AIS) transponder receiver.


EXIT
EXIT

HOVERING COULD ONLY GET EASIER
IF I UNROLLED A COT AND TOOK A NAP.

AN OPPORTUNITY FOR COMPARISON

In 2016, *Vertical 911* dispatched me to fly the CH-149 Cormorant with RCAF's 442 Squadron at CFB Comox. It was an opportunity for this former Air Force CH-113/A Labrador SAR pilot to see first-hand how the Cormorant had changed the job I did decades ago in those same mountains.

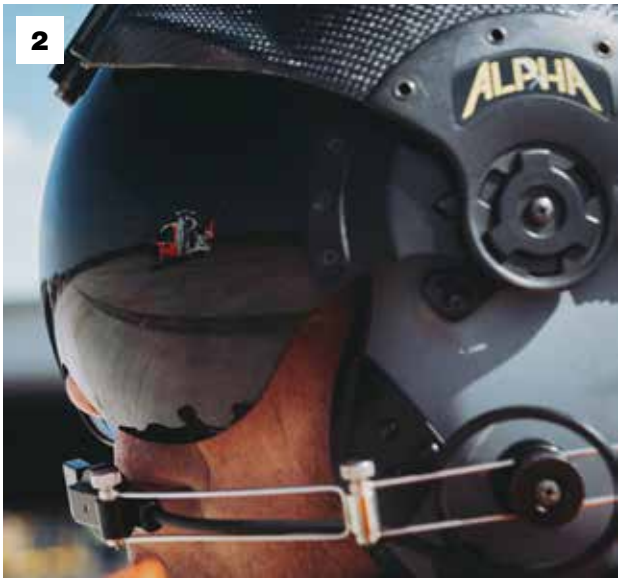
I recall that the Cormorant brought a lot of new technology to the SAR business, but the basic mission, like the mountains around us, was unchanged.

After that flight, I reported: "Flying SAR was still a matter of cautious and skillful flying, using maps, and looking out the window." That experience left me with great regard for Air Force SAR crews and for the operational capability of the Cormorant, but also bemused to find that the business of searching still basically relied upon the "Mark 1 eyeball."

A flight in the latest variant of the AW101 was a terrific opportunity for a more contemporary comparison. The experience would demonstrate that leading-edge systems — particularly electro-optic sensor technologies — offer SAR capabilities that are as much a generational improvement over the current Cormorant as the Cormorant was over my beloved ol' Labrador.

Leonardo Helicopters test pilot Richard "Russ" Grant kindly offered me the right seat for our demonstration flight. Veteran flight test engineer (FTE) Andy Cotton served as sensor operator. Conditions were ideal, under a clear sky with a warm (75 F/24 C) gentle breeze along the century-old former Westland grass runway.

Our test helicopter was the sixth production machine destined for Norway, operated by Leonardo under U.K. Ministry of Defence registration ZZ015. The helicopter's empty weight was 11,039 kilograms (24,337 pounds) with much of its SAR interior yet to be fitted. Adding 2,000 kg (4,409 lb.) of fuel (roughly half its 4,150-kg/9,150-lb. capacity) and three crewmembers brought the takeoff mass to 13,517 kg (29,800 lb.), which was well below the maximum allowable gross weight of 15,600 kg (34,392 lb.).



THE MACHINE ON OFFER TO CANADA IS AN EXTENSIVELY UPGRADED VERSION OF THE RCAF'S EXISTING AIRFRAME, BASED UPON THE AW101-612 CONFIGURATION.

The Cormorant that *Vertical 911* flew with RCAF's 442 Squadron, although fully equipped for SAR with a standard fuel load of 2,400 kg (5,291 lb.) and a crew of six, had a gross takeoff mass of 13,800 kg (30,424 lb.), compared to a maximum allowable gross weight of 14,600 kg (32,187 lb.). Direct comparison is difficult to establish, but the Norwegian machine is both heavier with installed systems and has more installed power than the CH-149, so the net result may be expected to be about the same operational power margin.

Rapid dispatch can be facilitated by starting the auxiliary power unit (APU) while strapping in. Grant talked me through the engine starting procedure from memory. Air Force crews will use a checklist, but the procedure was quick and straightforward.

Engine controls consisted of three rotary knobs on the overhead panel in place of engine condition levers. I monitored the start, but Grant advised that in the event of a start-up malfunction the FADEC would shut down the engine faster than the pilots could react. We started the No. 1 engine first to power the accessory drive, providing hydraulic and electric power and bleed air. Starts of engines No. 2 and 3 were done simultaneously. Pre-flight checks and initialization of the aircraft management system (AMS, but think "master computer") took Grant only minutes.

Despite the functional similarity of the cockpit to the CH-149, the impression that I was amidst unfamiliar new technology was immediate. As ground crews pulled the chocks and busied themselves around the helicopter, the onboard obstacle proximity lidar system (OPLS, where lidar is "light detection and ranging," since I needed to ask, too) annunciated their presence around the turning rotors.

1 // Rapid dispatch can be facilitated by starting the auxiliary power unit while strapping in. **2** // Searching in the legacy Cormorant still basically relies upon the "Mark 1 eyeball." That will change with the latest variant. **3** // A trained sensor operator in the cabin proved invaluable.

The demonstration flight proved that an upgraded Cormorant would be a significantly more capable Cormorant.

This system, which Grant described as being like the parking sensors in a car, provided a pop-up display and discretely pitched audio cues depicting the range and azimuth to obstacles around the helicopter. Having come from a generation where we squinted into a landing light beam to guesstimate rotor clearance from obstacles, all I can say is, I want one!

The Norwegian AW101 flies identically to the Cormorant. With its new AFCS, the flight controls are slightly heavier, but I know that only because Grant told me.

We tried all the flight control modes, with the only surprise being how pleasantly it maneuvered for such a large machine. I spent most of my time in the hover alternating between attitude mode and the impressive automated hover mode.

By depressing a button on the cyclic, a hover mode would lock the helicopter in place using a four-axis hold function, maintaining velocity, heading, and radar altimeter height. Each click on the cyclic-mounted switch smoothly varied the selected velocity by one knot. A switch on the collective trimmed the reference heading. Hovering could only get easier if I unrolled a cot and took a nap.

Cotton demonstrated his ability to command the hover mode using the flight engineer's hoist controller. His precision was evident in the cockpit through the video feed from the hoist, displayed on the multifunction display. Times have changed, indeed.

The cockpit is a significant upgrade from the current CH-149. The AFCS is far more capable, and the cockpit systems are — with a few exceptions — actually integrated into a singular cohesive system.

Nobody could say that about the legacy Cormorant. Monochrome screens, a clunky AMS interface, and limited systems integration combine to give the CH-149 a cockpit a feeling the author described as "very 1990s."

AN UPGRADED RCAF CORMORANT WOULD BE A MORE SYSTEMS- AND SENSORS-INTENSIVE CORMORANT, WITH CONSEQUENTIALLY ADDITIONAL DUTIES AND WORKLOAD FOR THE CREW.

By comparison, the NAWSARH, configured with a five-screen Rockwell Collins avionics suite, including a modern AMS with a trackball interface, represented the state-of-the-art.

An upgraded RCAF Cormorant would be a more systems- and sensors-intensive Cormorant, with consequentially additional duties and workload for the crew. The RCAF may find it necessary to adapt how it conducts SAR.

For Norwegian service, the machine is configured with a mission console for a dedicated systems operator, who serves as the mission commander. Biased by my prior experience, I was dismissive of the idea until we flew — but the crew was already quite busy enough, in my opinion, and a dedicated systems operator proved invaluable.

The systems operator requires considerable skill and training, however. The RCAF will find that someone will be required to work the new sensors, and that "someone" must be trained and proficient in the use of radar and electro-optical search techniques.

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SENSORS MAKE THE DIFFERENCE

Every SAR mission is unique, so at the risk of oversimplifying, a good SAR helicopter needs to do three things: get to the scene, find the victim(s), and effect a rescue. While the upgraded AW101 is overall more capable, it was sensor technology, and its promise of substantively enhancing SAR capability in the search phase, that were most impressive.

Departing southbound from Yeovil, Grant selected a digital map overlay of the marine autonomous identification system (AIS) transponder network off England's busy south coast. More than 200 vessels were visible to the system, with the names and particulars for each vessel being available with a "right click" on the cursor over the vessel icon. A further click was sufficient to activate the selected vessel as an AMS waypoint. It didn't require much explanation to see how AIS would be helpful in a marine rescue.

In lieu of rescuing someone against their will from an actual vessel, Grant selected a feature on the shoreline to demonstrate a coupled approach. It took Grant one click with the trackball to activate an autopilot-coupled approach.

While the helicopter performed a procedure turn into the wind in preparation for descent, Grant used AESA radar data, overlaid upon the primary flight display, to supplement the GPS navigation. The AW101 actually had two radars onboard: a simple weather radar solely for the "front end" crew, and Leonardo's own "Osprey" — a gee-whiz, electronically scanned, multi-mode search radar.

While the radar backed up the GPS, Cotton scanned the location for obstacles from the cabin with the electro-optical sensor, alternating between a well-stabilized daylight television image and an infrared image for best resolution. Later, eager to demonstrate that the sensor could see things that our eyes could not, Cotton pointed out a feature on the screen. "France," he explained, at a range of 108 kilometers (67 miles). "I've got it on radar, too," he furthered. Nice.

En route back to Yeovil, Cotton demonstrated the onboard cellular telephone tracking system. There were understandably quite a few cell phones in use in the U.K. at the time, but the company's particular "Nokia e51" phone was quickly "rescued" from where they had hidden it for my benefit off the factory site.

While only minimally integrated into the avionics, the system provided a bearing pointer and range to the phone through a pop-up window on the multi-function display. In most cases, the phone will obligingly transmit its coordinates, and can exchange both text and voice messages with the helicopter. The operational value of such capability needs little elaboration.

While the CH-149 Cormorant has proven capable, it was never an inexpensive helicopter to operate. That cost reflects the commitment by the RCAF to SAR as a core capability.

If an investment in that capability is warranted, what better investment than taking a proven, existing airframe and leveraging it to deliver more capability at a reduced operating cost?

The RCAF is on the right track.

Robert Erdos | Robert Erdos is a contributing editor for *Vertical 911* magazine. He is a graduate of the U.S. Naval Test Pilot School and a retired professional test pilot. Also an aviation enthusiast, his spare time activities include displaying vintage airplanes and flying his RV-6 kitplane.

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A Classic Act

Story & Photos by Dan Megna

From its beginnings in 1988 as a part-time single helicopter operation, Utah-based Classic Air Medical has matured into a prominent air medical and SAR provider, serving some of the most primitive yet breathtaking regions in the western U.S.

Classic Air Medical has grown considerably since its humble beginnings on the shores of Lake Powell, but its culture and focus remain largely unchanged.

