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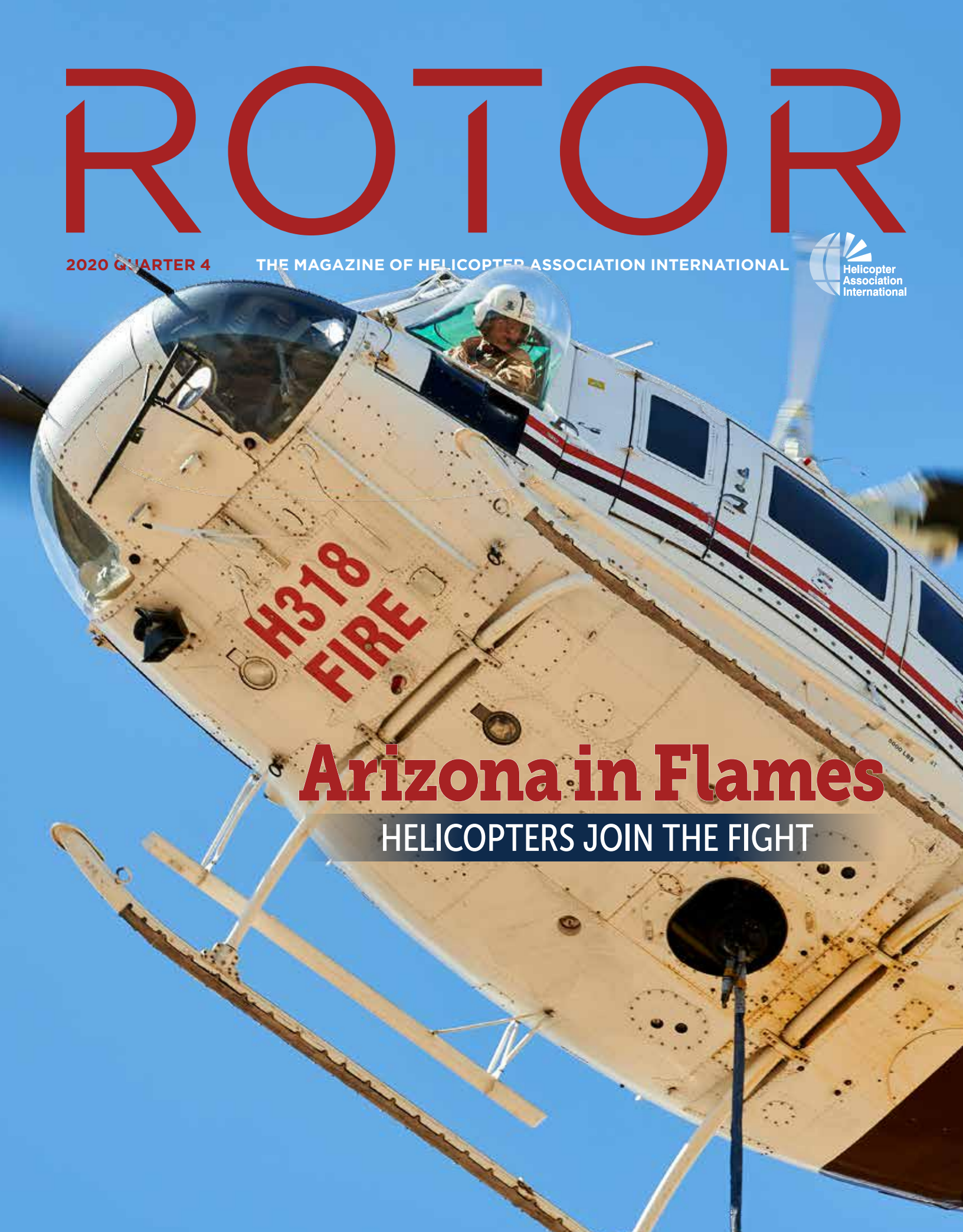

Arizona in Flames

HELICOPTERS JOIN THE FIGHT

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ON THE COVER: Pilot Marco Gnos and his Bell 205A-1, operated by Summit Helicopters, departs Arizona's Payson Airport (KPAN) after refueling to return to the Polles Fire, a wildfire burning about 11 miles west. A resident of Arizona, writer/photographer Mark Bennett documents that state's busy fire season in a photo essay on p. 48.

DEPARTMENTS/COLUMNS

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David Jack Kenny is a fixed-wing ATP with commercial privileges for helicopter. He also holds degrees in statistics. From 2008 through 2017, he worked for AOPA's Air Safety Institute, where he authored eight editions of its *Joseph T. Nall Report* and nearly 500 articles. He'd rather be flying.

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Gina Kvitkovich joined HAI as director of publications and media in 2011 after decades of honing her skills in writing, editing, and publishing. As editor of ROTOR, she is responsible for every error in the magazine that you're reading—and for some of the good stuff, as well.

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Dan Sweet joined HAI as director of communications and public relations in 2017. He previously served in the US Navy as a photojournalist. After leaving the Navy, he worked for Oregon-based Columbia Helicopters, performing public relations, communications, and trade show management work for more than 22 years.

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By Randy Rowles

The Vertical Flight Family

We share a goal: to provide safe, efficient aviation services.

An FAA pilot examiner for all helicopter certificates and ratings, Randy Rowles holds an FAA ATP and Gold Seal Flight Instructor Certificate and in 2013 received HAI's Flight Instructor of the Year Award. Vice chair of the HAI Board of Directors, Randy operates the Helicopter Institute, a Texas flight school.

In an industry that was once seeking a cure for the mass exodus of helicopter pilots to the airlines, times have changed. Instead of wasting time in a futile attempt to turn back the clock, the vertical flight industry is engaged in a flurry of innovation, developing a multitude of aircraft solutions and technologies that will change how we operate, as well as attract and retain the best talent in aviation.

Today, as the airline industry tightens its purse strings due to a pandemic, the remotely piloted and optionally piloted aviation sectors have joined manned helicopters to form the vertical takeoff and landing (VTOL) industry. We're moving forward together with no looking back.

Aircraft that don't require the pilot to be on board are here to stay, especially in those missions considered dull and dangerous. Unmanned aircraft systems (UAS) and optionally piloted aircraft are being developed and tested at a rapid rate across the globe. Manufacturers, regulators, researchers, operators—all are working diligently to develop the aircraft, infrastructure, and regulations for these new, exciting aviation missions.

Helicopter operators may have been initially suspicious of these innovations. However, as they learn about the capabilities and limitations of these aircraft, I'm confident they'll introduce these solutions within their fleets. It won't happen overnight, but it will happen, just as our industry has accepted turbine engines, GPS, fly-by-wire, and many other innovations. Why? Because keeping up with the latest technology is one way our industry keeps the rotors turning!

Surviving as an operator in the helicopter industry has never been easy. That's why representatives from six companies met on Dec. 13, 1948, to organize the Helicopter Council in Burbank, California. The idea was simple: form an organization to represent the collective interests of the helicopter industry. Today, we know this long-standing group as HAI, which has embraced the technological revolution within the vertical lift industry.

Our industry has consistently demonstrated its ability to accept new types of aircraft and successfully integrate them into the shared airspace. This integration hasn't been without tragedy, however. In 1931, popular University of Notre Dame football coach Knute Rockne was killed in an airplane crash, eliciting public calls for greater federal oversight of aviation manufacturing, operations, and safety that led to the regulatory structure in US aviation today.

Modern aviation still reflects a delicate balance between operational ingenuity and regulatory governance. Vertical lift aircraft manufacturers and developers of the supporting infrastructure in the UAS and eVTOL markets are outpacing the regulators. Although the FAA Reauthorization Act of 2018 put in place directives to the FAA for UAS integration, the ability to safely accomplish that integration remains the FAA's primary concern.

Questions remain about exactly what the future will look like. But ours is an industry in which problem-solving is just another day on the job, and we've demonstrated tremendous resilience to survive for generations. It's time for the helicopter industry to embrace new-technology vertical flight aircraft as we share a common interest: a safe, effective, and robust industry.

As the economy recovers from COVID-19, vertical flight operators will begin working their way back to prosperity as they have for decades, identifying new ways to use their aircraft to improve the lives of the general public. Without recognition or fanfare, the job gets done, safely.

Whether you operate helicopters or drones or plan to engage in VTOL technology, you're part of the vertical lift family. Our industry may look a little different from the past, but the people are the same—simply remarkable!

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Winning photos will be published in 2021 Q1 ROTOR and displayed at HAI HELI-EXPO 2021

By James A. Viola

Pandemic-Generated Innovation

Adapting to new conditions can lead to positive changes.

James A. Viola is HAI's president and CEO. After a career as a US Army aviator, he joined the FAA, where he served as director of the Office of General Aviation Safety Assurance before joining HAI. A dual-rated pilot, Jim holds ATP ratings in both airplanes and helicopters and is a CFII. Jim can be contacted at president@rotor.org.

THIS NOVEMBER, AMERICANS HAD THE PRIVILEGE OF PARTICIPATING IN OUR national elections. It can be a contentious time, but this is what makes a great democracy: the vibrancy and diversity of views, all coming together in an imperfectly perfect process. We watched the election closely and want to thank all of our members who fulfilled their civic duty by voting.

As we start to wrap up 2020, I hope this message finds you and your family healthy and safe. But just surviving isn't enough. HAI wants to help you take flight as soon as the health experts say it's safe to do so. So we've been seeding 2021 with as much positive rotor wash as we can.

Faced with the worst pandemic in 100 years, we realized that HAI members and the industry need up-to-date, comprehensive information on COVID-19 and its effect on vertical takeoff and landing (VTOL) operations. The COVID-19 section on rotor.org provides a central location for information gathered from OEMs, government agencies, and international health organizations. In addition, we created the HAI COVID Clean Program to support members who run public-facing operations. Operators participating in the program pledge to adhere to guidelines from OEMs, the US Centers for Disease Control and Prevention, and the World Health Organization to protect the health of their staff and customers and maintain sanitary aircraft and facilities. So far, 16 companies are participating in COVID Clean, including an OEM, a university aviation program, and air ambulance and tour operators. We also have a "Global Regulations" section that contains COVID-19 information from 10 regulatory agencies around the world.

This year saw the introduction of our HAI@Work webinar series. We initially created the webinars, which take place every Thursday, to provide you with current information on COVID-19–related topics, such as stimulus efforts, employment, and maintaining flight readiness. Now, we've expanded the series to include general industry topics, such as advanced air mobility, safety management, and insurance. The great response we've received—our webinars have been viewed in more than 50 countries, with around 25 countries represented at each webinar—tells me our industry was eager for this source of information and news. If you have webinar suggestions for us—topics you'd like to share or an expert you'd like to hear from—please email me at president@rotor.org.

I expect our industry will continue to feel this pandemic's effects until a vaccine is widely available, which I hope will be by early next year. This is an incredibly challenging time for businesses, which is why HAI has been so active in advocating for our members for legislative and regulatory relief. Tough times like these are exactly when you need the support and strength in numbers that an association provides.

Even as we wait out this pandemic, however, our industry has continued to evolve. Our OEMs are actively developing advanced air mobility and remotely piloted aircraft. Our pilots have decades of experience working in the low-altitude, confined-area airspace. The VTOL community—manufacturers, operators, pilots, and maintainers—is ideally positioned to build, operate, fly, and fix these aircraft.

All in all, I'm feeling optimistic for our industry because of our history of adaptation and versatility. While it may feel as though this pandemic will drag on, there is an end in sight. When that happens (and it will), I want our members to be primed for success and ready to go fly.