The Colorado Plateau contains some of the most remote and wildly scenic landscapes in the United States. Spreading an estimated 240,000 square miles (385,000 square kilometers) across Colorado, Utah, Arizona, and New Mexico, the Plateau's high deserts, forests, and vast expanses of eroded red sandstone create magnificent natural beauty. The region is home to 10 national parks including Zion and Grand Canyon, as well as dozens of national monuments and wilderness areas. Its wild, unspoiled beauty attracts millions of visitors annually.

In the early 1980s, this natural grandeur was a calling for two brothers from Salt Lake City, Utah. For Brent and Mark Henderson, Lake Powell, on Utah's southern border with Arizona, was a favorite destination. It was remote, set hundreds of miles from the nearest large city and connected by only a few ribbons of desolate two-lane highway. Along with family and friends, the brothers loved spending time exploring the lake's nearly 2,000 miles (3,200 kilometers) of shoreline set beneath towering red sandstone cliffs.

The brothers were entrepreneurs and business partners, owning and operating a number of roller skating rinks. Together, the pair had become quite successful. But when a neighbor approached them with a business opportunity to bankroll a helicopter, one can imagine it was met with skeptical curiosity. After all, the brothers had no experience in aviation whatsoever.

At the time, seismic work supporting oil-and-gas exploration was expanding throughout the region and the neighbor, who was a helicopter pilot, recognized the opportunity. He proposed that the brothers purchase a Bell 206 and he would operate the aircraft to generate revenue. The brothers considered it a sound opportunity and made the investment. This was the surprising beginning of what would eventually become Classic Air Medical, which today is a major provider of helicopter emergency medical services (HEMS) throughout the Colorado Plateau and beyond.

1

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FROM SEISMIC TO MEDEVACS

Beginning in 1984, the operation with the Bell 206 enjoyed much success. By 1987, however, seismic work had slowed considerably and the helicopter was no longer generating adequate revenue. Ultimately, the neighbor had no choice but to walk away from the helicopter, leaving it to the brothers.

When attempts to sell the aircraft failed, the brothers hired a pilot in an effort to keep it working. And because most other helicopter operators had pulled out of the area, the Hendersons were somewhat successful in finding enough work to sustain the helicopter.

Later that year, during a family outing to Lake Powell, the brothers experienced a pivotal moment. A friend's son took a bad fall from a cliff and was severely injured. It took four long hours to transport him by boat across the lake to medical attention. The brothers then recognized how their helicopter could have greatly reduced the transport time and alleviated so much anguish and suffering.

With events of that day fresh on their minds, the brothers moved swiftly. They sent their helicopter and pilot to the tiny airport in Page, Arizona, on the shores of Lake Powell. They hired two emergency medical technicians as a medical crew and on Memorial Day, 1988, began service as Classic Lifeguard.

Initially, the program operated only during the peak recreation seasons at the lake, but it was successful enough to become a year-round operation within a couple of years. A second Bell 206 was acquired and the brothers committed their full attention to the business. As they gained experience and confidence, they

1 // Classic medical crews and pilots are equally at home working from improved helipads or rugged outcroppings like this one near Moab, Utah. **2 //** Classic employs 163 paramedics and nurses who comprise its two-person medical teams, and 51 rotary-wing pilots. **3 //** This Bell 407GXP — based in Los Alamos, New Mexico, at an elevation of 7,300 feet — is the latest addition to Classic's HEMS fleet.


Bell 407GXP


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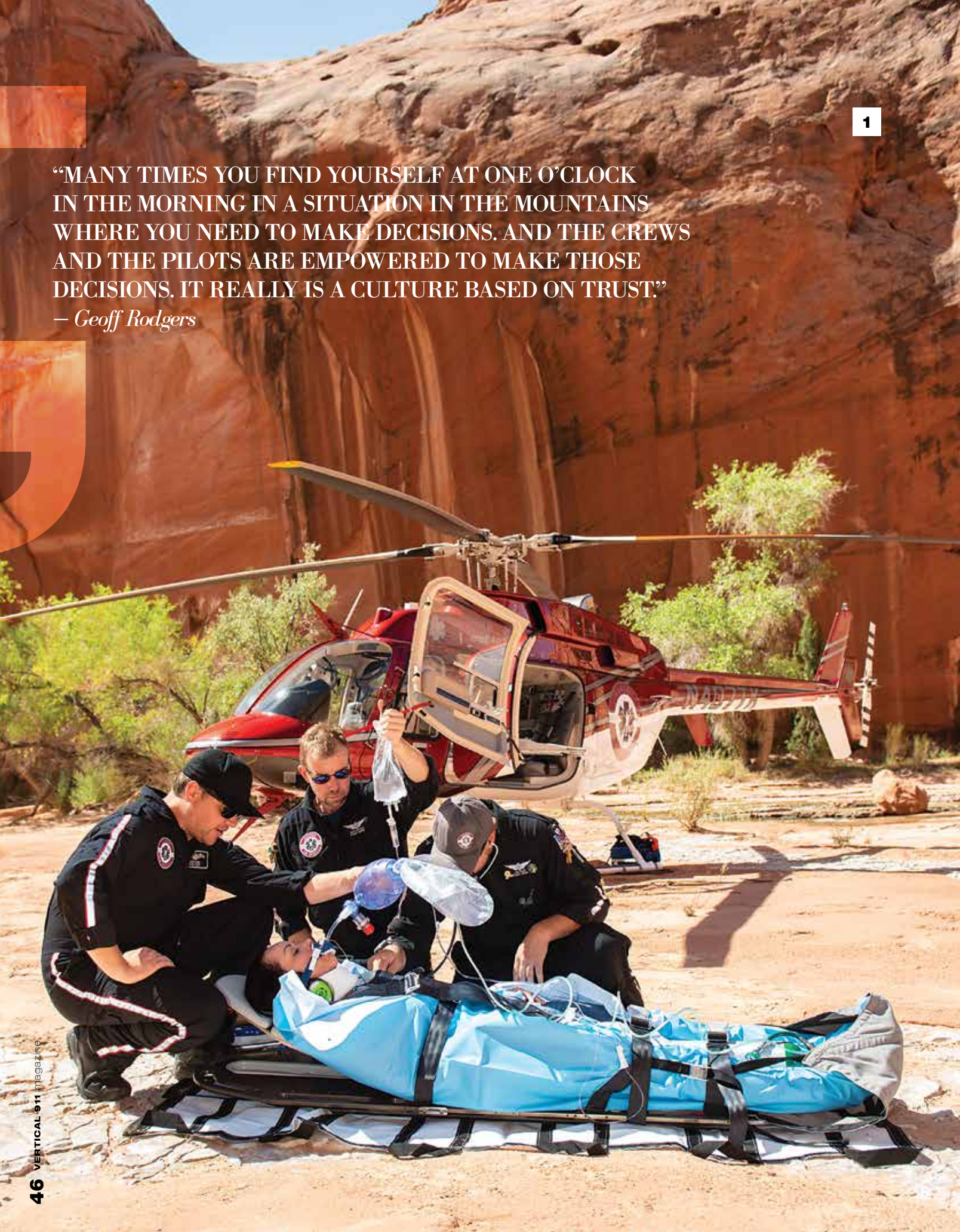

1

"MANY TIMES YOU FIND YOURSELF AT ONE O'CLOCK IN THE MORNING IN A SITUATION IN THE MOUNTAINS WHERE YOU NEED TO MAKE DECISIONS. AND THE CREWS AND THE PILOTS ARE EMPOWERED TO MAKE THOSE DECISIONS. IT REALLY IS A CULTURE BASED ON TRUST."
— Geoff Rodgers

recognized other opportunities. They acquired more aircraft — including Bell light singles, a Bell 205, and a Eurocopter (now Airbus) AS350 — and expanded operations to include charter, aerial filming, utility, and firefighting contracts.

In November 1991, tragedy struck the small company when Brent Henderson was killed while flying a Bell 206 at the Salt Lake City Airport. He had recently attained his private helicopter rating and was practicing hovering. Reports indicate he lost control and crashed on the runway.

In the dozen or so years that followed, Classic Lifeguard operations in Page evolved. By the mid-2000s, the company had built a hangar and fixed-base operator (FBO) to house the operation. The Bell 206s were replaced with three Bell 407s. Medical staffing transitioned to paramedics and registered nurses, and crews were certified for night vision goggle (NVG) operations. Additionally, a Beechcraft King Air E90 was brought on line, marking the first of the company's fixed-wing fleet.

In 2011, after 23 years operating solely from Page, Classic Lifeguard began seeking expansion opportunities. The company first chose Vernal, Utah, a relatively small town of 10,000 in north-central part of the state. It was a hub for an emerging oil drilling industry and a portal to the Flaming Gorge National Recreation Area. Other bases followed, including Riverton, Wyoming, and the outdoor recreation destinations of Moab, Utah, and Steamboat Springs, Colorado.

In 2013, Mark Henderson stepped down as CEO. A portion of the company was sold to an investment group. Classic Aviation Holdings (CAH) was created as parent company. After restructuring, Classic Lifeguard became Classic Air Medical (CAM). But in spite of the corporate influence, CAM retained the culture and feel of the original small, family-run company. That was due in part to Tony Henderson, son of co-founder Mark Henderson, being handed the company reins as CEO.

One unique trait of CAM is the management culture and the relationships with the crews. Because most bases are in somewhat remote locations, far flung from one another, there's no practical way to micromanage daily operations. Instead, management and flight crews depend on one another's individual character and competence to forge an authentic culture of trust for one another.

Owen Park, a regional assistant chief pilot and lead training pilot for CAM, has high praise for management's confidence in the crews. "I love flying for Classic," Park said. "They allow me to do what I'm comfortable with and capable of doing, and I think that's part of what makes Classic kind of a special operation. They trust us to be responsible and allow us to take the initiative to do what we've got to do."

Echoing a similar sentiment is CAM pilot Geoff Rodgers: "Many times you find yourself at one o'clock in the morning in a situation in the mountains where you need to make decisions. And the crews and the pilots are empowered to make those decisions. It really is a culture based on trust; they trust us to do the job properly and we trust our management team that there will not be repercussions if we make mistakes or if we have to go 'outside the box.' But let me emphasize, we are not cowboys. There's a very strong safety culture here at Classic."

Nowhere is that trust put to the test more than in CAM's search-and-rescue (SAR) role. SAR is an important mission for the crews and an invaluable resource for the small communities they serve. CAM provides two hours of free aerial support to any SAR mission undertaken by local public safety agencies. While absorbing the costs of such flights does impact the bottom line, Tony Henderson said, "We do it just to be good helpers in the community. It's our way of giving back. And it's definitely appreciated out in those places."

1 // Chief pilot Adam West, left, assists flight nurse Keith Lepsch and paramedic Joe Root in an isolated canyon in the Glen Canyon National Recreation Area. **2** // The cockpit panel of the Bell 407GXP with its Garmin G1000 avionics suite, Technisonic TDFM 9000 multi-band AM/FM radio, and Flightcell DZMx for satellite and cellular voice and data transmission and aircraft tracking. **3** // Aircraft maintenance technician Pete Malcom is one of three techs assigned to the Page, Arizona, base. **4** // Since 2004, Classic medical crews and pilots have been operating with NVGs. They're presently making the transition to Gen-3 White Phosphor systems.