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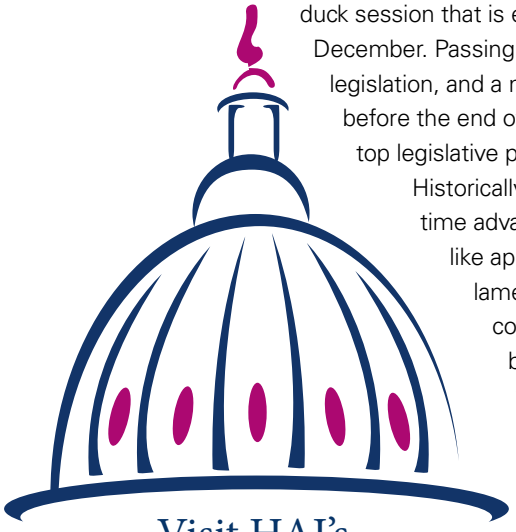
By Cade Clark and John Shea

The Post-Election Landscape

HAI sets its legislative agenda for the new Congress.

Now that the US general election has concluded, Congress has returned to Washington. While candidates elected to the US Senate and House of Representatives won't be sworn in until Jan. 3, 2021, the Congress that has been in place since January 2019 began a lame duck session that is expected to extend well into December. Passing appropriations bills, defense legislation, and a new COVID relief package before the end of the year will be among the top legislative priorities.



Visit HAI's Legislative Action Center
rotor.org/lac

Historically, Congress has an easier time advancing must-pass legislation like appropriations packages in a lame duck session, due to the conclusion of election frenzy, but that may not be the case this year. With some state results in the presidential race being challenged by the Trump administration and two Senate races heading to a January 2021 runoff that will determine which political party controls the upper chamber, the same partisan gridlock that's plagued the 116th Congress could continue for the remainder of the year.

The 117th Congress

When the 117th Congress convenes in the beginning of January, a new legislative year will begin. All unpassed legislation of the previous Congress will expire (with the exception of treaties). If any of those bills is to move forward, it must be reintroduced.

On opening day of the 117th Congress, the House will elect a speaker, announce party leaders, and establish rules for the legislative body as well as policies for certain floor practices. The House may also adopt resolutions assigning some or many of its members to committees. This process regularly continues over several more weeks.

The committee assignment process occurs primarily within the party groups—the Republican Conference and the Democratic Caucus. There are representatives and senators currently serving who represent other parties, but their numbers are so small (one in the House, who actually retires at the end of the 116th Congress, and two in the Senate) that they must work with the two main parties. In fact, both the House and Senate are primarily organized around our two-party system. Legislators and their staff—there's a red team and a blue team, and everyone knows which one you play for.

The Senate will follow a similar protocol in January. After swearing in senators elected or reelected in the general election (approximately one-third of the Senate), the upper chamber will adopt administrative resolutions and standing orders. If there is a vacancy or a change in party control, the senators may elect a new president pro tempore (generally the longest-serving senator from the majority party; in the 116th Congress, Sen. Chuck Grassley [R-Iowa] served in this role) and one or more Senate officers.

Negotiations between parties over committee sizes and ratios, action on committee assignments, and decisions on party leadership changes and organization may begin during the early organization meetings for the new Senate, which will occur in November and December. The committee assignment process may continue after the beginning days of the 117th Congress. At some time, usually other than opening day, the Senate adopts committee assignment resolutions. Any changes in Senate party leadership take place in respective party conference meetings.

As a result of the November elections, Democrats will maintain their majority in the House but by fewer seats than they held in the 116th Congress. The majority in the Senate will be determined by the results of the runoff elections in Georgia on Jan. 5. If the 117th Congress ends up with the same parties in the majority

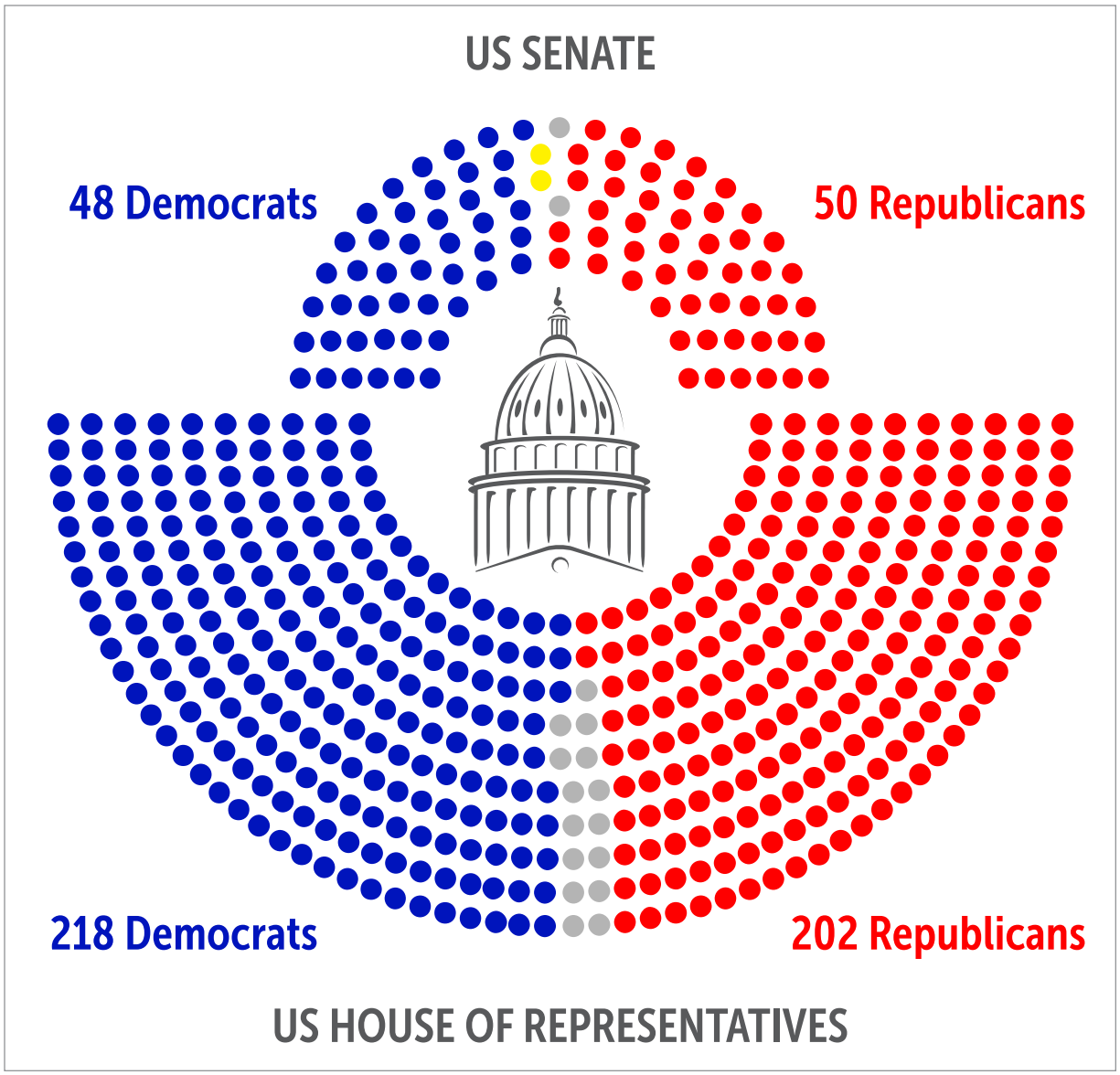
as the previous 116th Congress, party and committee leadership aren't expected to change too dramatically. Legislative priorities for the two chambers will be set by their respective leadership and could resemble those of the 116th Congress.

Power of the Majority

In both the Senate and the House, the power that comes from being the party in the majority can't be overstated. The majority party controls both the messaging and the direction of its chamber throughout the congressional year. Particularly in the House, the power of the majority allows for essentially complete control of the legislative direction and ability to pass or block legislation as the majority sees fit. The minority party can't even bring legislation to the floor without the cooperation of the majority party.

The Senate, on the other hand, does provide some additional measures, like the filibuster, that allow the minority party to assert its voice and influence the legislative process. However, despite these additional Senate procedures, make no mistake about it: majority status is what both parties want.

Although many different factors can influence the



As of press time, the balance of power in Congress stood as follows:

Senate
- 50 Republicans (red)
- 48 Democrats (blue; includes 2 Independents [gold] who have chosen to caucus as Democrats)
- 2 Senate races facing January runoff (gray)

House
- 218 Democrats (blue)
- 202 Republicans (red)
- 15 uncalled races (gray)

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ability of a bill to move forward in any Congress, one consideration is the legislation's level of controversy and the political party of the sponsor. Sponsors in the majority party may see more action on controversial bills than those in the minority.

Through the 116th Congress, articles in ROTOR have chronicled numerous legislative initiatives with varying degrees of controversy that could impact the helicopter industry. While those proposals will expire at the end of the year, the sponsors of those initiatives still maintain their position and therefore are expected to reintroduce their bills in the 117th Congress.

2021 Legislative Agenda

The 117th Congress starts after what most would charitably describe as a tumultuous 2020 for the entire world. Additionally, this year has seen a wide range of events, both positive and negative, that have placed the vertical flight industry in the spotlight for legislators and policymakers at all levels across the globe.

HAI Members

HAI is here for you! Contact advocacy@rotor.org with your legislative challenges.

Our industry has also made invaluable contributions to society in 2020. The impacts of a worldwide COVID-19 crisis, a record-setting hurricane season in the Atlantic, and the worst fire seasons in history for the United States and Australia were all made less severe thanks to the vertical flight industry.

Moving into the 117th Congress, the parties controlling the House and the Senate will establish their agenda for their legislative priorities. Aviation issues will continue to be in the forefront.

The COVID-19 pandemic has had devastating effects on some segments of the vertical flight industry. Stay-at-home orders, travel restrictions, state and local orders, and an overall decrease in economic activity have had a disastrous impact on many helicopter operators, especially in the commercial tour industry. COVID response efforts will continue to be a huge priority for lawmakers in 2021, and targeted relief to the aviation industry will remain a focus because of the massive impact the industry has on the US economy.

HAI's Agenda

Within the framework of the 117th Congress, HAI will continue to press for industry priorities, which include:

- Promoting, expanding, and defending the vertical flight industry
- Promoting legislation that increases industry safety and ensures its viability
- Promoting the development of electric aircraft, including vertical takeoff and landing and advanced air mobility platforms
- Preserving those segments of the electromagnetic spectrum critical to aviation safety
- Preserving federal sovereignty over the National Airspace System (NAS) by protecting federal preemption
- Strengthening and expanding aviation workforce development programs.

This election has shattered everyone's crystal ball but looking through those shattered remains, we anticipate that all these priorities will be addressed in the 117th Congress.

The COVID-19 pandemic has forced a departure from how HAI's Government Affairs team traditionally conducts congressional outreach. As with the rest of the business world, meetings, networking events, committee hearings, receptions, fundraisers, conferences, and other traditional advocacy activities are no longer in person. Meeting and developing relationships with newly elected officials and their staff will take place in a completely different manner. Webinars, video meetings, website content, and other online communications are now the new norm.

What hasn't changed is the need for relationships. Remember that legislative agenda? It's just as important as ever for you to develop a relationship with your elected officials—both federal and local.