EXPANDING ITS REACH

Since 2013, CAM has maintained a steady expansion across the Colorado Plateau and into neighboring Wyoming and Idaho, adding an average of two to three helicopter bases annually. The company is presently operating 11 bases, each in relatively small communities that see significant numbers of outdoor recreational visitors. These are community-based programs, for the most part, and not affiliated with any particular hospital. Like a number of other community-based air medical providers, CAM offers an annual membership program to cover out-of-pocket costs for individuals who may require their services.

In the past two years, CAM has responded to 3,984 HEMS calls (1,854 for the fixed-wing fleet) and provided helicopter support for 186 SAR missions. The present HEMS fleet consists of one Bell 429 and 11 Bell 407s including two GX models and one GXP. Pilots appreciate the performance of the aircraft in the many diverse environments in which they operate, as well as the advanced instrumentation found in the newer models.

Rodgers, a former U.S. Army pilot who also flew civil helicopters for many years before taking an 18-year hiatus, is now back in the air with CAM flying the 407GX out of Los Alamos, New Mexico. “I flew Hueys and OH-58s in the Army and the 407 is right between

the two in size and performance. It's a comfortable aircraft. I've never not had enough power and it's a fun flying machine. And having only flown old 'steam gauges' and now flying the GX with the Garmin 1000, it was truly a Rip Van Winkle moment. It has so many amazing capabilities for flight planning."

The Bell 429 was recently acquired to serve Pocatello, Idaho. While this too is a community-based program, it does have an affiliation with a local hospital. Henderson said, "We still have the nurses, the paramedics, the pilots, the billing. But we use the hospital's NICU [neonatal intensive care unit] team and we pay [the hospital] when they're used."

CAM recently enhanced its patient care capability aboard all aircraft with ultrasound imaging. Utilizing the Philips Lumify portable ultrasound with a smart tablet, CAM medical crews have advanced capabilities to better monitor and diagnose patients in the field and in flight.

"The ultrasound replaces the stethoscope," explained CAM flight nurse and ultrasound trainer Aaron Friel. "In the air using a stethoscope we can't hear what's going on in a patient's lungs. So we use the ultrasound to see what's going on. We can see the heart pumping, how it's pumping, if it's effective or not. It's also way more accurate in diagnosing different types of shock. I've used it for everything and it's phenomenal. We can treat patients more effectively than ever before. If you're dying, you want me and an ultrasound taking care of you."

Beyond HEMS programs throughout the greater Colorado Plateau, CAM/CAH has other air medical, utility, and charter operations. In Puerto Rico, for example, an AS350 B2 and an Airbus EC135 support an air medical contract. Domestically, a fleet of eight fixed-wing aircraft — including four Pilatus PC-12s, a King Air E90, a Embraer Phenom 100, and two Bombardier LearJet 31s — operate from bases throughout the Plateau region and a base in Alaska for EMS and charter.

The company maintains its headquarters in Woods Cross, Utah, just outside Salt Lake. It's co-located with their maintenance hub, Helicopter Services of Utah (HSU). The 12,500-square-foot facility is a full-service Federal Aviation Administration-approved part 145 repair station, and is recognized by both Bell and Airbus Helicopters as an approved service center.

Field maintenance is handled by mechanics assigned to each individual base. They work 20 days on and 10 days off, and are supported by a number of "rovers" who rotate through the different bases, providing coverage for time off and larger projects.

Because many of the communities CAM serves are small with limited EMS resources, CAM developed a program to improve EMS education. According to CAM chief pilot Adam West, "We wanted to be able to provide education to rural hospitals and rural EMS agencies that don't have access to advanced simulation training mannequins. So we created a training trailer that is used to provide these people with their education as well as provide our own people their annual competency."

The trailer has two sections; one replicates a full functioning hospital emergency room. The other is configured as the medical suite aboard the company's Bell 407s, complete with original Bell parts and capable of simulated NVG operations. While personnel


DANGER


Classic Lifeguard
Air Medical Service

are inside training on scenarios with mannequins, those outside can watch and listen on externally mounted TV monitors.

This year marks 30 years since the Henderson brothers launched their fledging air medical operation on the shores of Lake Powell. Since then, the Colorado Plateau region has experienced an increase in permanent residents and a significant upsurge in the numbers of outdoor recreation users, many pursuing extreme sports and other high-risk activities. Henderson said, “In my state and in the surrounding states we have lots of recreation areas: Lake Powell, Moab, Steamboat... They all have lots of visitors and all kinds of recreation. And any time you have outdoor recreation you also have accidents.”

These trends have driven CAM’s growth and evolution as an operator. Today the company is a truly indispensable EMS and SAR resource for the communities it serves. CAM personnel strive to integrate themselves with the locals and build genuine relationships with small businesses, residents, and EMS agencies. In addition to community involvement, West said, “As a company we’re diligent in our efforts to improve safety, training, communication and to strengthen our family culture on a daily basis. Our ultimate goal is to simply serve, then let our performance speak for itself.”

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* and *Vertical 911* since 2004.

In addition to its HEMS fleet of 11 Bell 407s and a Bell 429, Classic also operates a small utility fleet consisting of two Bell 206s — an L-3 and an L-4 — and an Airbus AS350 B2.

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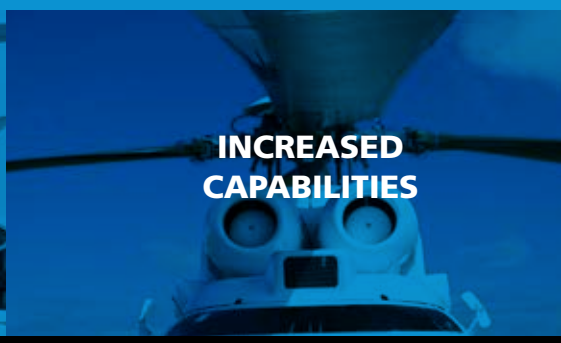

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When a sightseeing helicopter crashed in the Grand Canyon in February of this year, the crew of Classic 2, a Bell 407 based in Kanab, Utah, responded to the call.

On the afternoon of Feb. 10, 2018, a sightseeing helicopter operated by Papillon Grand Canyon Helicopters crashed in the Grand Canyon of Arizona. The accident occurred while the Airbus EC130 B4 with seven people on board — a pilot and six passengers — was making an approach to a landing zone (LZ) on a bluff top within the canyon, some 3,100 feet below the rim.

The LZ is a part of the large Hualapai Indian Reservation, which stretches for over 100 miles (160 kilometers) along the west rim of the Grand Canyon. Papillon and other sightseeing operators have made arrangements with the tribe to land on designated bluffs around Quartermaster Canyon. Once there, passengers can enjoy a brief stay for picnics and to take in the grandeur of the canyon. The Grand Canyon West Airport was constructed on the reservation near the canyon rim specifically to support sightseeing operations.

Witnesses described the helicopter as being on short final to the bluff when it experienced a loss of directional control for a reason yet to be determined. It crashed in a wash at the bottom of a narrow side canyon 200 feet below the top of the bluff, where it burst into flames. Although the accident wreckage was contained to a small area and autopsy reports suggested the accident was survivable, a post-crash fire immediately claimed three lives. Four souls survived the initial event and were in critical need of medical attention.

One hundred miles away in Kanab, Utah, Classic Air Medical (CAM) pilot Owen Park was at home when he received a call from his dispatch. They informed him of the crash and location but could provide few other details.

By the time Park made the short drive to the Kanab Municipal Airport, the sun had set and the glow in the western sky was fading to dusk. At the hangar he met up with his medical crew, flight paramedic Ray Hall and flight nurse SheriDawn Neilson. Together they readied their Bell 407, designated “Classic 2,” for the mission.

The flight from Kanab to the crash site would take them across miles of completely uninhabited, mostly flat, featureless terrain. Although flight planning revealed that there would be no

PULLING TOGETHER

How crews responded to a fatal helicopter crash at the Grand Canyon earlier this year.

STORY AND PHOTOS BY DAN MEGNA

Owen Park, left, piloted Classic 2 for the response to the crash. With him were flight nurse SheriDawn Neilson, right, and paramedic Ray Hall.

moon until the early morning hours, Park felt confident that the enhanced visual acuity provided by the crew's white phosphor night vision goggles (NVGs) — along with the well defined horizon provided by the distant bright lights of Las Vegas, Nevada — would allow them to complete the flight safely.

The area of the crash was in a portion of the Grand Canyon very familiar to Park and Hall. Park had nearly 1,000 hours flying into this very canyon while working as a tour pilot. Hall, a 6,000-hour dual-rated commercial pilot and fixed-wing pilot for CAM, was also familiar with that portion of the canyon, having worked many calls there as a medic. Hall said, "Having this experience and flight time was a factor that increased our safety margin; both of us knowing the conditions as well as the capabilities and limitations of the aircraft."

Approaching the area of the Grand Canyon West Airport, Park's radio calls to establish communication went unanswered. Finally, a female voice finally came up on the air. Neilson said the radio operator sounded somewhat confused and initially tried to send them away. After Park clarified they were an emergency medical services (EMS) asset there to aid in the crash efforts, she "cleared" them into the bottom of the canyon.

"We were very cautious as to how we entered the canyon since we had very little info to go on," said Park. "The woman in the tower just told us the accident was down at the bluff and had no more info to give us."

After a recon of the area to assess the environment, hazards and traffic, the crew began their descent into the canyon. However, the weather seemed to be deteriorating. At the time of the accident winds were blowing 12 knots gusting to 19 knots, but as evening grew near, the winds became turbulent and blowing dust reduced visibility. Park described, "I slowed to a safe maneuvering speed, approximately 60 knots, to keep my descent as safe as possible and give a good power margin and time to maneuver to assess the situation as we approached."

Arriving at the bottom of the canyon, the crew got their first look at the scene. On the bluff, they were surprised to see a number of parked helicopters — sightseeing aircraft that had landed and shut

down prior to the crash — and people running in different directions.

"When we first got there it was chaos," recalled Park. "It was crazy. There was probably six other helicopters already on the ground. I think there were three or four tour helicopters and then two other EMS helicopters. And when we landed there were people running around frantically, some of them had no shirt on, some just in their underwear and shorts..." Park estimated there were 20 to 30 bystanders, passengers from the other tour helicopters, milling about.

Neilson said, "We flew into a weird time period where the initial responders were on scene but the incident command wasn't set up yet. So when we made our approach it was during a bit of a chaotic time period."

Google Earth screenshots of Quartermaster Canyon provide an overview of the crash site and surrounding area.

The crew discovered that many of the bystanders without items of clothing had removed them to provide to the crash victims. So Park and his crew began shedding items of their own clothing to provide to the bystanders. It was early February and the nighttime temperatures were falling quickly. Park said, "I gave up my coat, my crew gave up their coats, I had an extra shirt, I just started pulling things off and just kept my flight suit on and started giving these people clothes so we didn't have other problems."