We encourage you to get to know your newly elected officials or reach out to congratulate your current representatives on their reelection. While observing COVID-19 restrictions, look for opportunities to bring your lawmakers physically, or virtually, to your business to showcase your operations and the benefits you bring to the community. Have questions on how to do that? Please reach out to us and let us help.

As we turn the page on 2020 and begin a new Congress, our industry confronts new opportunities and challenges. HAI's advocacy program saw some successes in the last Congress, and we look to build on that momentum as we continue to advocate for the VTOL industry in the 117th Congress.

ROTORWASH

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HAI BRIEFS

Vertical Readers Cite HAI for Pandemic Assistance to Industry

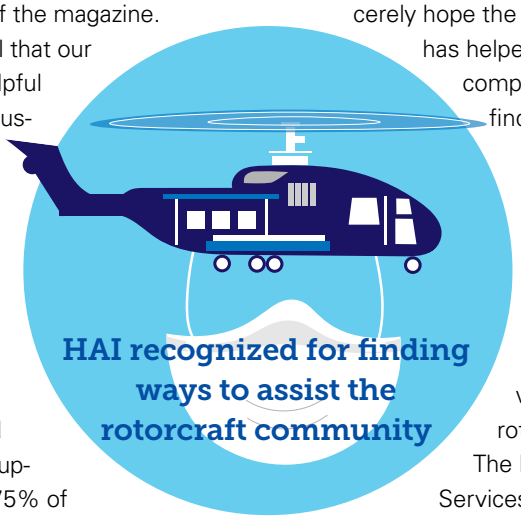
HAI'S EFFORTS TO SUPPORT AND INFORM the vertical flight industry throughout the COVID-19 pandemic received recognition in a recent survey by *Vertical* magazine, a leading publication in the rotorcraft community.

Conducted in September 2020 by independent research firm PMG Intelligence, the survey focused on the effects of COVID-19 on the industry. One question inquired whether "industry associations have been helpful in providing information about resources that are available to you during the pandemic."

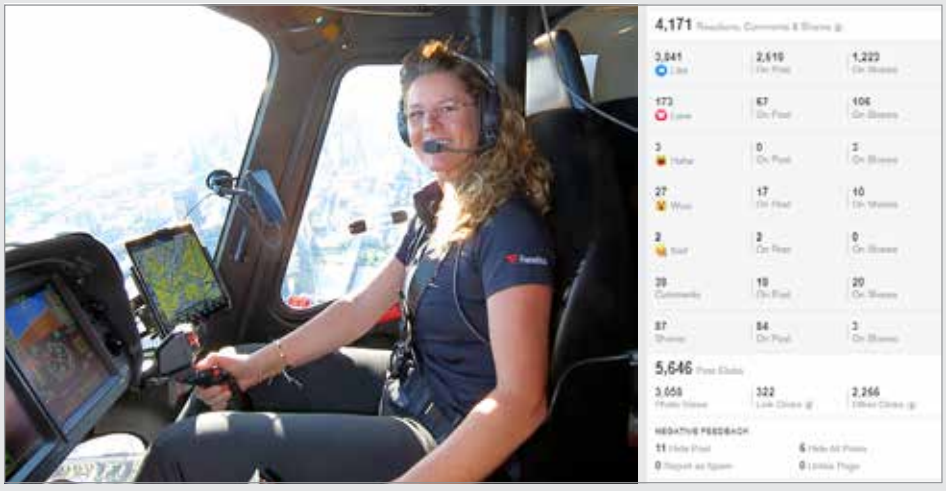
Respondents were asked to name the associations that have been most helpful to their company.

"Of those associations, HAI was mentioned most often," reports Elan Head, editorial director of the magazine.

"We're grateful that our work has been helpful to those in the industry who've been affected by the pandemic," says James Viola, president and CEO of HAI. "Businesses have been so hurt by this pandemic and the economic disruption it's caused—75% of the respondents to *Vertical*'s survey said their business has decreased, and 50% have had to lay off staff. I sincerely hope the work HAI has done has helped some of these companies or individuals find relief."



Since the spring, HAI's staff have dedicated much of their time to distributing information or working with governments to find ways to assist the rotorcraft community. The HAI Member Services Department has advocated for the rotorcraft industry before civil aviation authorities around ➤



The tips that keep on giving! The seven power networking tips discussed by Stacy Sheard, chair of the HAI Board of Directors, in her profile in the Q3 issue of ROTOR were both entertaining and extremely helpful to HAI's social followers around the world.

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➤ the world, helping to create compliance solutions on behalf of individuals and companies.

HAI's Government Affairs team has worked with US lawmakers to ensure that the vertical flight industry is included in financial assistance programs. Staff from many of the association's departments have worked to collect and compile information from operators, rotorcraft trade groups, and government agencies worldwide to post on HAI's website as a helpful resource.

"Another statistic from Vertical's survey that stands out is that 53% of respondents indicated that COVID-19 has prompted changes to their business model. The VTOL industry is wonderfully adaptable, and these figures tell me that rotorcraft companies are doing their best to remain flexible and accommodating during the pandemic."

HAI also this year developed a weekly webinar series, HAI@Work. The initial goal of the program was to provide the rotorcraft community with up-to-date information about the pandemic in a rapidly changing legislative and regulatory landscape, but the webinars now cover other topics of interest to the industry as well. More than 4,300 attendees from over 50 countries have viewed the webinars live, and videos of them have been viewed more than 4,500 times.

"Another statistic from *Vertical*'s survey that stands out to me is that 53% of their respondents indicated that COVID-19 has prompted changes to their business model," adds Viola. "The VTOL industry is wonderfully adaptable, and these figures tell me that rotorcraft companies are doing their best to remain flexible and accommodating during the pandemic."

Viola believes that the rotorcraft industry, with its ability to tackle a diverse set of missions for customers worldwide, is resilient.

"In the long run, it's this versatility that will help the rotorcraft industry rebound. We know we're headed into a seasonal slowdown in the Northern Hemisphere, but we experienced a mostly positive summer season in firefighting and agricultural work this year," Viola told *Vertical*.

"Many of those operators are ready to begin their off-season cycle of training and maintenance and are otherwise preparing for next year's operations. Work is already starting to pick up in areas of the Southern Hemisphere, and a few firefighting operators are shifting aircraft to the other side of the equator," Viola continued.

It is this ability to adapt, says Viola, that is key to the industry's long-term future.

"Even as we wait out this pandemic, our industry has continued to evolve," he added. "Our OEMs are actively developing advanced air mobility and remotely piloted aircraft, working their way through testing and proof-of-concept phases. Our pilots have decades of experience working in the low-altitude, confined-area airspace. The rotorcraft community—manufacturers, operators, pilots, and maintenance—is ideally positioned to build, operate, fix, and fly these aircraft.

"All in all, I'm feeling optimistic for our industry because of our history of adaptation and versatility," Viola continued.

"While it may feel that this pandemic will never end, there is, in fact, a light at the end of the tunnel. When that happens (and it will), I want our members to be primed for success and ready to go fly," he noted.

HAI BRIEFS

HAI Introduces Membership Services Department

EXCITING CHANGES ARE UNDERWAY AT HAI, AND the result means significant changes for our members.

HAI's Operations and Business Development Departments have merged to create the Member Services Department. This group directly supports HAI members by providing services in regulatory assistance and advocacy, operations support, education, and membership and by producing HAI HELI-EXPO, conferences, and other events. This change was prompted by two events: the hiring of Michael Hertzendorf as VP of Operations and the retirement of Karen Gebhart, HAI's longtime VP of Business Development.

"As we discussed the vacancy in Business

Development, it became clear that we had an opportunity to demonstrate our commitment to our members," says James Viola, president and CEO of HAI. "The Operations staff was directly engaged in providing services to our members, often advocating for them before regulatory authorities. And we recognized that increasing our members' satisfaction is the path to growth. It made sense to reorganize these two departments into an integrated unit focused on providing member value.

"HAI is grateful to Karen for her years of service to the association and her part in making HAI HELI-EXPO the success that it is today," adds Viola. "The show is recognized as one of the fastest-growing trade events, and it remains the largest helicopter show in the world. Karen's work, and that of her team, ensured that members of the global vertical lift community could find everything they need in this one event."

In his expanded role as VP of Member Services, Hertzendorf will oversee HAI's work for its members in flight operations, maintenance and technology, safety, education, events, and membership. He will also work closely with HAI's Government Affairs Department to ensure HAI members across the VTOL industry are protected from overly burdensome regulations.

"We're very pleased Mike accepted this new responsibility just as he was settling in. He understands that continuing to grow member value is a priority for HAI," says Viola.

After a 29-year career in the US Army as a special operations aviator, Hertzendorf most recently served as CEO of NUAIR (Northeast UAS Airspace Integration Research), where he was responsible for the integration, synchronization, and execution of all activities necessary to develop a national unmanned aircraft systems (UAS) traffic management system within New York state's 50-mile UAS corridor.

His background in both manned aviation and UAS provides Hertzendorf with a unique perspective. "Mike's history as an army aviator and leader, along with his work at NUAIR, means that he understands the issues and can represent the needs of both rotorcraft operators and those working to integrate new classes of aircraft into the airspace," says Viola.

"I'm excited to join the HAI team in these unprecedented times for aviation," says Hertzendorf. "I look forward to advancing HAI's global presence as well as incorporating future VTOL platforms. With their experience in rotorcraft and low-altitude operations, HAI members are well positioned to take advantage of advancements in VTOL technology that I believe will ultimately improve the economic viability of our industry."

Michael Hertzendorf, HAI VP of Member Services

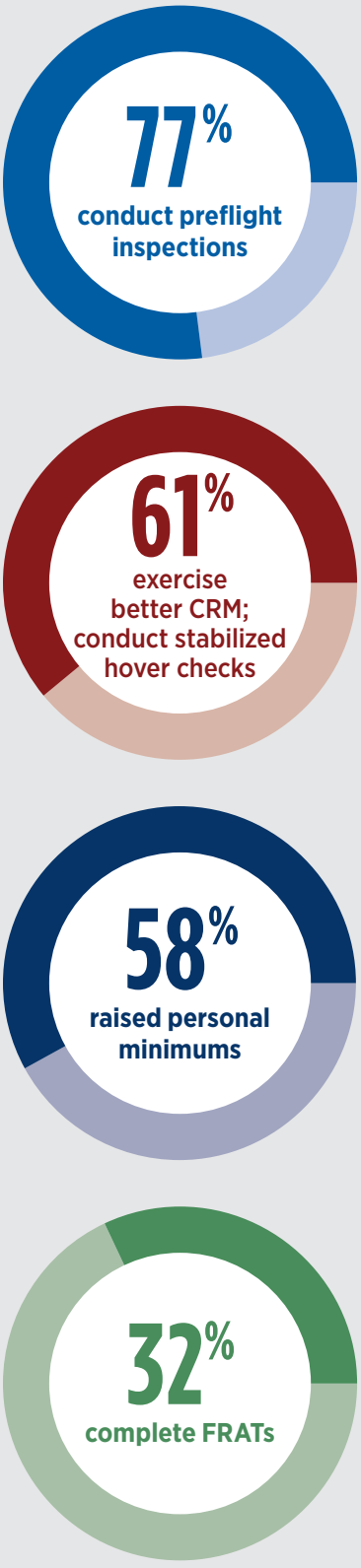
Mike grew up in Upstate New York and has more than 20 years of command and leadership experience, finishing his US Army service as chief of staff of the 82nd Airborne Division. He holds a master's degree in national security and strategy from the US Army War College, a master's degree in public administration from Murray State University, and a bachelor's degree in business administration from Ithaca College.

Hertzendorf is a commercial instrument rotorcraft and private single-engine land pilot, and he volunteers on the Military Advisory Board for Tuesday's Children, a nonprofit supporting youths, families, and communities affected by terrorism and traumatic loss. He is an avid outdoorsman and focuses his off-hours on fitness and swimming.

The hiring of Hertzendorf and combining the two departments also resulted in additional staff changes. Chris Martino is now senior director of operations and international affairs, and Zac Noble has been promoted to director of maintenance and technology. Greg Brown has been named director of education and training services. Charlotte Zilke is now senior director of membership and conventions, and Shaquanta McFadden is HAI's membership manager.

ONE QUESTION MANY ANSWERS

By Christine A. DeJoy



What changes have you made since experiencing—or narrowly avoiding—an aviation accident?

EXPERIENCING AN ACCIDENT OR NEAR MISS CAN BE A WAKE-UP CALL—time to go back to basics, dust off that procedures manual, or get additional training. To find out what changes our readers have made since experiencing an accident or close call, ROTOR anonymously surveyed them in September. After reading their suggestions, why not cut out the accident and go straight to improving your flight routine?

More Preflight Inspections, Better CRM. Overwhelmingly, performing a preflight inspection or walk-around is the top change our readers have made post-accident or -incident: 77% of our 31 respondents (24 people) say they now always conduct the safety procedure. Certainly, we hope the 23% of respondents who didn't select this answer didn't because they were already conducting walk-arounds, an essential aspect of safe flight.

Exercising better crew resource management (61%, or 19 individuals) and always completing a stabilized hover check before departure (also 61%) are the next most common changes. And 32% now always use a flight risk assessment tool (FRAT) since having had an accident or near miss.

Taking Initiative. Most of our respondents say they've taken the initiative to learn on their own since their accident/event. More than half say they've changed their personal-minimum criteria to a higher standard (58%, or 18 respondents), and a similar amount now make time for personal aviation study (55%, or 17 readers). Nearly a third of respondents (29%, or 9) have requested additional training with an instructor.

Already Doing That. The least-selected changes our readers have adopted in response to an accident or near-accident are to (1) always complete the required maintenance procedure card without any interruptions or distractions (13%, 4 respondents); (2) always complete a quality-assurance check after maintenance procedures that mandate one (26%, 8 people); and (3) adopt, or increase the frequency with which they practice, in-aircraft and/or simulator training (also 26%). Again, we hope the low number of respondents reporting these changes means they had always incorporated these practices into their flight routine.

ROTOR also asked readers to describe an especially memorable change they've made as a result of an accident or close call. At right are some of their responses (edited for space).

"An accident changes your level of vigilance. So I always have a place I'm going in the event of a partial power or engine failure plus an alternate … and an alternate … and an alternate—just a heightened sense of awareness I thought I had but really didn't before the accident."

"I can recall when I used to fly medevac for the state police. I'd often put pressure on myself to try to complete the missions. After an encounter with IIMC or flying in bad weather too often, I decided I needed to take a more conservative approach. I didn't make a drastic change but enough to keep me and my crew safe for the 18 years I flew for the police. Now, I fly corporate, I rely on a good FRAT, good training, good CRM, and good decision-making. The great equipment helps as well."

"Numerous situations over the years during single-pilot operations in which I was surprised by something unexpected have convinced me that having nonrated crew members who aren't actively engaged in the flight safety equation results in significantly increased operational risk. An actively engaged team of nonrated crew members working with a single pilot can close safety gaps."

"After experiencing a dynamic rollover accident because the snow skis were improperly modified, I now (1) always check the mechanic's work; (2) try to self-check my assumption bias that if someone else has been operating the aircraft in that condition for a period of time, then everything is OK; and (3) use caution when I put something on the MEL that I think won't be important."

"While flying on the coast of Alaska in the spring, I encountered a snowstorm in a VFR machine. A series of external pressures had led me to make a go decision, but had I taken more time for preflight planning and not allowed myself to rush, I would have most likely chosen not to go. Now, when the customer's in a hurry, I tend to intentionally drag my feet. I revert to what I learned in flight school: I use the PAVE model to ensure that I've checked every box and I'm making a safe go/no-go decision. This intentional dragging of my feet has really led me to evaluate opportunities for outs. That Alaska flight was the worst flight I've ever had, but I think I'm better for it now. Mission creep sneaks up on you when you least expect it. I hope to never let it happen again."

COURTESY CHAD DOLLICK

By Christine A. DeJoy

Working in Longline Operations

Longline work is a special niche of the vertical takeoff and landing (VTOL) industry, one that requires precision and intricate teamwork.

1 DON'T rely on the horizon for reference when flying longline. In most helicopter flights, the pilot faces forward, looking out the windscreen at the nose of the aircraft to determine spatial positioning. But in external-load operations, which typically use lines of 100 to 250 feet that hang below the ship, it's critical to look out the door of the helicopter and down—a practice even experienced pilots find challenging, says Cody Barton, chief pilot for Columbia Helicopters. "Using vertical reference is the toughest thing about longline to get used to," he says. "It can frustrate a pilot who's new to the sector. It really gives you humility."

2 DO practice, practice, practice. The key to becoming adept at longline work, say experts, isn't so much the aircraft you train in but the amount of time you put into it. "It takes about 20 hours of flight time for a pilot with no longline experience to get to a point where you can safely fly a basic longline op," says Andre Hutchings, director

PHOTOS: TOP, JORDAN COLLINS; BOTTOM, BEN WIEBORG

of operations at external-load training company Volo Mission (VM). In VM's in-person classes, participants practice with various line lengths—50 feet versus 200 feet, for example—to solidify their skills. And in the ground portion of the course, they learn to appreciate the perspective of the ground crew, who must complete their work with helicopters hovering over their heads.

3 DO obtain class training. Don't rely on on-the-job training to perfect your longline skills. Instead, get formal instruction led by professional teachers. In this sector, "everyone starts as an SIC [second-in-command pilot]," Barton says. "Learning longline is like learning to fly a helicopter all over again." Acquiring the basics in a setting that allows you to concentrate without the demands, pressures, and time constraints of a job is essential, adds Kim Hutchings, VM's CEO. "In a course, you're fully immersed in and focused on the training, and you aren't interrupted by business concerns," she says. Class training also enables students to learn the intricacies of longline ops—what it's like, for instance, working with steel lines instead of the now more-common, lighter synthetic lines, or graduating to heavier, more-unwieldy two-part load work after beginning with one-part loads.

4 DON'T assume longline recruiters look only at a job applicant's previous experience. Humility, a good attitude, and a strong work ethic are just as critical, Barton notes. Columbia has been known to hire someone who's a great fit for the job and then send the person to longline training. Sami Challburg, who's in her first year conducting firefighting missions with Helicopter Express (HE), worked her way up from flight instructor. Dedication and commitment earned her a Whirly-Girls scholarship that afforded Challburg 20 hours of longline training, which eventually helped her secure her position with HE.

5 DON'T join the longline sector unless you enjoy working on a team. The sector is very team oriented, and for good reason: ground coordinators, riggers, pilots—all must rely on one another to safely execute what are often hazardous procedures. Performing precise load placements depends not only on the aeronautical skills and experience of the pilot but also on the preflight equipment preparation, rigging, and staging proficiency of ground personnel, and the communications skills of every crew member, in the air and on land.

Thanks to Chris Hill, HAI director of safety, and the panelists on the Aug. 20, 2020, HAI@Work webinar, "Longline Operations: Training and Discussion": Cody Barton, chief pilot, Columbia Helicopters; Sami Challburg, pilot, Helicopter Express; and Andre Hutchings, director of operations, and Kim Hutchings, CEO, Volo Mission. Listen to the recorded webinar to learn more about this fascinating field.

WATCH the webinar

PHOTO: BENJAMIN SCHAEFER

By Jen Boyer

Mark Bathrick, Director, Office of Aviation Services, US Department of the Interior

DOI UAS have conducted nearly 1,800 flights supporting wildland fire operations this year.

WATCH a UAS work the Pine Gulch Fire

AS THE INCREDIBLY INTENSE AND DESTRUCTIVE 2020 WILDFIRE SEASON begins to wind down, HAI got the chance to ask Mark Bathrick, the director of the Office of Aviation Services for the US Department of the Interior (DOI), how the season went and what next year may hold.

ROTOR: This fire season was certainly one for the books. How were DOI helicopters and unmanned aircraft systems (UAS) assets used and how did they make the most impact?

Bathrick: DOI is committed to deploying all resources and technology to protect human health and safety. The department continues using the drone fleet during wildfire response operations. So far this year and despite challenges associated with COVID-19, DOI has conducted fuel management treatments on nearly 1 million acres, putting us ahead of our 10-year average.

Commercially contracted helicopters continued to play a vital role in wildland firefighting in 2020. A critical part of the annual preparation for the fire year is the inspection of aircraft for proper equipment and conditions and the training and evaluation of pilots prior to the contract start.

Working closely with our industry and interagency partners, the Office of Aviation Services (OAS) developed COVID-19 sensitive travel and inspection risk assessments and protocols that enabled us to exceed fire-year readiness requirements while also mitigating the risk of COVID-19 to our employees, commercial vendors, interagency partners, and the communities we visited to perform the inspections.

Our UAS continue to be used across the country in support of wildland fire operations.

A firefighter launches a UAS during a training exercise.

ISTOCK/MICHAEL CHAPMAN

Were there any surprises, either good or bad, in how helicopter and UAS assets were used?

The use of aerial-ignition UAS helps our teams conduct burnout operations during smoky conditions and at night.

Given that we're seeing longer, more intense fire seasons, what are you hoping to bring to the 2021 fire season?

For 2021, OAS plans to meet the DOI bureaus' requests to train more UAS operators to support wildland firefighting efforts.

How did UAS technology support firefighting this season?

DOI bureaus continue to use our UAS fleet during wildfire response operations. DOI UAS have conducted

1,793 wildland firefighting support flights in 2020. Of those, 903 were used in the aerial-ignition mission.

Crews are still currently deployed supporting many fires across the western US, including the following:

- The Pine Gulch and Grizzly Creek Fires in Colorado provide examples of using UAS to minimize personnel risk and achieve management objectives.
- The Pine Gulch Fire (139,000 acres) in the Book Cliffs north of Grand Junction, Colorado, was burning in steep and often inaccessible terrain. DOI's Bureau of Land Management (BLM) and interagency UAS personnel were tasked with building an indirect fire line utilizing the Ignis 2 Plastic Sphere Dispenser (PSD) payload. UAS crews worked at night to ignite ridge tops and create a backing fire, which ultimately assisted in containing the main fire. Crews worked for 18 days and performed 161 flights that dropped 60,000 plastic spheres.
- The Grizzly Creek Fire (32,431 acres) burned near Glenwood Springs, Colorado, in August, also in steep and inaccessible terrain. The BLM Unaweep Wildland Fire Module was assigned to this incident on Aug. 20 and was tasked with protecting the Glenwood Springs watershed. The crew utilized UAS to provide situational-awareness, infrared, and aerial-ignition services in support of incident objectives. Aerial ignition with UAS was of particular importance because of the rocky terrain in the area: 1,000 plastic spheres were dropped in an effort to protect Bair Ranch and other critical infrastructure. The Unaweep Module conducted 23 flights during this successful operation.

What new developments are on the horizon to increase UAS support?