Several Papillon pilots with military first aid training had been the first to reach the crash site. Additionally, some tour passengers — including two with medical backgrounds and several members of the Australian Air Force — had hiked down to the crash site and were helping first responders. However, there was no radio communication between those on the bluff and the crash site. To remedy this, the CAM crew provided two portable radios from their aircraft.

The original survivor extraction plan developed by the initial responders was to have them hoisted from the crash site and delivered to the EMS aircraft on the bluff. That plan was dashed, however, when the hoist assets arrived on scene and determined conditions to be too dangerous for an extraction operation.

Adding to the growing list of complications, Park learned there were still more aircraft inbound. He assumed they likely didn't know about one another and there was no designated communication channel.

"I knew another Classic ship from Fort Mojave was coming in as well as two Ranger [Arizona Department of Public Safety] helicopters," he said. "And they were coming into a dark hole with terrible visibility on a non-standard route and I wasn't feeling real happy about that. So I found a spot where I had one bar indicating service on my cell phone and I texted my dispatch. I explained we had no communications and told them to contact the agencies and get their aircraft on a national SAR [search-and-rescue] frequency."

The second CAM aircraft, "Classic 9," arrived, a Bell 407GX piloted by Johnross Doyel with paramedic Kristen Speer and flight nurse Stacy Lawson. Like Park, Doyel also had experience in this particular portion of the canyon, having flown tours before coming to CAM.

Upon landing, Park briefed the crew then requested Doyel begin "ups and downs," ferrying the bystanders back up and out of the canyon to the newly established command post nearby at the airport on the rim. The return flights would bring down much needed equipment and personnel.

As Doyel spooled up, CAM medical crewmembers attempted to coordinate the bystanders into groups of two for each ferry flight. But many of the bystanders weren't having it. About this time, an Arizona DPS Bell 407 arrived, delivering flight officer paramedic Edgar Bissonnette into the scene. Park suggested he use his law enforcement "command presence" to persuade those hesitant bystanders to accept the flight out of the canyon.

And if reluctant passengers weren't enough, the environment and overall conditions elevated Doyel's workload. He recalled, "It was low celestial illumination, we had high winds, we're inside a canyon with wind shear and turbulence and it's roughly a 4,000-foot drop in just a couple miles and we had some pretty aggressive climbs and descents. So I had to match my situational awareness to the conditions."

"IT WAS LOW CELESTIAL ILLUMINATION, WE HAD HIGH WINDS, WE'RE INSIDE A CANYON WITH WIND SHEAR AND TURBULENCE AND IT'S ROUGHLY A 4,000-FOOT DROP IN JUST A COUPLE MILES."

With a sense of organization having been finally established and communication now flowing from the crash site, everyone could concentrate on other tasks. The medical crews on the bluff were receiving updates on the four survivors who were in various critical states. They were also warned by the medical crews attending to survivors that they were close to running out of pain medication.

Neilson grabbed her med bags and began the 20-minute hike down to the crash site. "We got down there and made sure everybody had pain medication," she recalled.

By now, both CAM aircraft were doing the "ups and downs," each returning back with urgently needed medication and supplies. Park and Hall assembled a package of medical supplies inside a large plastic trash bag and developed a plan to fly down to the crash site, where Hall could deliver it from a low hover.

It was while maneuvering to drop the supplies that Park and Hall

Classic Air Medical operates 11 Bell 407s and a Bell 429 in six western states, supporting a number of communities that are portals to popular outdoor recreation destinations.

had their first close look at the scene. It was a narrow sandy wash twisting between 200-foot rock walls and the floor strewn with large rocks and bushes. While in many areas the walls were quite narrow, Park identified a couple areas up canyon from the crash site where he believed there might be enough room to land.

Park and Hall worked as a team making attempts to land into several different spots. They were in radio communication with another helicopter pilot, "Jimmy," who was watching from the crash site and providing information and feedback. Park said, "I turned around and I came down the canyon and I tried three different spots to get the helicopter on the ground. But it was just too tight. I couldn't fit. In the third spot I was actually bumping my skids against two large boulders. I asked Jimmy, 'Do ya see where I'm at? Come over here and clear this spot of the two boulders. Get them clear and we'll be back.'"

While Jimmy went to work on the boulders, Park and Hall went back to the bluff and shut down. They discussed the spot they had found with Doyel and the DPS pilot. They developed a plan wherein Park and the DPS pilot would take turns extracting victims. Doyle did not participate in the extractions based on concerns the larger instrument panel in the 407GX might limit visibility in that particular confined setting.

When medical crews advised that the four survivors were ready for extraction, Park and Hall and the DPS crew lifted off. Park made his first landing in the narrow canyon, his aircraft tail facing upslope away from the scene. Nearby, the DPS helicopter hovered, the two pilots exchanging information via radio.

Once safely on the ground, Hall oversaw the loading of the most critical survivor. He was lifted from the scene and delivered to Classic 9 waiting nearby on the bluff. As the aircraft was being readied, the survivor's condition became compromised, requiring additional life-saving measures. Once he was stabilized, Classic 9 departed the bluff for the rim of the canyon. The DPS 407 conducted the extraction of the second survivor in similar fashion, delivering that survivor to a Mercy Air helicopter on the bluff.

Throughout the first two extractions, Neilson had remained at the crash site tending to a female survivor. When it was time for her extraction, Park and Hall in Classic 2 once again squeezed into the tiny LZ. Neilson and the survivor were loaded aboard and departed the LZ for the canyon rim.

Arriving at the canyon rim and the command post with the hopes of refueling, Classic 9 was informed fuel was not available. Doyel relayed this news to Classic 2 and together they decided each still had enough fuel and reserve for the 80-mile (129-kilometer) flight to Las Vegas and the University Medical Center Burn Center.

The two CAM aircraft flying under NVGs chose a low-level route to Las Vegas with Classic 9 in the lead. The Mercy Air aircraft was several minutes ahead and had climbed up to altitude. Doyel said, "The weather between the crash site and Las Vegas was less than ideal. It was about as marginal VFR [visual flight rules] as you'd want to get. It wasn't clouds or rain or anything like that. The conditions were due to blowing dust and high winds. I was the lead aircraft flying a GX, [equipped with the Garmin G1000 glass cockpit], so therefore I had synthetic vision which further enhanced our safety margin. Not to mention that Owen [Park] and I were very familiar with the route having flown it many, many times."

It was during the extraction of the third patient that helicopter and rescue crews were made aware rescue teams from the U.S. Air Force's 66th Rescue Squadron were on scene. Flying two HH-60 Pave Hawks, they were preparing for a hoist extraction of the fourth survivor and would themselves conduct the transport to the hospital. Sadly, two of the four survivors extracted from the scene that night eventually succumbed to their injuries.

The events of that evening were certainly horrific. But in spite of the grim circumstances, Hall, a former U.S. Marine, believes all the first responders embraced the Marine Corp's unofficial slogan to "improvise, adapt and overcome."

"Everybody deserves a lot of credit," he said. "I'll tell you, that was a very difficult call all the way around; the location, the environment, and then the dynamics of all those people being thrown together that have never worked together before. But everyone pulled together and we're very grateful for everybody that was there."

FlightSafety International (FSI) built the full-motion simulators for use at Metro Aviation's Helicopter Flight Training Center, and FSI receives revenue from their use. FSI also conducts some of its own courses at the center. **Metro Photo**

Open House

Since its opening in 2013, Metro Aviation's in-house Helicopter Flight Training Center has become a valuable resource for the entire industry.

By Guy R. Maher

If you're involved with the air medical industry, you would pretty much have to have been hiding under a rock these recent years to not have noticed the incredible growth of Shreveport, Louisiana's Metro Aviation. One key reason for this sustained and successful growth is that Metro's founder, Mike Stanberry, has the ability to predict the needs of the company well in advance and come up with innovative ways — in house — to meet those needs.

Since its founding in 1982, Metro Aviation has grown to comprise four different enterprises: an air medical operations division, a completions center, the satellite tracking and technology company Outerlink Global Solutions, and the Helicopter Flight Training Center (HFTC). It is the training center that is the focus of this report.

Stanberry saw the need for increased training resources, not only for Metro's growing flight operations but for the industry at large. And so, in October 2012, he hired Terry Palmer away from her post at FlightSafety International (FSI) to build a flight training center from the ground up *(see p.26, Vertical 911, Spring 2014)*.

From the onset, HFTC was intended to operate as a separate company. It was Stanberry's dream, as well as Palmer's, to put something together that all operators could benefit from. As such, Metro wanted HFTC to be generic in its branding. Moreover, the facility would be operating not as a profit center, but as a cost center. That would allow Metro to satisfy its own training needs while also making simulator training affordable to other operators — including competitors.

The HFTC's current stable of sims encompasses all of the aircraft that Metro operates. There are two Level 7 flight training devices (FTDs), one for the Airbus AS350 and another for the Bell 407. The latter is capable of conversion between a traditional analog instrument panel and the Garmin G1000-equipped panel on the Bell 407GX.

There are also two Level D full-motion simulators, for the Airbus EC135 and EC145, developed in partnership with FSI. For these, HFTC charges an hourly rate that goes back to FSI. Metro has guaranteed FSI a minimum number of hours in exchange for placing the sims at Metro's Shreveport facility. HFTC's staff maintains the sims, but often with parts supplied by FSI.

The arrangement works well for both parties in that FSI receives the revenue from the sims, while Metro has them locally available for its own pilot training. But Palmer was quick to emphasize that "HFTC schedules the Metro pilots around the schedules of the third-party customers, who have priority."

Currently, the EC145 Level D sim in Shreveport is the only such simulator available in the Americas. For that reason, FSI actually brings its own EC145 customers to Shreveport for training. To enable FSI to teach its own Federal Aviation Administration-approved part 142 courses in the sim, there are three instructors who are permanently attached to the HFTC location but employed by FSI's Dallas Learning Center.

"It's a huge process to meet the part 142 requirements," explained Palmer. "They have to have specific classrooms and courseware approved by their authorities for their certificate. And it's very restrictive as to what they are, and aren't, allowed to do under that certificate."

Certain operators, such as Air Methods and PHI, already have contracts with FSI and find it easier to schedule through FSI, which in turn coordinates with HFTC to schedule sim time. However, any customer who wants FSI to train them in the EC145 can get that at HFTC. This can be an appealing option for independent operators who do not have any instructors on staff.

"It's a good working relationship and the [Dallas] guys are awesome," stated Palmer. "The management team comes once a month — unannounced — to check on their instructors." (In fact, they were there on the day of my own visit.) "This is a unique situation here for FSI, with three unsupervised instructors. So, [the management team] comes in regularly to make sure everything is up to standard."