Additional training courses are planned over the winter to increase the number of personnel who can be deployed to support the 2021 fire season.

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Helicopter Association International

HELICOPTER EVENTS

2020

NOV. 17–18/VIRTUAL
HAI *Virtual* Aerial Firefighting Conference
Helicopter Association International
Learn more at rotor.org.

NOV. 26
Young Eagle Build and Fly Program
Experimental Aircraft Association
Hilo, Hawaii, USA
Learn more at eaa.org.

DEC. 2–3/VIRTUAL
NBAA GO Virtual Business Aviation Convention & Exhibition (VBACE)
National Business Aviation Association
Learn more at nbaa.org.

DEC. 9/VIRTUAL
European Rotors: The VTOL Show and Safety Conference
General Aviation Manufacturers Association
Learn more at gama.aero.

2021

JAN. 26–28/VIRTUAL
2021 Autonomous VTOL Technical Meeting and Electric VTOL Symposium
The Vertical Flight Society
Learn more at vtol.org.

FEB. 8–10
2021 Leadership Conference
National Business Aviation Association
Palm Springs, California, USA
Learn more at nbaa.org.

FEB. 23–26
2021 Schedulers & Dispatchers Conference (SDC2021)
National Business Aviation Association
Fort Worth, Texas, USA
Learn more at nbaa.org.

MAR. 11–13
2021 International Women in Aviation Conference
Women in Aviation International
Reno, Nevada, USA
Learn more at wai.org.

MAR. 22–25 / EXHIBITS OPEN MAR. 23–25
HAI HELI-EXPO 2021

2021 HAI HELI-EXPO
BY HELICOPTER ASSOCIATION INTERNATIONAL

Helicopter Association International
New Orleans, Louisiana, USA
Learn more at heliexpo.com.

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AIR ENFORCEMENT AGENT: MAX McFADDEN
US BORDER PATROL SUPPLEMENTAL AIR CREW: AARON QUAIN

PHOTO BY MARK BENNETT

By Thomas McKenzie

Katrina Remembered

First came the floodwaters. Next came the helicopters.

US COAST GUARD (USCG) AVIATION SURVIVAL TECHNICIAN Petty Officer 2nd Class Joel Sayers, suspended beneath a hovering orange USCG rescue helicopter, is lowered to the rooftop of a home. His mission: to save an elderly woman clinging to that roof, the house now surrounded by rising floodwaters. It is Aug. 29, 2005, the first day of Hurricane Katrina rescue operations and mere hours after the flood levees failed, releasing billions of gallons on storm-sieged New Orleans.

As Sayers touches down, the woman anxiously rushes toward him, pointing and shouting to be heard above the roar of the rotors; her husband is trapped in the attic below their feet, unable to escape. Sayers drops down and looks through the small opening in the roof the woman managed to escape through. The face of her trapped husband peers back.

Unable to widen the hole any further using the rescue helicopter's lightweight crash ax, Sayers realizes he needs something with more weight—and a better plan. He speaks to the man through the ragged opening, shaking his hand, calming him, assuring him, and promising to return soon. He then ties a brightly colored strip of cloth around one of the roof's visible vent pipes to better identify the house before convincing the woman to leave her husband behind … temporarily.

Katrina Strikes

Recently, we observed the 15-year anniversary of Hurricane Katrina, widely considered one of the worst natural disasters in the history of the United States. Forming over the Bahamas on Aug. 23, 2005, the storm crossed into southern Florida as a Category 1, gathering strength in the warm waters of the Gulf of Mexico before wreaking catastrophic damage on parts of south Florida and stretches of the Mississippi Gulf

USCG PHOTO BY PETTY OFFICER 2ND CLASS NYXOLYNO CANGEMI

Coast and unleashing mass flooding in the greater New Orleans area.

In *A Failure of Initiative,* the 2006 federal after-action report by the US House of Representatives that examined the response to Hurricane Katrina, both the National Weather Service and the National Hurricane Center received praise for their forecast efforts. Storm track projections were available nearly 56 hours before Katrina's arrival, with the landfall prediction off by a mere 15 miles.

In its preparations for Katrina's arrival, the USCG issued broadcasts to mariners—repeated radio warnings to the offshore recreational and commercial fishing communities—and pre-positioned key rescue assets to safe areas ahead of the storm, thereby ensuring airframe survivability and promoting a rapid response posture as soon as the weather conditions permitted.

Despite all early warnings and preparations—and as it remains today with economically challenged communities where seasonal natural disasters are common—thousands of New Orleanians were simply unable to evacuate ahead of the storm. But Katrina wasn't just a storm. The extreme rain, surging waters, and high winds stressed the city's extensive flood protection system to the breaking point.

According to published reports, once the 17th Street Canal levee gave way, just after 9 am the morning of landfall, New Orleans began to flood. One disaster was followed by 28 additional catastrophes as levee after levee burst, releasing billions of gallons of water into the city over the next 24 hours, and turning an already severe hurricane into a disaster of epic proportions. Nearly 80% of all structures in Orleans Parish sustained water damage, with more than 204,000 homes damaged or destroyed, and an estimated 800,000 citizens in the greater New Orleans metropolitan area forced from their homes—the largest displacement of Americans since the Dust Bowl of the 1930s.

To make matters worse, the primary and secondary power sources for the city of New Orleans—including the pumping stations that might have prevented some of the flooding—were down, as was the local communications infrastructure, making it difficult for state and local responders to effectively evaluate the unfolding disaster, let alone coordinate their actions. Instead, initial communications between responders consisted of limited cell phone availability and satellite phones.

The Coast Guard Launches

Mere hours after Katrina made landfall in Louisiana on Aug. 29, once the winds of the storm had dropped to just below 60 knots, USCG helicopter crews launched their rescue operations. The first happened at around 2:50 that afternoon; they continued long into the night.

The Coast Guard Aviation Training Center (ATC) in Mobile, Alabama, and Coast Guard Air Station New Orleans (the buildings of which suffered considerable damage during the storm) shared tactical control for operations. Helicopter rescue crews from USCG air stations across the country would receive tasking from ATC Mobile. After flying scheduled six-hour mission windows, crews would return to ATC Mobile for mission debriefing. They'd be replaced by rested, briefed, and newly tasked crews who would launch immediately for the flooded New Orleans area while the original crew ate and tried to get a few precious hours of sleep.

Berthing was sparse, and commodities were few. Crews slept on cots on the floor of an administration building with no air-conditioning, their limited electricity provided by an auxiliary generator. For the first week, they subsisted on bottled water and MREs (Meals, Ready-to-Eat) flown in by

One-third of all USCG aviation assets were deployed to the Gulf Coast for Katrina relief. Below, a crew from Kodiak, Alaska, based out of Air Station Houston, aboard an HH-60 Jayhawk out of Air Station Clearwater, Florida, drops a sandbag to repair a damaged levee.

Opposite, USCG Petty Officer 2nd Class Shawn Beaty looks for survivors.

USCG PHOTO BY CHRISTOPHER EVANSON

Above: An HH-65 Dolphin from Coast Guard Air Station New Orleans takes a break from search-and-rescue operations to land on the Boston-based USCG cutter *Spencer* to refuel.

Opposite: Working at their Mobile, Alabama, base, USCG Petty Officers 2nd Class David Villarreal (left) and Steve Fruzan work to loosen a bolt on the tail rotor driveshaft of an HH-60 Jayhawk used in the post-Katrina response.

Coast Guard C-130s. Operations ran 24/7, and briefings were held in a makeshift ops center using whiteboards.

From the air, New Orleans resembled an immense flotilla of houseboats, with 10- and 20-block stretches of neighborhoods submerged beneath muddy waters. Many of the storm's survivors who'd been unable to evacuate had climbed to high points in their homes to escape the flooding.

The stranded were visible everywhere, waving frantically from the roofs of houses, apartment buildings, and isolated high-rise balconies, huddled in trees, or standing atop their submerged vehicles. Thousands were rescued by USCG helicopter pilots hovering "danger close" to active high-power electrical lines, pushing rescue crews to their physical and mental limits.

While the sun was shining, survivors waved anything that would attract the attention of rescue crews, scrawling desperate pleas for help on sheets of plywood or any large surface they could find. When night fell, pilots reported seeing "thousands of twinkling lights" in their night-vision goggles as survivors used flashlights to draw attention to their positions.

Rescue swimmers faced some of the most difficult and challenging conditions during these missions: navigating steep, slippery roofs of flooded houses and buildings and hidden or submerged objects in muddy water, likely contaminated by sewage, chemicals, or fuel oil. The engine roar and the constant downward pressure of the rotors were familiar to the swimmers who had trained to work under these harsh conditions. The flying shingles and other debris added a new level of threat.

Rescues were conducted by lowering a basket or "strop," a stainless-steel–reinforced web harness that goes under the arms, with a crotch strap to prevent the survivor from slipping out. The rescue swimmer would hook his or her own harness plus the rescue strop to the lowered steel cable and signal for the hoist operator to winch them up. Some evacuees, gripped by sudden fear and panic, would yell and scream as the ground fell away beneath their feet before being delivered to high ground, dry land, or a nearby temporary safe zone.

A Husband Waits

With the rescued wife now safely aboard, the pilot of Sayers's helicopter flew them directly to a nearby staging area where a local fire truck was waiting. Having radioed their request ahead, Sayers dashed to the fire truck, grabbed a much heavier ax, and darted back to the waiting helicopter, which immediately lifted off and returned to the cloth-marked house, an anxious wife still aboard.

USCG PHOTO BY PETTY OFFICER RUSS TIPPETS

For the second time that day, Sayers was hoisted carefully down to the roof. Looking through the jagged hole once again, he advised the relieved man to stand clear before he began chopping an opening large enough for the man to escape through. Chunks of shingles and wood went flying with each determined whack of the ax, until the hole was wide enough. Once freed, the man was snapped into a harness and hoisted up to the waiting helicopter, where he was happily reunited with his wife.

As soon as the details of this rescue were briefed to crews, USCG responders from ATC Mobile began calling the store managers of every single Lowe's and Home Depot in the area, buying up every heavy ax and light gas-powered chain saw in stock and equipping each of their rescue helicopters with one or both of the lifesaving tools.

As hot days and dark nights wore on, there was a growing sense of urgency among the crews, a need to reach each one of what felt like an endless succession of desperate survivors. Such sustained rescue efforts were possible because of the USCG's organizational structure, based on tested operational principles and

USCG PHOTO BY PETTY OFFICER 2ND CLASS NYXOLYNO CANGEMI

Petty Officer 1st Class Steven Huerta hoists two children into a USCG rescue helicopter.

USCG PHOTO BY PETTY OFFICER 2ND CLASS KYLE NIEMI

standardized training.

This training allows a wide mixture of personnel and assets from anywhere in the country to respond quickly, forming competent operational response teams. As one captain commented, a rescue swimmer from Savannah, a pilot from Detroit, and a flight mechanic from San Francisco could crew a helicopter based out of Houston and, despite having never met before, brief for and fly a six-hour mission, "rescue 80 people, and come back without a scratch on the helicopter."

The Coast Guard Response

Of the 60,000 survivors stranded in New Orleans, the USCG, using both surface and air assets and in coordination with other response agencies, rescued more than 33,500—a figure close to the total active-duty population of the service at that time. And of then–New Orleans Mayor Ray Nagin's original prediction of 10,000 lives lost, the final count was just 964 directly attributed to the storm.