TRAINING THE TRAINERS

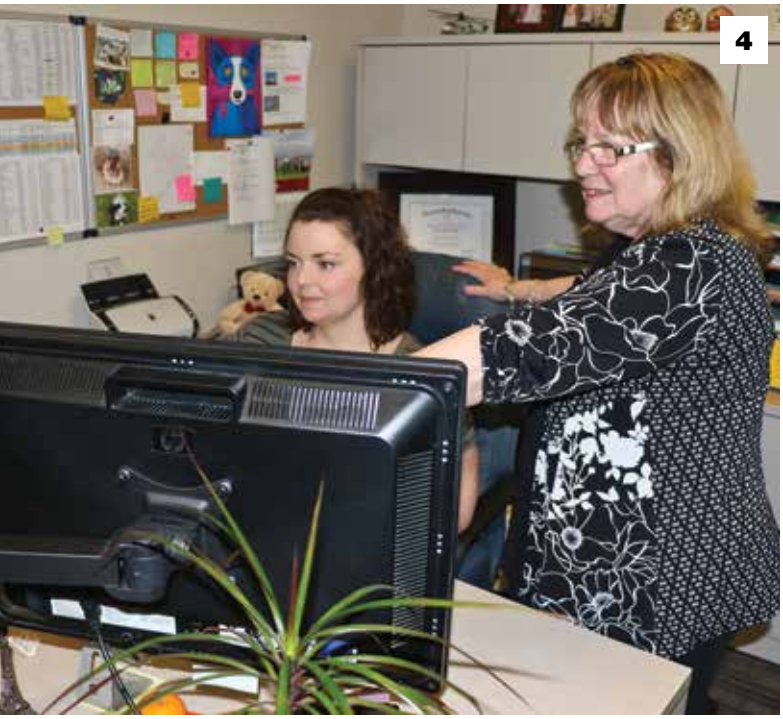
For many larger operators, one of the most appealing aspects of HFTC is that it "dry leases" its sims, allowing customers to take control of their own training programs. However, third-party customers don't operate the sim until they take a special course from HFTC. And this course is a little bit different from most normal sim courses in that it doesn't just teach the third-party instructors how to operate the sim — it teaches them how to teach in the sim.

"Since I'm the director here, I don't care if they are FlightSafety's customers, or they're Air Methods, or they're Med-Trans, or who they are. I'm going to make sure everybody's happy, get the feedback, and give it to the right people," Palmer said. "We don't dictate how you do your training, but we want it to be worthwhile."

HFTC will review each customer's particular operations and go over what types of scenarios they should practice, and where they should practice them. "We take it one step farther: 'I know what's causing the accidents, so why don't we work on those types of scenarios?'" said Palmer. "And the instructors know that our sim technicians are here to help if it's been a while since that instructor was here and needs reminding on how to do a specific task."

When Palmer first came to Metro, she was seeing reluctance from various companies to come to HFTC. To her surprise, it wasn't because of the cost or the schedule; rather, it was due to them simply not knowing how to use the equipment. "They were used to training in the aircraft and just checking the boxes. They did not know how to use the resources in the sim," she stated. "Once I realized that this was the situation, then we were able to provide them the guidance and the resources to help them get that done."

According to Palmer, the flight training taking place at HFTC is "constantly evolving. The customers that come in here now are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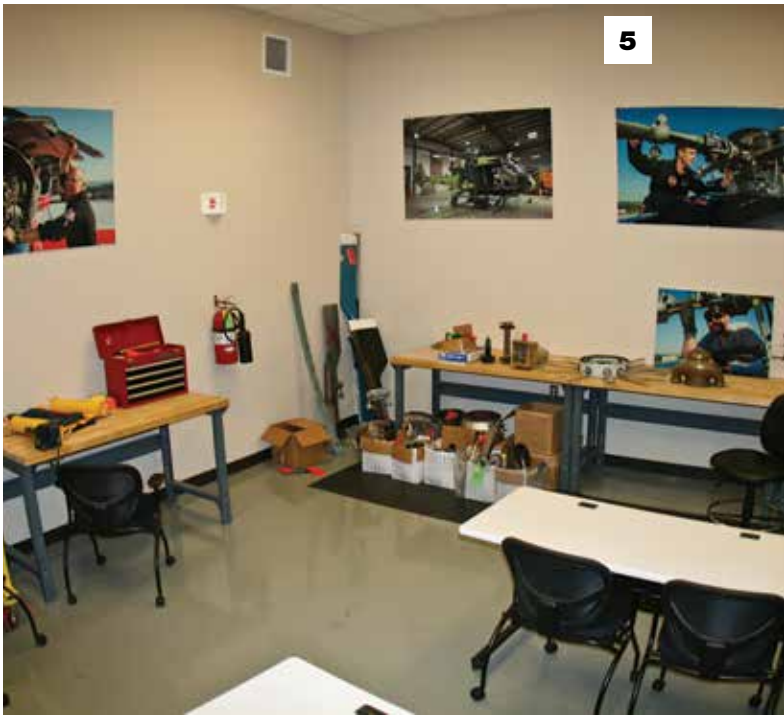
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1 // HFTC's Bell 407 FTD can be configured with either a traditional analog instrument panel, or the Garmin G1000-equipped panel on the Bell 407GX. **Guy Maher Photo** **2** // HFTC is co-located with Metro Aviation's headquarters in Shreveport, Louisiana. **Mike Reyno Photo** **3** // In addition to conducting its own pilot training at HFTC, Metro dry leases its sims to other operators. Third-party customers take a special course before operating the sims themselves. **Metro Photo** **4** // HFTC director Terry Palmer and scheduler Rachel Corpier review the schedule for the upcoming week. **Guy Maher Photo** **5** // The maintenance training room has the benefit of being right next door to Metro's completion center, where there is an abundance of components to use as training aids. **Guy Maher Photo** **6** // HFTC offers training for Safran Helicopter Engines using Safran instructors, and Pratt & Whitney Canada through FSI. **Metro Photo** **7** // Students who attend the Comm Lab get hands-on training with the actual software they will be using in their dispatch centers. **Guy Maher Photo**

constantly building on their course to fit their type of operation, and it's really starting to work," she said. "And most of our customers are willing to share what they are doing with HFTC so it can help other operations."

As an example, Palmer described, "I had a new customer instructor here. I asked him to tell me what he was looking for. I told him 'Med-Trans has really got that down, and this is what they're doing.'" She continued, "If I walked into a Med-Trans class and said, 'I have a new guy here that's going to be teaching for — somebody — and he'd like to see how you're teaching this. Can he sit in your class?' 'Absolutely!' would be their reply."

She emphasized, "Safety is number one. Let's share all the safety material we can. Let's share all of the training material we can. And let's make the whole industry better. It's a different culture when you enter here."

Of course, if a program is going to discuss some company-privileged material or a specific accident, you might expect they would want to keep it behind closed doors. But if not, then why not share? That's what it's really all about anyway. And let's face it, in the good old days, operators stole from each other when it came to courseware. Pilots talk; instructors talk. So, let's just put it out there in the open. That philosophy is just one of the reasons HFTC has become so successful.

Besides its sim training offerings, HFTC is also an approved knowledge testing center for FAA written exams (in fact, it is the only such center for all of northern Louisiana). For many pilots flying on a commercial pilot certificate who want to get an airline transport pilot (ATP) certificate, this is a very convenient way for them to get their written out of the way. HFTC doesn't take any money from customers for this service, nor does it handle the reservations. It's all done through the national system.

1 // Terry Palmer, right, with Metro CEO Mike Stanberry. From the beginning, Stanberry and Palmer wanted HFTC to be something that all operators could benefit from. **Mike Reyno Photo** **2** // Third-party customers who attend HFTC also have the opportunity to tour Metro's completion center, which has led to an increase in the company's aircraft sales and completions businesses. **Guy Maher Photo**

EXPANDED FOCUS

And then there is the Comm Lab. "It's the only thing like it in the world," proclaimed Palmer. "It had a slow start, but is now doing great and really making a difference."

Open to any air medical dispatchers, the two-day course is taught by communications managers from different programs around the country that are considered the best of the best. These people wrote the course, they keep it updated, and volunteer their time to come in and teach it. Although all of their travel expenses are reimbursed, they are not paid. Clearly, they are dedicated to the project.

The course costs $399, and that's the money HFTC uses to bring the instructors in. The course includes all of the ground school necessary for dispatcher qualification. Then students get hands-on training with the actual software they will be using, such as Zoll, Flight Vector, Golden Hour, and HSI programs. Whichever one they are using — or are switching to — they can learn it here and in a communications center setting.

"The computers in the Comm Lab are directly connected to the pilot simulator. So, they are running actual scenarios," said Palmer. "We have a pilot in the simulator running scenarios such as inadvertent IMC talking directly to the dispatchers in the Comm Lab. Every one of the dispatchers also gets time in the simulator to actually see what the pilot is seeing, what his workload is like, how this all works, and what happens when *I'm* talking to him. This way they get to see all of it."

The pilot in question is a former Marine helicopter pilot who's now flying Boeing B-52s. And he actually schedules himself around the Comm Lab. Besides running the scenarios, he'll give the students one-on-one training on aviation subjects like using a plotter, map reading, or whatever the student needs.

The course is approved by the International Association of Medical Transport Communication Specialists, and students who complete the course receive a certificate and continuing education credit. "Things are really picking up with this course," said Palmer. "We are averaging 10 to 12 people per month."

Finally, HFTC also offers maintenance training. Currently, the maintenance training classroom is dedicated to factory training for Safran Helicopter Engines using Safran instructors, and Pratt & Whitney Canada through FSI. Classes average one per quarter for each of the two engine types. HFTC also brings in guest instructors to teach other classes, such as night vision goggle repair and inspection authorization (IA) renewals.

The benefits that HFTC offers to the industry at large are clear. But for Metro, the center is paying off in more ways than one. Not only does the company get the advantage of home court training for its own pilots, it also has a constant flow of third-party customers passing through Shreveport and touring its entire facility. This in turn has generated a significant increase in its aircraft sales and completions businesses.

And you don't need a training manual to recognize that as a win-win situation.

Guy R. Maher | Guy R. Maher is a 17,000+ hour dual-rated pilot and flight instructor for helicopter, airplane and instrument ratings. Retired after 24 years as an HEMS pilot, he continues to run his aviation services company — Lanier Media — established in 1978. In addition to being a FAASTeam representative, Guy is frequently called upon to provide consultation on aircraft sales, operational, and safety issues, and litigation support. He can be contacted at guy@verticalmag.com.

INTERIOR DESIGN

Air medical interiors haven't changed radically in recent years, but they're steadily getting lighter and better tuned to customers' needs.

By James Paul Wallis

When it comes to developments in helicopter medical interiors, it's a case of evolution rather than revolution. The speed of innovation is governed in part by the cost and time involved in putting designs through the regulatory approval process, and also by the benefits to operators of having uniform designs across their fleets.

That said, there has been innovation in aspects such as materials and lighting as producers and customers of air medical interiors continue to seek lighter, more effective solutions.

LIGHTWEIGHT MATERIALS

Reduced weight continues to be a key feature that customers look for in an air medical interior, according to Hans Bretscher, vice president and general manager at Aerolite America. The company has put its efforts into developing lightweight interiors and components to satisfy this demand.

"Complete HEMS [helicopter emergency medical services] interiors for light twin helicopters that are currently implemented are below 150 kilograms/330 pounds," he said. "Where hot-and-high search-and-rescue capabilities are prevalent, complete interiors weigh around 100 kg/220 lb."

As Matthew Christenson, vice president and account executive at Spectrum Aeromed, explained, weight savings allow a crew to carry more medical devices or more fuel, which can change what they can do. And while the majority of components in medical interiors continue to be produced from machined aluminum, Spectrum Aeromed has been using carbon fiber in its medical interiors for several years.

As an example, the company employs carbon fiber to make light, durable helicopter flooring. The company is exploring additional applications, said Christenson; the next step would be to do more with the main base unit of the stretcher. Alongside the potential for significant weight savings, he noted that using carbon fiber

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An Aerolite medical interior for the Airbus H145. "With new or updated helicopters coming to market and being introduced, Aerolite is constantly answering to development trends," said Aerolite America's Hans Bretscher. **Nicolas Gouhier / Airbus Photo**

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can allow the creation of shapes not possible with aluminum.

Mike Slattery, president of United Rotorcraft, cautioned that the low production rates for EMS interiors could result in a high unit cost for carbon-fiber construction. For another route to produce otherwise impossible shapes, how about 3D printing? Such "additive manufacturing" could also provide weight savings, although the effort and cost of achieving certification may be prohibitive, said Slattery. However, it's a technology that United Rotorcraft is monitoring as a possible option in the future.

FLEXIBLE SOLUTIONS

According to Slattery, while some customers are looking for lighter, simpler interiors at lower cost, others need to be able to complete a range of complex missions with perhaps more team members and equipment (think isolettes and balloon pump transports) where the main concern may be functionality, not weight. He also noted that there is growing demand for interiors that can be easily reconfigured for different mission types, such as swapping from EMS to a special mission or passenger transport configuration.

For example, in July, United Rotorcraft gained European Aviation Safety Agency (EASA) certification for Leonardo AW139 and AW169 interiors that allow for easy installation and removal of seats, which can either be seats intended to transport passengers in comfort or flip-up seats that facilitate patient loading. A more extreme example of this reconfigurability is a Sikorsky S-70 Firehawk interior that can be set up for EMS litter transport, firefighting, crew transport or cargo flights, thanks not least to seats that fold down from the ceiling as required.

COOL LIGHTING

LEDs have long been the light source of choice onboard medical aircraft, thanks to their low weight, reliability, high output and low power consumption. They also run cool, a potential advantage for the medical crew operating in a cramped cabin (just ask the medevac doctor who according to LEDtronics Inc. seared his hand on a hot halogen light bulb that then burnt out, prompting the Royal Danish Air Force to switch to LEDs back in 2004).

Slattery of United Rotorcraft said that the shift to LEDs for both interior and exterior lighting has been happening for a number of years. It's an ongoing process, he said, noting that any lighting changes require certification.

Thanks to the widespread use of night vision goggles (NVGs), interior lights are typically filtered to be NVG-compatible, which can result in a blue-green cast. However, that could be changing.

AeroBrigham has been installing NVG-compatible LED lighting in medical helicopters for at least the past 10 years, said owner and president David Brigham. Some 18 months ago, the company introduced a unit that provides a bright, white light that's NVG-compatible right out of the box, no filter required. It took some time to convince the NVG makers, said Brigham, but these days the firm employs the light for helicopter cabin illumination in all of its medical completions.

MEDICAL MOUNTS

A far less visible, but no less important, element of these interiors can be found in the mounts to secure medical equipment. Christenson of Spectrum Aeromed reflected that working on new mounts is a continuous process, given the ever-

changing range of devices available to crews.

Most of the customers of Wysong Enterprises prefer to keep their aircraft standardized for training purposes, pointed out Steve Wysong, president. However, mounts are an area where customers do request changes, he said: "We do get requests now and then to mount a different medical monitor in the rear cabin of the [Bell] 407 . . . The monitor mounts are approved in a way that if a current medical piece of equipment is changed, we can adapt those items to the STC [supplemental type certificate] mounting brackets easily."

Giving a specific example, Kristen King Holmes, director of marketing for Metro Aviation, commented that ultrasound equipment is becoming more mainstream and customers are increasingly asking for ways to secure it in the aircraft.

Meanwhile, David Brigham for one is seeing a trend of moving away from mounting equipment to the interior. Observing that certifying new mounts is an expensive process, he said that AeroBrigham is increasingly seeing operators opt to take medical devices as carry-on equipment, either strapped to a seat or on the stretcher with the patient. He noted that much of this modern equipment is very lightweight, giving the example of defibrillators weighing just a couple of pounds that can be put between a patient's legs.

NEW MARKETS

A clear shift that is occurring is in the geographic location of customers seeking helicopter medical interiors. Hans Bretscher of Aerolite America explained, "We see growing demand for HEMS interiors, not only from our existing customers in North America and Europe but also from operators in the Pacific Rim countries, China and South America. Operators in these countries demand the same sophistication in their HEMS capabilities as requested by our customers with established and long-running operations."

This July, United Rotorcraft completed its first EMS Bell 407 for the Chinese market. Mike Slattery asserted that in the future, China will be the biggest market for rotor-wing aircraft. Speaking of the process of gaining approval from the Civil Aviation Administration of China (CAAC), Slattery explained that the CAAC analyzed the Federal Aviation Administration STC data packages as the basis of certification.

NEW AIRCRAFT?

It's to be expected that as new helicopter models come onto the market, medical interiors will be developed so they can be employed in the air ambulance sector.

Bretscher commented, "With new or updated helicopters coming to market and being introduced, Aerolite is constantly answering to development trends such as roll-in stretchers, stretcher pack rack capabilities that are certified for all phases of flight, and customer-demanded integrations of sophisticated medical equipment such as balloon pumps, ultrasonic and ECMO [extracorporeal membrane oxygenation] equipment."

United Rotorcraft gained EASA certification for its modular AW169 and AW139 interiors just this August. Speaking at the time, Frank Graham, senior director of global sales and marketing, said: "The AW169 and AW139 configurations allow for a head attendant seat, which is a cornerstone to patient care and access."

Although the AW139 is hardly a new model, the AW169 has only recently begun gaining traction in the EMS market. While the release of an interior may follow on the heels of the introduction

1 // Extensive certification requirements for air medical interiors mean that advancements in the field are often a matter of evolution rather than revolution. **2 //** AeroBrigham recently introduced a unit that provides a bright, white light that's NVG-compatible right out of the box. **AeroBrigham Photo** **3 //** Metro has seen growing demand for its loading ramp for the EC135. **Metro Photo** **4 //** North American and European operators still account for much of the demand for HEMS interiors, but many interior providers including United Rotorcraft anticipate growing demand from countries like China in the future. **United Rotorcraft Photo**

According to United Rotorcraft president Mike Slattery, while some customers are looking for lighter, simpler interiors at lower cost, others need more complex interiors suited to a range of specialized missions. **Skip Robinson Photo**

of a new model, in some cases the medical design work gets underway ahead of the launch of the aircraft. For example, Holmes revealed that Metro Aviation is already hard at work on a proposal for a medical interior for the Airbus H160 helicopter, EASA certification of which isn't now expected until late 2019.

Meanwhile, both Metro and AeroBrigham report that growing numbers of operators are spurning factory deliveries and turning to pre-owned aircraft. Commenting on Metro's experience, Holmes said: "Another big trend is refurbishments instead of people purchasing new aircraft. About half of this year's completions have been refurbished aircraft."

Meanwhile, Brigham said that over the last three years in particular, his firm has been helping start-ups to source used single-engine helicopters, adding that even with repainting, reconfiguring and thorough mechanical servicing, the price tag for a pre-owned machine might be some two-thirds lower than for a new machine. Smaller start-ups in particular are adopting single-engine helicopters, he said, as they favor models that are cheap to acquire and operate as they look for ways to compete in the marketplace.

CUSTOMER DEMAND

At Metro Aviation, there have been changes in the equipment that customers are looking for, explained Holmes. "As far as loading goes, we've developed a ramp for the H135. It's been available for a couple of years, but we've seen an increase in requests for it. It assists with loading the patient stretcher into the aircraft and was originally designed for an overseas customer that, due to their height, was having trouble getting the stretcher into the aircraft," she said.

One current area of work at Metro involves accommodating Stryker EMS stretchers, she added: "We're developing a Stryker Performance manual load solution for the H145."

It's fair to say that while most of the work in helicopter medical completions involves work on the interior, some of the changes that providers like Metro are seeing are located outside the cabin or involve communicating with staff on the ground. For example, said Holmes, Metro has seen a rise in the number of requests for external cameras fitted in the tailboom area.

And the company is coming to the end of a project to install IRIS, a flight data monitoring, tracking and communications solution from Outerlink Global Solutions that among other things will allow medical crews to transmit live electrocardiogram data to receiving hospitals while the patient is still in flight.

Said Holmes, "We are outfitting all of our ops aircraft with IRIS. We plan to have the entire fleet done by the end of the year."

James Paul Wallis | James has been writing about helicopters, UAVs and fixed-wing aircraft for over a decade. He specializes in covering developments in air medical, search-and-rescue, law enforcement and aerial firefighting sectors.

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A typical GES crew for SAR missions — one captain, one co-pilot, one winch operator/flight engineer and two rescue swimmers — are photographed here in Teide National Park on Tenerife.