There are three reasons USCG personnel were able to effect this outcome:

- The rapid response by the USCG, its standardized training model, and literally *centuries* of experience in lifesaving missions
- The training USCG personnel receive to assess a situation and "act first, ask permission later"
- The proficiency and ability of USCG rescue swimmers.

When rescue swimmers established first contact with evacuees, they instituted a hierarchy of priority for evacuations: the elderly, a person in a wheelchair, or someone with a mobility-limiting condition would go first. Next came mothers with small children. The able-bodied would have to wait, often as long as a day, according to the needs of the situation.

Before departing, the swimmers would designate a group member to be in charge, tasking them with looking after the survivors until a rescue crew could return. This leader would often be the last person to be rescued.

Twelve hours after Katrina's landfall, a quarter of the entire USCG helicopter fleet was conducting rescue operations across New Orleans and along the Mississippi coast. Just two days later, the USCG had eight fixed-wing aircraft and 43 helicopters conducting operations in the region, leveraging its mix of mission-modified HH/MH-65 Dolphins and HH/MH-60 Jayhawks.

While the two airframes are suited for similar missions, the MH-65 Dolphin, manufactured by Eurocopter, is the service's primary rescue helicopter. Crewed by two pilots, one flight mechanic, and one rescue swimmer, the Dolphin is driven by twin 853 hp Turbomeca Arriel 2C2-CG turbine engines, providing a top speed of 175 knots and a range of 290 nautical miles for all-weather and nighttime

operations.

The Sikorsky-made MH-60 Jayhawk, also ideal for search-and-recovery missions, is closer in design to the US Navy's MH-60R or MH-60S Seahawk. With a similar crew complement, the Jayhawk is powered by a pair of GE T700-401C turboshaft engines that push the all-weather, medium-range helicopter to a maximum speed of 180 knots but with a range nearly double that of the Dolphin.

Katrina was an all-hands operation; military response to the disaster brought a wave of aviation assets from all services across the country. The Department of Defense had over 350 helicopters and more than 70 fixed-wing aircraft involved in relief efforts. National Guard helicopter crews in UH-1 Hueys were hoisting one or two survivors up at a time. The US Army's III Corps and two US Air Force rescue wings also brought in at least 30 helicopters with crews.

Of the 60,000 survivors stranded in New Orleans, the USCG rescued more than 33,500—a figure close to the total active-duty population of the service at that time.

The civil industry also stepped up, eager to put the unique abilities of their aircraft into service. Some were summoned as part of the government disaster response, and others volunteered aircraft, pilots, and ground crews to help the beleaguered city. Bell, Sikorsky, and Eurocopter (now Airbus) all sent aircraft and crews, joined by operators from around the country. You can read about the Eurocopter team's experiences on p. 32.

Working for Bell Helicopter at the time, Randy Rowles, now president of the Helicopter Institute and vice chair of the HAI Board of Directors, was part of a crew the OEM dispatched for Katrina relief. "Having grown up in south Florida, I was quite familiar with hurricanes—at least, that was my thought," Rowles says. "But, once we arrived in New Orleans immediately after Hurricane Katrina's departure, I was amazed at the scope of damage and devastation.

"We were dispatched at the end of our workday and sent to Lafayette [Louisiana] for staging into New Orleans. We flew four flights into New Orleans that first night, since we were equipped with night-vision goggles. Initial air traffic control was provided by an overwatch government aircraft, call sign Omaha 44 and then Omaha 45.

"The following days were more organized, with our Bell 407 designated MED16," Rowles says. "People were moved from I-10 and the Intracoastal Highway interchange to the New Orleans International Airport [KMSY]. At one point, three lines of helicopters were waiting

KATRINA REMEMBERED *continues on p. 34*

The Civil Industry Responds: One Team's Story

Two pilots and a mechanic discover "what they could do" to help a devastated city.

AS AMERICAN EUROCOPTER (NOW AIRBUS Helicopters North America) pilots Bruce Webb and Frank Kanauka approached New Orleans early in the afternoon of Aug. 29, 2005, they fully expected to encounter a bit of chaos.

The two pilots, along with mechanic Bob Hernandez, had been dispatched by then–American Eurocopter President Marc Paganini with two helicopters, some cash (they assumed, correctly, that the devastated city would be off the grid and unable to process credit cards), and orders to "see what they could do" to help after what was then the worst hurricane in US history. But nothing could have prepared them for the next week.

"My rule was, I carry only people, no things."

"They didn't know what to do with us," Webb recalls, when he and Kanauka arrived. The two had landed their aircraft at the Superdome, and Webb had gone in search of the person in charge of the powerless (and therefore dark, hot, and ridiculously humid) indoor stadium holding tens of thousands of storm refugees.

Finally, Webb found the person in charge: a general (Webb never found out his name or service branch), who asked him, "Who are you working for?" To which Webb could only reply, "I guess you." And so, for the next seven days Webb and his small EC120 and Kanauka, flying a larger EC135, volunteered as first responders.

At first, they and Hernandez, who came along to care for their aircraft and to manage logistics, formed one of the few civilian helicopter teams in the storm zone. But by the time the trio headed back to their Texas headquarters (leaving their helicopters behind to be flown by replacement teams), more than 400 helicopters, including more than 50 operated by civilian companies and individuals, were filling the skies over the 200-mile-wide storm zone.

"The No. 1 thing I remember was Omaha 44 and Omaha 45. If you ask someone if they were flying at Katrina, and those words don't mean something to them, then they weren't there," Webb says.

"Omaha 44 and Omaha 45 were the military aircraft that controlled your ability to enter the game, so to speak," Webb explains. FAA operations were effectively offline for a couple of weeks, so early on after the storm passed, two military planes assumed overwatch duties, doing their best to control access to the skies over New Orleans and to keep the 600 or more helicopters and fixed-wing aircraft supporting the relief efforts from bumping into one another.

On their way into New Orleans, Webb says, "Frank and I topped off at Houma," a New Orleans suburb just across the Mississippi River, where they also left Hernandez to find a place for them to stay and to set up a makeshift helicopter support operation at the local municipal airport. Once they started working for the general, they both began shuttling refugees with medical issues northwest to the campus of Louisiana State University in Baton Rouge, where a medical triage unit had been set up.

Right: Katrina survivors on their way to shelter in the Superdome; opposite, top: the EC120, just east of New Orleans; opposite, middle: pilots Bruce Webb (left) and Frank Kanauka in front of the Superdome.

Hernandez recalls one very tiny patient they evacuated: a baby born overnight in the Superdome, at the peak of the storm's intensity. The little girl's name? Katrina.

The pilots then moved to shuttling people off the I-10 causeway. Because power was out across the city, Webb, flying a VFR ship, had difficulty maintaining visual references after the sun went down. He followed closely behind Kanauka, whose EC135 was IFR equipped and had a much better searchlight.

The first day they arrived, they flew until about 2 am the next day, until exhaustion forced them to remain overnight in Lafayette, Louisiana. There they grabbed a few hours' sleep on the floor of Acadian Ambulance's helicopter base before flying back to Houma early the next morning and reconnecting with Hernandez. He'd snagged what seemed to be the only two rooms still available, at a bed-and-breakfast owned and run by a judge and his wife. The two pilots shared the "honeymoon suite" while Hernandez bedded down in a much smaller room.

"The judge and his wife treated us very well. They had all sorts of great food waiting for us at night when we came back. I can't tell you how good that was," Hernandez says.

Otherwise, the days were long, tense, and sad. Upon landing atop Tulane University Hospital, where the lower three floors were under water and the power was out, both ships would keep their rotors turning as nurses ushered passengers aboard. The trick was to land, load, and leave quickly, making way for the next helicopter coming in.

The hospital's evacuation took more than a full day to complete. The last ones out were teams of doctors and nurses, whom Kanauka described as having "that thousand-mile stare," exhausted from having worked 48 hours or more without sleep or food.

Everywhere the team looked, they saw people confronting loss—of a loved one, a home, or a life they had once lived. Out on I-10, Webb recalls ordering a man carrying his briefcase to either toss the briefcase or get out. He chose to get out.

"I could take three people in the back and one up front with me. My effective cargo limit was 1,000 lb., or four passengers. They didn't understand how critical my weight issue was," Webb says. "My rule was, I carry only people, no things."

A couple of hours later, he plucked four more passengers off of I-10, including that same businessman. This time, his briefcase was nowhere to be seen.

Another time, Webb, shouting to be heard over the engine's roar, told a passenger who'd just climbed into the front seat next to him not to touch any controls. The young woman, likely in shock, couldn't speak and began sobbing uncontrollably. "I had to shout, and I had to hear her acknowledge that she knew not to touch the controls. But I felt so bad. She was so scared," he says.

During one search-and-rescue mission, Kanauka came across a half-destroyed shack where a few people had gathered to await help. He landed nearby, got out, gave them a few bottles of water that he had with him, and left with five passengers aboard. Those who remained begged him to bring food.

Upon his return, with Webb and his EC120 in tow, a much larger group of people was waiting. Initially, they began to charge the helicopters as they set down. But with the rotors still turning, Kanauka was able to motion for them to wait while he and Webb unloaded a supply of water bottles, military rations, and even diapers before taking off again. "It probably had been several days since those people had eaten," he says.

Webb adds that they never knew the names of the many people whom their team rescued. But one thing about them sticks out in his memory: "I never saw a person I flew who had shoes on."

– By Dan Reed

ALL PHOTOS COURTESY BRUCE WEBB

to deliver hurricane victims to the terminal building."

Like other responders, Rowles remembers both the people who were saved and the ones who couldn't be helped, not in the midst of so much overwhelming need.

"On one of the flights that first night, we flew a physician who was literally performing surgical procedures in the middle of I-10. When we extracted him back to Lafayette, his eyes were deep and empty with a face that reflected the pain and sorrow he was feeling. I remember his words in the helicopter: 'I took an oath to save lives. Today, I condemned many to death, as I could not help them.'"

At the apex of operations, the skies above the city were a dense swarm of rotorcraft activity. The tandem-rotor Chinook, the S-64 Skycrane, and the immense Sikorsky CH-53 could be seen flying overhead, along with most every other rotary-wing workhorse.

The sheer scope of airborne operations required assets to fly dangerously close to one another. Air traffic control was at first self-service; pilots had only their eyes and a common radio frequency with which to coordinate their efforts, similar to small aircraft at airports that lack a control tower. Communications with personnel on the ground and at staging areas were largely nonexistent.

USCG Lieutenant Beth McNamara, a C-130 pilot on an environmental evaluation flight during the initial response, recognized this problem and redirected her mission within the scope of her authority, creating the first airborne communication platform in the area. USCG C-130s continued to provide this service until the third day of rescue operations, when the task was assumed by US Navy E-2C Hawkeyes and US Customs and Border Protection P-3B Orions. Strategic decisions like these, made by personnel of both aviation and surface forces, contributed significantly to the effectiveness of USCG operations and made the effort a success.

Disasters of such scope and scale represent more than widespread disruption of life, interruption of livelihood, and untold property damage. They bring about suffering and far-reaching catastrophe to communities literally overnight and represent an erasure of personal infrastructure, a profound loss of security, and the introduction of long-term psychological trauma.

But disasters like Katrina also bring out the best in those who train for them, knowing that someday they'll be called on to place their own lives in peril so that others may live.

USCG Chief Aviation Maintenance Technician Marc Triglia hugs his 11-year-old son Lucas before leaving Kodiak, Alaska, to participate in Hurricane Katrina recovery operations.