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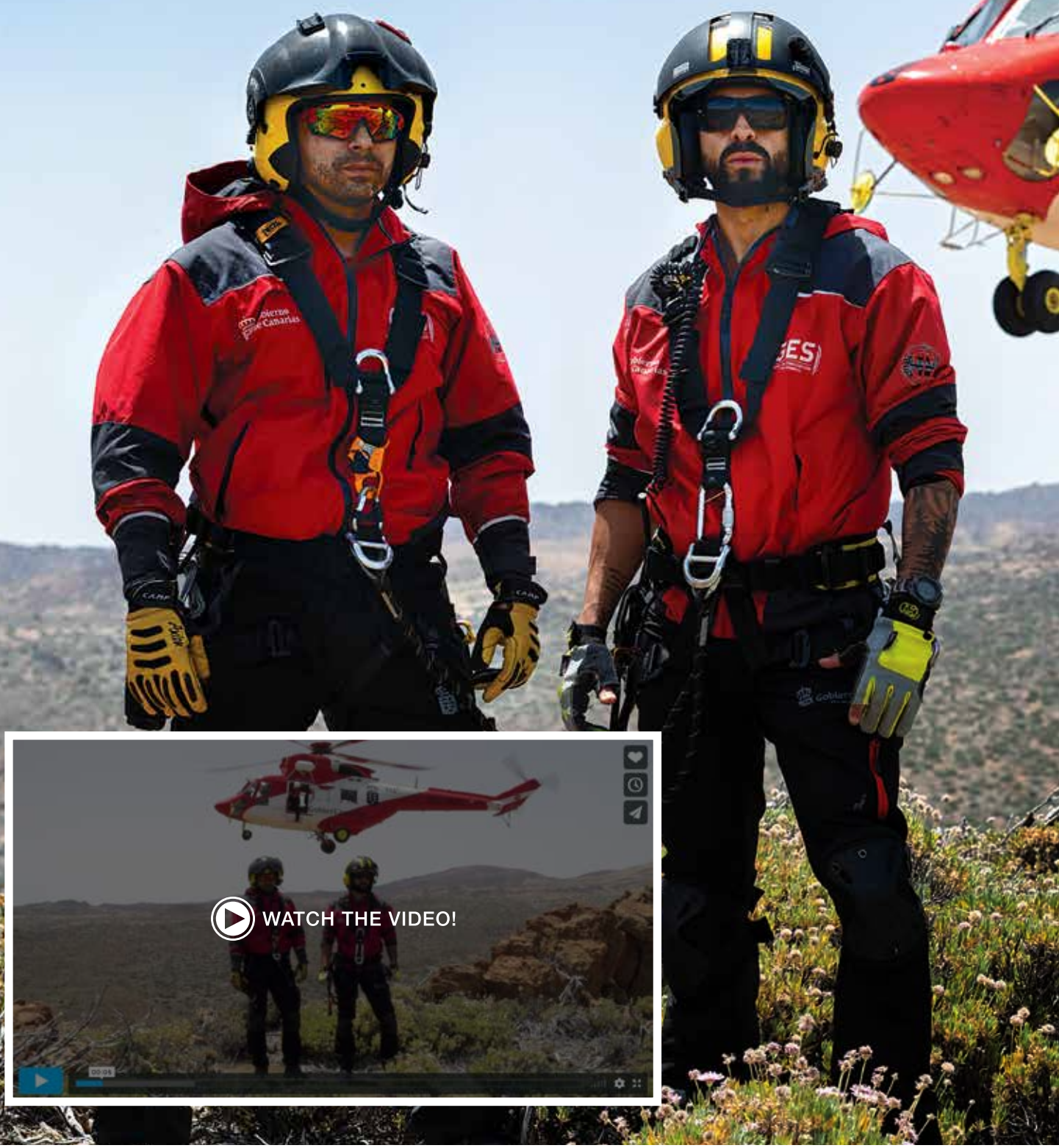


Beauty & the BEAST

For the helicopter crews charged with rescuing thrill-seekers and tourists in the scenic Canary Islands, the W-3 Sokół is the utilitarian performer they need. **By Jon Duke | Photos by Lloyd Horgan**

1 // GES uses the W-3 Sokół with a 1,600-liter Bambi Bucket to fight fires on the Canary Islands, in addition to performing SAR missions. **2 //** Rescue swimmers are winched down to the water near to Puerto de la Cruz during a small exercise with the Salvamento Marítimo. **3 //** Unusually, on the GES Sokółs the winch is located above the port cabin door, which is noticeably smaller than the other door. However, the crews manage to negotiate stretchers in and out with relative ease.

"Maybe it's a little bit ugly," conceded Jorge Ortega. It was hard to argue. The Leonardo PZL-Świdnik W-3 Sokół has an appearance that would most charitably be described as "squat." Yet in the same breath, Ortega described the aircraft as "his mother" — a clear illustration of how well the aircraft has looked after him for over 500 hours. "At sea or in the mountains it's perfect," he went on. "We can hoist with full crew, out of ground effect at the top of the mountain."

Ortega is a co-pilot with El Grupo de Emergencias y Rescate del Gobierno de Canarias. Better known as GES, the organization is responsible for rescue and emergency aviation throughout the Canaries archipelago, under a six- to eight-year contract that is serviced by Hispánica de Aviación (HASA).

The mountain he referred to is Mount Teide. Standing at 12,198 feet (3,718 meters) on Tenerife — the largest Canary Island — it is the world's third tallest volcanic structure; base to summit the tallest in the world outside Hawaii. Among the islanders it is simply "The Mountain."

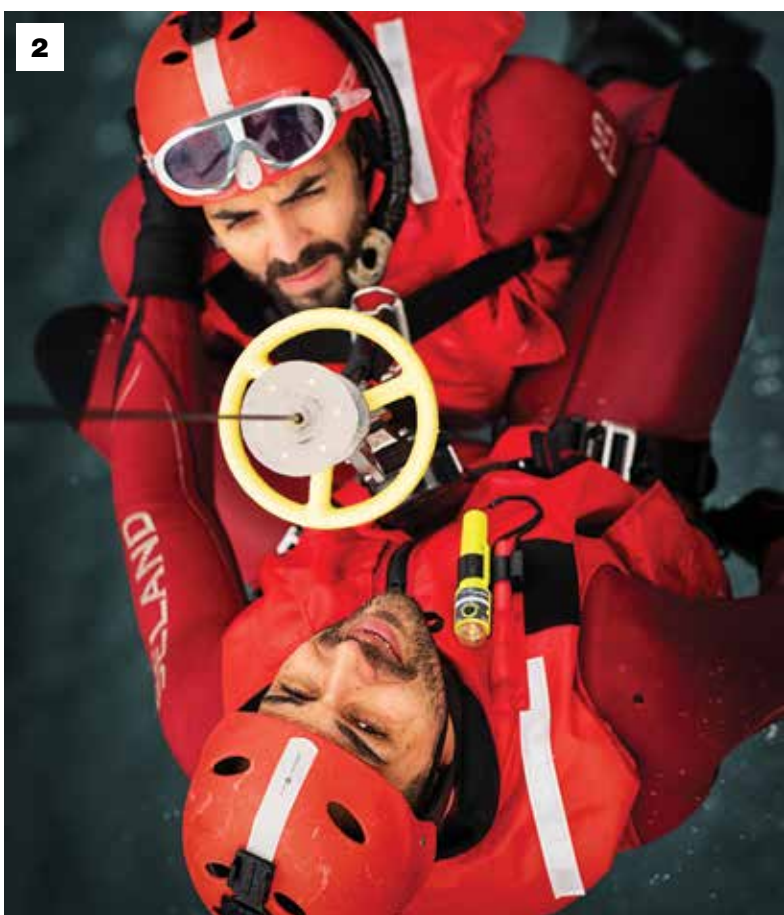
Most visitors to the Canaries come seeking sun and sand, but at altitude the Atlantic wind that cools the beaches is transformed by the rocks; tearing through narrow gullies seemingly at random. While the climate is subtropical, the terrain varies wildly. Lush greenery gives way to desert, providing a combination of altitude and temperature that would challenge most helicopters and many pilots. In this stunning yet unforgiving environment the utilitarian Sokół is a debutante.

"I am in love with the aircraft," GES co-pilot Santiago Velasco told me. "Despite its robust looks the handling is smooth and stable, but it has the high maneuverability necessary to conduct firefighting operations or to reach victims trapped in gorges."

Summer brings no shortage of bathers heading for the beach in shorts and sandals, as well as those apparently prepared to tackle the mountains similarly attired. Dry summers also mean the vegetation takes little encouragement to ignite and wildfires are commonplace.

"Quite often it can be 30 degrees C [85 F] on the beach," Ortega told me. "The tourists will be happy to go up Mount Teide in t-shirts and flip-flops, but up there it's minus 4 C [24 F]."

With this variety and tempo of missions, HASA requires an aircraft that has the power to contend with the environment, the cabin space for offshore search-and-rescue (SAR), and the nimbleness to negotiate the mountain crags.



GETTING THE JOB DONE

The W-3 Sokół was the first helicopter entirely produced in Poland. It was designed in the early 1970s by Stanisław Kamínski of PZL-Świdnik and conceived for use by the USSR and satellite states for military and civil missions. Perhaps as a result of its heritage, the aircraft was not widely adopted in the West, and with PZL-Świdnik enduring increasing financial difficulties that beset development of more advanced military variants, the company was acquired by AgustaWestland and has since become part of the Leonardo group.

Although there are only a handful of Sokół operators, mostly in Asia and South America, HASA has one of the largest fleets of the type outside of Poland.

"We have 13 Sokóls in total, because the helicopter is in such high demand for firefighting," Ortega told me. After winning the GES contract in November 2015, HASA acquired five Sokóls to be stationed at the main islands of Tenerife, Gran Canaria, La Palma, Fuerteventura, and El Hierro. The year 2016 saw the addition of one more aircraft based at Gomera for use during the summer months.

While the aircraft are based at different islands to provide a distribution of assets for rapid SAR response, resources are pooled for firefighting tasks as these usually require more than one aircraft. Crews therefore must be familiar with other islands and operating areas, as they can expect to be moved from island to island as situations develop.

The funding for this program comes principally from the European Regional Development Fund, which provides 85 percent of the budget. The remaining balance is met by the Government of the Canary Islands.

Despite the maritime location, the aircraft was required to have only nominal night and offshore capabilities. With the broader SAR region covered by the AW139s of the Salvamento Marítimo (Spain's sovereign maritime rescue agency), the Sokóls of GES are only required to cover the 12-nautical-mile territorial limit of the islands themselves.

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While an instrument flight rules (IFR) capability was retained, the aircraft's avionics are extremely basic, consisting almost entirely of traditional "steam" gauges augmented by an aftermarket Garmin GPSMAP 695 and an Apple iPad kneeboard with the Air Navigation Pro app. Even with night vision imaging systems (NVIS), there are serious difficulties inherent in conducting SAR or firefighting at night without the protection that more advanced avionics would offer. For this reason, operations are limited to day only until safe night procedures have been validated.

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THE MOUNTAIN KING

For now, at least between sunrise and sunset, the Sokół rules the roost in the mountains. With a maximum water payload of 1,590 liters (420 gallons) of water in an SEI Industries Bambi Bucket, it has nearly twice the high-altitude lifting capacity of the Bell 412s that are also operated by the Canaries government.

"The highest mountains in Canary Islands are off-limits to the 412, due to power limitations," Ortega told me.

When undertaking firefighting missions, the normal SAR fit on the cabin interior is stripped out, to ensure maximum performance. This also reserves space for up to 10 fully equipped firefighters to be carried. In the SAR role, the aircraft is fitted with a TRW Aeronautical/Goodrich Rescue Systems electric hoist, which can lift up to 275 kilograms (606 pounds) out to a maximum usable 90 meters (295 feet). GES crews do not have a self-extraction method, such as a rescue basket — their standard operating procedure is to deploy a winchman for all rescue operations.

The location of the winch above the port cabin door appears to be a design oversight, as this door is appreciably smaller than on the other side of the aircraft. However, the starboard door is also much further aft, which would place the pilot a significant distance ahead of the winch operator. In tight confines, it would be possible for this to introduce complications as visual references differed between crewmembers.

In any case, the crews manage to negotiate stretchers in and out

1 // The aircraft's cockpit consists almost entirely of traditional "steam" gauges augmented by an aftermarket Garmin GPSMAP 695 and an Apple iPad kneeboard with the Air Navigation Pro app. **2 //** Rescue swimmer Juan (left) checks that Michael's harness is securely connected to the cable before signaling to the winch operator that he is clear to winch. **3 //** A rescue swimmer is winched back up to the aircraft following a demonstration in Teide National Park.