USCG PHOTO BY PETTY OFFICER PAUL ROSZKOWSKI

New Orleans

EXPECT THE Extraordinary

Fifteen years after Katrina, New Orleans once again offers visitors the unique blend of history, music, cuisine, and culture that makes it one of the world's destination cities. So when HAI HELI-EXPO 2021 lands there Mar. 22–25 (exhibits open Mar. 23–25), attendees can look forward to their time in the Big Easy.

"New Orleans is a great location for our conference," says HAI President and CEO James Viola. "The city is walkable, right on the Mississippi, and world famous for its food and music. Of course, we're right next to the Gulf, and so this is a town that knows and loves our industry too."

HAI and the City of New Orleans are working together to provide a safe environment for Expo attendees. The New Orleans Ernest N. Morial Convention Center, the site of HAI HELI-EXPO 2021, is one of the first centers in the United States to achieve the GBAC STAR™ accreditation. This certifies that the center achieves the highest standards of cleaning and has a staff that is trained to keep it that way.

Hosting thousands of aviation professionals, hundreds of exhibitors, and dozens of aircraft, HAI HELI-EXPO 2021 will be the same mix of networking, career development, and trade show opportunities that you've come to expect—set in the extraordinary, resilient, historic Crescent City.

Power Play

Will electric motors propel the next generation of helicopters?

By Paul Seidenman

Using both the H125 (in background) and H130 models as test beds, Airbus Helicopters is working on an electric backup system that would provide up to 30 seconds of power to the rotor system in case of engine failure.

CLIMATE CHANGE HAS ACCELERATED research on alternatives to fossil fuels, with electric propulsion viewed as a leading contender. While the fixed-wing and advanced air mobility sectors are blazing the trails, research and development into electric propulsion for helicopters is also in progress, although to a much lesser degree.

Currently, electric helicopters account for only about 5% of all publicly known electric aircraft developments, according to the Roland Berger Electric Aircraft Database. As Nikhil Sachdeva, project manager and lead for electric propulsion at the London-based consulting firm explains, the electrification of a helicopter simply requires replacing the fuel tank and turboshaft assembly with a completely electric power train comprising a battery, power electronics, electric motors, and the necessary cabling.

"These subsystems are already seeing success in small general aviation aircraft and in urban air mobility, and we expect them to be relevant for small to medium-sized helicopters," Sachdeva says.

One constraint on electric propulsion for all vehicles is the current limits of energy density, which is the amount of energy stored in a battery per unit volume. Sachdeva adds that further improvements are constantly being made in battery energy densities and costs, primarily driven by the automotive sector, that extend the range of electric-powered helicopters and enable larger helicopters to be electrified.

All-Electric versus Hybrid

As with automobiles, helicopters in the future could be offered with an all-electric or a hybrid solution. An all-electric rotorcraft would derive all of its propulsion energy from a

AIRBUS PHOTO

battery that drives electric motors directly powering the rotors. This eliminates the need for an engine powered by avgas or jet fuel, reducing both emissions and noise.

In contrast, a hybrid rotorcraft can have multiple configurations, but the key aspect of this solution is that at least some of the energy comes from a conventional fuel-powered engine.

One example of a current hybrid rotorcraft project is Bell's electrically distributed anti-torque (EDAT) aircraft. As Eric Sinusas, program director, light aircraft, at Bell in Fort Worth, Texas, explains, this helicopter uses a conventional fossil fuel–driven engine to power both the main rotor and the electric generators. "The generators then provide electric energy—the same way a battery would—to power electric motors that drive the anti-torque system."

The EDAT's anti-torque system, says Sinusas, is unique in that it controls thrust by changing the rpm of the fixed-pitch anti-torque blades. In comparison, a conventional helicopter controls thrust by dynamically changing the pitch angle of each anti-torque blade while the blades rotate.

Currently, the EDAT helicopter is flying as a technology test bed, utilizing a seven-passenger Bell 429, configured with an EDAT tail boom encompassing four sets of shrouded anti-torque blades. Bell, reports Sinusas, isn't disclosing plans for production of an EDAT helicopter but, rather, is testing technology that could be applied to a future production aircraft. The OEM, he says, is currently "continuing to expand the flight envelope" and gather data at its Mirabel facility near Montreal.

The major technical challenge to making an all-electric or hybrid propulsion system viable is the development of batteries with the required power density. In tandem with that, Sinusas says, there are range and payload issues.

"The first all-electric and hybrid-electric helicopters will probably have to make some trade-offs of range and payload capabilities due to the weight of the existing batteries, at least for the short term," he says. "Battery technology will have to make significant improvements in terms of being lighter weight and, therefore, comparable in weight to gasoline-powered systems."

In addition, unlike liquid fuels, which are consumed during combustion, thereby increasing payload capability, a battery essentially weighs the same whether empty or full. (Using the familiar $E = mc^2$ formula, Tesla estimates the difference between the weight of a full and discharged Model S battery, for example, to be the equivalent of a grain of sand.) Fuel calculations for electric aircraft will look very different from those powered by avgas.

Also required, reports Sinusas, will be built-in safety provisions that are needed to protect a high-power electric system from lightning strikes. And since any next-generation electrically powered helicopter will likely be all digital, anti-hacking features will be needed. Other factors to consider, he adds, are vibration as well as the impact of HIRF (high-intensity radio field), a radio-frequency energy of a strength sufficient to compromise the performance of a device.

"With HIRF, the energy emitters of concern tend to be large ground-based systems, such as radio and TV transmitters, and radar," he says. "The concern with airborne systems is how that energy may affect sensitive electrical components."

But once the engineering challenges are met, says Sinusas, electrification is expected to result in lower ownership costs, given that there would be fewer moving parts and lubricated components. "For an all-electric helicopter, there are fewer items to wear out. For example, gearboxes and driveshafts [would be] replaced by electric wiring."

Looking forward, Sinusas ventures that lightweight helicopters are the most likely candidates for an electric propulsion solution, which would initially be hybrid. "The hybrid-electric would have more range than an all-electric helicopter, at least in the near term," he notes. "In fact, at Bell, we believe we can retrofit existing engines for application to a hybrid-electric helicopter, because there is nothing stopping them from integrating with a hybrid-electric system."

Putting aside the technology and engineering challenges, however,

Sinusas adds a cautionary note. "There is the question of whether an electric or hybrid-electric helicopter will be treated as a new concept by the regulatory and certification authorities, and how comfortable they'll be with a system that really has no precedent to date."

The Hybrid Solution

According to Luca Cossetti, Airbus Helicopters' innovative power solutions expert, the first step toward helicopter electric propulsion will be hybridization. As he describes it, an electric propulsion system will be combined with a current thermal (fossil fuel–powered) engine, in order to supply additional power to the rotors during specific flight phases.

"For helicopters, the four major challenges for electrification are the batteries, the low power and energy density of current cell technologies, a difficult integration within the helicopter airframe, and certification requirements that are still under definition," Cossetti says. "Also, the electric propulsion chain needs to show sufficient availability/reliability for helicopter applications and expected functions. This is not an easy task with current technology standards for batteries, power electronics, and e-motors."

Cossetti also stresses that, unlike fixed-wing aircraft, which are more tolerant of increases in empty weight and integration of additional equipment, the balance between empty weight, payload, and fuel quantity on a helicopter is very delicate.

"Even small mass variations can have important consequences for mission capabilities and performance," he cautions. "Batteries would for sure increase the empty weight of a helicopter—in the case of both hybrid and, even more, in full electric versions. This is why we need a significant increase in battery power and energy densities in order to limit the degradation on payload."

Cossetti explains that at Airbus, the philosophy is to "start with a small degree of hybridization and increase progressively." In fact, he notes that the OEM has been engaged in hybrid projects since 2011, when an electric backup system test campaign was carried out on an H125 Ecureuil light helicopter test bed.

"Since then, a lot of progress has been made regarding batteries and electric engines. In the coming months, we're planning to do another flight test campaign on an H130, with lighter batteries and smaller electric engines," Cossetti explains. "The aim of the project is to provide power to the rotor system for up to 30 seconds in case of an engine failure. In such circumstances, the system would make autorotation safer by maintaining the rotor's constant rotation speed."

Light single-engine helicopters have been deployed at Airbus as test beds, because, according to Cossetti, they're a logical starting point. "With a light single-engine helicopter platform, hybridization could bring benefits and new functions without unacceptable performance degradation," he says.

Asked about the potential for easier

Airbus Helicopters has been engaged in hybrid projects since 2011.

AIRBUS PHOTO

maintenance with hybrid helicopters, Cossetti says that will depend on system configuration.

"Hybridization, by default, means adding stuff, such as batteries, electrical motors, and controllers, which means more parts to maintain," he says. "New regulations concerning hybrid-electric propulsion systems could also add requirements that could have a direct impact on maintenance tasks. However, hybridization could bring some significant advantages in terms of maintenance cost reduction over the life of the helicopter, which is one of the key parameters for a helicopter operator/user."

In the case of full electric propulsion, says Cossetti, electrical components are generally less demanding in terms of maintenance compared with an internal combustion engine, which could partly alleviate the additional complexity and allow for decreased maintenance costs.

Hervé Blanc, executive vice president and general manager, Power Division, Safran Electrical & Power in France, says that while an electrical solution is easier and less costly to maintain than a conventional piston or turbine powerplant, a hybrid solution represents a different dynamic.

"A good hybrid solution increases maintenance costs with the addition of the electrical system but reduces drastically the most expensive part, which is the thermal engine, by optimizing the use and the conditions of operation of the thermal system," Blanc explains. "If the turbine is less stressed due to the electrical system, then the total maintenance cost is reduced."

Electrical Solutions for Gas Helicopters

Blanc says there are many opportunities to introduce electrical solutions to conventionally fueled helicopters. They include a full electrical tail rotor, already successfully flown with one helicopter manufacturer, and a "stop and start" solution to safely restart a turbine in flight now in development. "We're also developing a solution to provide additional power to the main gearbox of the helicopter to ensure greater performance," he says.

While the electrification of the entire propulsion system is the ultimate goal, Mike Mekhiche, deputy director, Rolls-Royce Electrical in the United Kingdom, ventures that considerable value can be achieved via the partial electrification of a conventional propulsion engine. He terms this solution a "mild hybrid" propulsion system.

"This involves integrating an electric generator-motor—and the associated bidirectional power electronics converter with a sensibly sized battery—into the turbine engine of the aircraft," Mekhiche explains. "The purpose is twofold. Firstly, using the battery power, the generator-motor can provide additional torque to boost the aircraft thrust and supplement

Above: Bell's electrically distributed anti-torque (EDAT) system, shown being tested on a Bell 429, controls thrust by changing the rpm of the fixed-pitch blades.

Opposite: Airbus plans another series of flight tests of its electric backup system, this time on the H130.

its ability to handle larger payloads and/or enable the aircraft to take off faster under normal operating conditions."

And, he says, in case of an engine-out situation, instead of relying on the autorotation to land the aircraft—a maneuver that requires quick reactions and appropriate flight inputs by pilots—the electric subsystem would provide enough electric torque to maintain a controlled rotation of the helicopter rotor and therefore enable the aircraft to "land safely in an area of the pilot's choosing."

The sizing of the battery in a mild hybrid system, says Mekhiche, will be determined by the available space within the aircraft and the minimum torque required to enable the aircraft rotor to continue to operate for a handful of minutes in the case of an engine failure. "The electric machine and the associated power-conversion electronics can operate as a motor or as a generator," he says. "The latter operating mode enables battery charging via the engine upon depletion."