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> "IT'S A DIFFERENT KIND OF FLYING IN THE CANARIES. WITH THE WORST WEATHER IN THE MOST DIFFICULT TERRAIN, IT WOULD BE VERY DIFFICULT TO PROPERLY USE AN AUTOPILOT."
> — *Jorge Ortega*

of the cabin with relative ease. Within the aircraft, there is room for the SAR role equipment and stretchers, plus a doctor. "The Sokół looks small on the inside, but the cabin is long and high, without any obstructions," Ortega said.

The vertical room in the cabin is again important for the firefighting role, as Velasco explained that the configuration means firefighters have enough space to stand while carrying their equipment.

For all of its power and lifting capacity, however, the Sokół is a child of the '70s. Although the HASA aircraft were built new, the design is now showing its age. In common with other aircraft designed in the same era, the Sokół has little automation and very few pilot aids. It also relies on mechanical system redundancies rather than elaborate electronics.

Well maintained and operated by skilled and knowledgeable personnel, these leave more potential for the crew to decide what level of risk they are prepared to accept, rather than rely on software logic. However, this comes at the cost of limited capabilities, increased cockpit workload, and fewer safeguards.

Granted, there are few if any automation modes or avionics that would be of much assistance when flying during the day in such close proximity to complex terrain features, as makes up much of the task in the islands. "It's a different kind of flying in the Canaries," Ortega told me. "With the worst weather in the most difficult terrain, it would be very difficult to properly use an autopilot."

It's not difficult to understand their reluctance to rely on automation when hovering and maneuvering the helicopter in very close proximity to obstacles using dynamic and non-standardized profiles. However, the crews are aware of the benefits it would bring in other environments.

"We have to run the whole operation by hand," said Velasco. "When we are operating in close spaces with sudden winds like gorges or narrow valleys, perhaps the autopilot wouldn't correct it fast enough, but it would be a great tool at sea operations where it's harder to keep references during the hover."

THE VALUE OF EXPERIENCE

Spanish law requires all SAR pilots to have qualifications in all environments, but to become a co-pilot there's no minimum hours requirement, although previous experience in SAR or firefighting is beneficial. New pilots to the HASA operation typically start flying firefighting duties, building hours and experience before being trained in SAR, making them employable in the GES task.

"The company needs pilots and engineers who can resolve the issues that can often come up in our bases," Velasco told me. "Being island-based poses particular challenges to logistic and maintenance."

To be eligible as captains, pilots must have a minimum of 1,000 flight hours pilot in command (PIC) conducting offshore SAR, with at least 700 onshore. While it is preferable for captains to have all the necessary qualifications already, non-SAR-qualified captains are recruited and are provided with the necessary training to ensure that they are mission-capable.

"Pilots with high hours on other types might have enough experience to be captains, but they first need to learn how the Sokół behaves — beyond a simple conversion," added Ortega. "You can learn to fly it in a few hours, but to have the confidence to use it to its full potential takes a lot of experience."

Typically, senior captains — who are mostly instructors — are crewed with junior co-pilots. Conversely, junior captains with low Sokół experience are crewed alongside co-pilots with greater than 500 hours on type. When airborne, the flying is split between the pilots, who share duties with no hard and fast division of labor in the cockpit.

"It's not a perfect MCC [multi-crew cooperation] type scenario where one pilot is always flying and the other is always monitoring him," explained Ortega. "We change the roles in the cockpit according to the situation."

Given the emphasis on daytime operations, normal duty hours are sunrise to sunset; usually around 11 hours on duty at 15 minutes notice. For night operations outside routine hours, this readiness is relaxed to 40 minutes. However, if the mission requires more preparation, either because of navigation to a precise location or due to complex terrain or weather, additional time is taken on the ground, reducing the risk of mistakes in the air that could make the job of locating the casualty more difficult.

The Sokóls of GES are only required to provide offshore SAR services within the 12-nautical-mile territorial limit of the islands themselves.

TROUBLE NEVER COMES ALONE

The annual average mission rate equates to just over one rescue per day, but this is rarely the rate at which crews are tasked.

"A normal day might start with someone in the water, then there's a rescue on Teide," Ortega told me. "Then we have to land to get the Bambi Bucket because there's a fire."

Ortega's joviality at the prospect of a busy day makes this sound like fairly predictable business as usual, albeit at a busy tempo, but the islands have seen their share of major emergencies with serious risks involved. In 2015, a single act of carelessness resulted in a wildfire that roared across 48,000 hectares (118,000 acres), destroyed property, and cost one firefighter his life. Several Sokóły were instrumental in efforts to bring it under control.

Then, in March 2017, the Teide cable car broke down while 300 people were on the mountain or in the cable cars as temperatures rapidly sank towards freezing. A combined operation involving the Sokóły of GES and other helicopter assets was successful in rescuing those at most risk, lowering up to four people at a time from the stricken gondolas.

However, a consistent highlight of the year for the GES crews is the Transvulcania run, an ultramarathon in which contestants race a 46-mile (74-kilometer) course with more than 14,000 feet of climbing and 13,000 feet of descent. The perhaps unsurprising result is around 50 rescues per day, with two aircraft being placed on standby specifically. They are also required to transport infrastructure such as generators, food, and water to react to any requirements at race checkpoints, either internally or using external sling loads. As Ortega told me, "I love that job because as a pilot I am performing all of the duties that the helicopter can perform."

IN THE EYE OF THE BEHOLDER

For the crews the busy days are relished; they present opportunities to fly a machine that they love, at the limits of its considerable capabilities. Coupled with the satisfaction that comes with the job, their passion is understandable.

But there are undoubtedly challenges. While the pilots extol their machine's capability to conquer the mountain that occupies the center of their flying world, their evident enthusiasm makes the task of manually flying a complex aircraft in the Canaries' unforgiving conditions no less demanding. And even with the current limitation on night-time mountain operations, accomplishing all this with next to no automation is far from a trivial matter.

The Sokół is not perfectly suited for any of the myriad jobs demanded of it, but in this environment it is one of the few helicopters that can perform them all, and its crews love it. Their aircraft is not the most modern; it is certainly not the best looking. But for anyone who has made the mistake of underestimating the terrain of the Canaries to their cost, the utilitarian Sokół might be the most beautiful machine they are likely to see.

Jon Duke & Lloyd Horgan | Vortex Aeromedia provides specialist media services for the aviation, defense, and aerospace sector. Formed in 2015 by photographer Lloyd Horgan and helicopter pilot Jonathan Duke, Vortex Aeromedia draws on their unique blend of military aviation and media experience to deliver high-impact film, photography, and writing specifically to the defense and aerospace industry. They have flown with, photographed, and filmed for a variety of international military and civilian clients. For more information visit www.VortexAeromedia.com.

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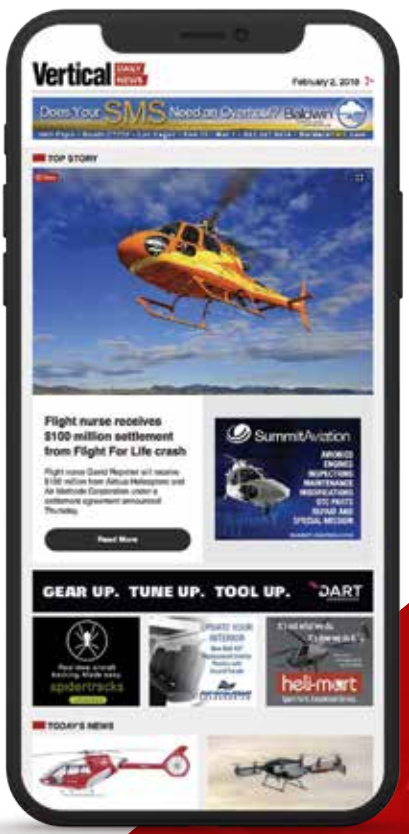

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Final Approach

Interviewed by Elan Head | Bryan Snuffer, Aviation Artist

Over the years, a number of military aviation units have turned to Bryan Snuffer to immortalize their operations in paintings like these. **Images courtesy of Bryan Snuffer**

A native of Muskegon, Michigan, Bryan Snuffer is a fine artist who specializes in depicting the achievements of U.S. military aviation. His work is regularly commissioned by the U.S. Army, Navy, and Coast Guard, and his paintings have been displayed at the National Museum of Naval Aviation, the Pentagon, and U.S. Coast Guard headquarters, among other places. He is the recipient of the 2016 R.G. Smith Award for excellence in Naval Aviation art.

Vertical 911: How did you get involved with doing this type of work?

Bryan Snuffer: I got started doing aviation-related projects with a local business, and I always really loved the military side, so I did that as a hobby. That led me to the Air Force art program, and I started working with them. And then the more that I worked with them I realized that maybe I could do this with all of the branches.

When I started working with the Coast Guard — which is about 13 years ago now — that's when things really started to click. They've been so engaging that I could probably make a full-time job out of just working with the Coast Guard. And then the Coast Guard is always friends with somebody else. Like, the Savannah [Georgia] Air Station is right across the street from [the U.S. Army] 3rd Battalion 160th. So that put me in with the Special Operations Aviation Regiment as well. The more that I engaged, the more I found myself just doing lots of stuff with all the branches.

V911: What is your process for approaching a commissioned piece? How do you go about moving from rough ideas to a finished product?

BS: Rarely will I run into a situation where the command won't know which direction to go. Most of them have seen what I've done in the past, so that sparks an idea for them. And then they tell me, "We want to see this, we want to see this," and so then I do drawings and things like that. And then after everything is approved, we start doing a painting.

V911: What do you use for models and to ensure that you get the technical details correct?

BS: Well I have a large library of photographs and that's generally what I'm using, a lot of photographs that I've taken myself. Or the command will sometimes send pictures over: "Here are the pictures that we'd like you to use for a reference." When it comes to specific aviation assets — like on the Coast Guard side, we do a lot of paintings with their MH-65 Dolphin helicopter — I generally have a number of different references that I use, that I know I can paint well and I use those.

V911: What have been some of your favorite projects over the years?

BS: Some of the things I guess I don't know if I've enjoyed so much as they were an honor or a privilege for me to be involved in. A lot of the memorial pieces — if there's an accident, sometimes I'll get invited to do something that will memorialize it. I really have enjoyed working with the special operations in the Army. A lot of those guys are my friends now, and that's really the ultimate thing for me. . . . You see people's lives and are involved with them on a certain level and that's a really cool thing. I could do just about any kind of art, but that's ultimately a really rewarding thing about what I do [with the military].

V911: Do you have a favorite aircraft to paint?

BS: No, not really. I think there are some now that I've been doing enough of — like the Dolphin, for example — that it's kind of like breathing. You just do it and you know it, you know the aircraft, you know the pieces and parts on it. It's a lot easier to paint than something that I don't know or haven't done as much with. So I'm not sure if it's necessarily my favorite, but it's something that I feel like I can do well . . . and I have one of those flying over my studio right now.

This interview has been edited and condensed.

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