Issues to Solve

Reaching the goal of an electrically powered helicopter will require sufficient battery energy density to meet the unique power needs mandated throughout a helicopter mission. Those needs, unique to rotorcraft, pertain to sustained hover as part of the mission profile, according to Jonathan Hartman, Sikorsky Innovations' disruptive technology lead for Sikorsky (a Lockheed Martin Company) in Stratford, Connecticut. (Sikorsky hasn't publicly announced a hybrid or full-electric helicopter project at this time.)

"The end-of-flight hover and landing is the most onerous part of a helicopter mission because you would need to pull a lot of power at the time the energy stored in the battery would be at its lowest level," says Hartman. "To address this issue, the performance of batteries has to improve."

At present, reports Hartman, there are a number of "interesting energy storage technologies" being developed—all at various stages of maturity—that could have a substantial impact on future aircraft design. "But it's still too early to know if one technology will meet the rigorous performance requirements for certified flight more affordably or reliably than any other," he stresses, adding that how the electric propulsion technology will be applied could vary significantly depending on the helicopter mission requirements.

"The answer will come down to payload and range, which is why, at this time, the technology for some type of an electric helicopter looks very promising," Hartman remarks. "Specifically, that would be smaller vehicles flying shorter distances, carrying smaller and lighter payloads."

Marc Brodeur, VP, military and commercial sales, at MD Helicopters in Mesa, Arizona, emphasizes that in order

BELL PHOTO

to make electrically powered helicopters viable, battery technology needs to reach a "breakthrough" beyond what's available today. "What we have to do is look for a next-generation battery solution. In addition, there are other challenges involving cost and performance," Brodeur says. MD Helicopters, he discloses, isn't pursuing a hybrid or all-electric helicopter project currently.

Another hurdle to scale, says Brodeur, is a redesigned infrastructure required to support a fleet of electric helicopters. "You would definitely be looking at a special supply chain, new kinds of tooling, as well as battery storage and charging facilities. But I don't believe that this would be a showstopper that would make electric helicopters totally impractical."

Brodeur adds that, in his opinion, the first steps toward an electrically powered helicopter will take place in the unmanned aerial vehicle sector.

"This is where the technology is likely to be perfected," Brodeur says. "From there, it would transition to very light utility helicopters. It's going to be a crawl-to-walk kind of progression."

Rolls-Royce's Mekhiche agrees that, based on current battery and electric motor technologies, a helicopter's payload capacity would have to be significantly reduced in order to accommodate a full hybrid or a full electric propulsion system. "The very limited real estate of the helicopter makes it much more challenging to physically accommodate the components of such a propulsion system," he notes.

Yet, he adds, there are opportunities where a hybrid or an electric helicopter could be repurposed to a mission profile that fit its new or modified ratings. "This would be the case where a quieter operation [would enable] greater operational flexibility, longer operating hours, and superior point-to-point access in heavily regulated areas, such as densely populated urban areas."

Mekhiche stresses that cell technology is improving at an accelerated rate, with energy density expected to more than double by 2030. "As the cell technology improves, larger aircraft with longer travel distances and greater payload capacity will transition from a hybrid propulsion solution to an all-electric power train over time."

But what about acquisition costs compared with a conventionally driven helicopter? This is hard to guess, says Professor Rolf Henke, member of the Board for Aeronautics and Technology of the German Aerospace Center (DLR) in Cologne, Germany, since an electrically driven helicopter needs to be developed and certified and new production lines installed.

"All the things to be changed demand many innovations—if not disruption—and the cost of this process will be part of the purchase price," Henke says. "Therefore, at the beginning, we're talking almost about prototypes, which are costly. But when the learning curve has come down, I could think of a lower purchase price. In this overall small market, the question will be which company would have the [staying power] needed for this."

AIRBUS PHOTO

Is AMT Education Ready for the 21st Century?

By Jen Boyer

Pandemic conditions may accelerate Part 147 reforms.

WELL BEFORE COVID BECAME A HOUSEHOLD word, the aviation industry was already struggling with meeting the demand for qualified aviation maintenance technicians (AMT). For years, the number of applicants for AMT training has been outstripped by the number of experienced AMT leaving the field, leading to forecasts of crippling labor shortages. Another hurdle to building a sustainable pipeline of AMT talent, according to industry observers, is the antiquated Part 147 regulations that limit the flexibility of AMT schools and their ability to deliver graduates trained for the modern aviation workplace.

Originally established under the US Civil Aviation Administration, a precursor to the FAA, 14 CFR Part 147 governs all aspects of training toward an airframe and power plant (A&P) certificate. AMT schools must teach a prescribed number of hours on general, airframe, and power plant topics; 1,900 of those hours are required to be "class-seat hours," where students must be physically present. Graduates must pass the FAA written and oral tests, based on the agency's mechanic Airman Certification Standards (ACS), to receive their A&P certificates. Neither the regulation nor the subject areas it dictates be taught have been significantly revised since 1962.

Under Part 147, AMT schools aren't only told what curriculum to teach, they're told exactly how that curriculum must be taught, and they must obtain FAA approval to modify operating procedures. For example, each AMT student must still learn wood and fabric repair techniques suitable for antique aircraft, while their schools face a daunting regulatory gauntlet to receive approval for teaching avionics and health and usage monitoring systems.

Proponents of reform argue that the FAA's antiquated mandates for AMT education inhibit those schools' flexibility to operate in an accredited education environment; accredited institutions are generally given flexibility on curriculum and how that curriculum is delivered. Industry observers also charge that the 58-year-old Part 147 curriculum contains large gaps, such as helicopter-specific systems and maintenance,

AVIATION INSTITUTE OF MAINTENANCE PHOTO

that leave students ill prepared for work in modern aviation. They urge the adoption of Part 147 reforms that would allow schools flexibility in how they deliver the curriculum required by the ACS while fully preparing students to meet industry needs.

Industry advocates, led by the Aviation Technician Education Council (ATEC), a group that represents US AMT schools, have been working with the FAA for more than a decade to modernize Part 147. Unfortunately, the drawn-out process has led to FAA-proposed rules that further limit flexibility. In response, the industry has employed a different strategy for change: to force reform through congressional mandate.

In December 2019, the Promoting Aviation Regulations for Technical Training (PARTT) 147 Act was introduced in Congress (S. 3043 / H.R. 5427). The industry-supported, bipartisan, bicameral bill, if passed, would direct the FAA to use community-drafted, performance-based regulations to define the A&P curriculum and to defer to the Department of Education in areas concerning the quality of education. The FAA would maintain oversight of an AMT program's facilities, equipment, and instructor qualifications. The FAA would still control the ACS, which in turn drive AMT education curriculum, providing the agency with the means to evaluate the performance of individual students, as well as the performance of the AMT school, through analysis of student passage rates.

The overall result of the law would be the modernization of how aviation technical schools teach, which includes the flexibility to adequately support the aviation industry's technical workforce needs.

Along Comes COVID

In the spring of 2020, as the PARTT 147 Act was gaining momentum in the US House and Senate, COVID struck. Overnight, AMT schools across the country closed. Administrators and faculty began assessing how to respond to the virus. Educators of all types across the country have demonstrated the pitfalls of pivoting to an online learning platform; this was exceptionally difficult for AMT schools, given the FAA approvals required to deliver any of the mandated 1,900 class-seat hours virtually.

By the end of March, the FAA announced a "short-circuit" relief program that allowed AMT schools greater flexibility to use electronic and online training and assignment delivery during the pandemic. Many schools took advantage of this offer.

In May, ATEC surveyed its member schools about the impact of COVID on their operations. The group asked the same questions again in September to gauge the level of change across the aviation maintenance training industry. In May, two schools announced they'd suspended operations. This number increased to five in September. Conversely, the number of schools moving to some level of online instruction steadily increased as the pandemic dragged on.

"In the United States, we have about 180 certificated programs, with a little under half of them responding to the survey," says ATEC Executive Director Crystal Maguire. "All of these schools were traditionally hands-on, with only four having received permission for any online content prior to COVID. By this summer, about 60% of our schools had some content online.

"Interestingly, the majority of the schools would like to maintain the level of virtual instruction beyond the pandemic time line," says Maguire. "This is a piece of the flexibility we seek."

Unfortunately for some, the flexibility wasn't enough in the face of the current Part 147 regulations. ATEC estimates that 20% of the country's AMT schools have suspended their programs, either temporarily or permanently, since March.

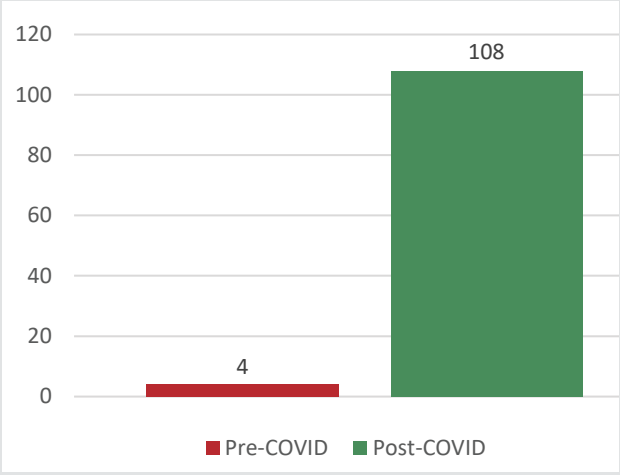
Requirements Form Barriers

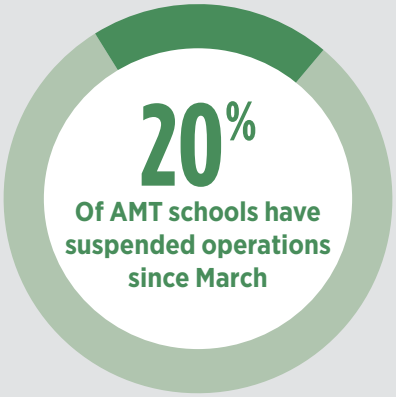
North Idaho College began the long process of AMT certification in 2013, receiving its airframe program certification in 2015.

"We planned to eventually have a full airframe and power plant program," says North Idaho College Aerospace Director Patrick O'Halloran. "We'd received a federal grant to add aerospace to the college as a part of solving manufacturing needs and started with the

AMT Education in Flux

Growth in AMT Schools Approved for Online Learning in 2020





Source: ATEC surveys, 2020

Southern Utah University worked with the FAA for four years to build the first helicopter-focused aviation maintenance program in the United States. It opened in January 2020, as shown in this pre-COVID photo.

airframe side. We were certified in 2015 and, as I like to say, we became the newest antiquated aircraft maintenance school due to the old Part 147 rules."

Adding the power plant certification was more expensive and required additional work. In 2018, the school began drafting its power plant curriculum for certification. Then, the FAA released a supplemental NPRM with more suggested changes to Part 147. That, paired with the industry's later action on the PARTT 147 Act, muddied the waters.

"We were in the middle of deciding if we would continue efforts to pursue the power plant program or wait for the new rule when COVID hit," O'Halloran says. "Our lease would be up for our building in June 2021, and we were considering our options based on pushing forward—renew or get a larger building. Sadly, 2020 proved to be the wrong year to make that decision. Financially, we chose not to continue our lease and announced we'd be closing the program.

"The hardest thing about this final decision is we had the highest number of credible applicants this year," O'Halloran continues. "People want to become aircraft mechanics."

North Idaho College will continue its aviation maintenance operations through the end of the 2020–21 school year, ensuring that current students can complete their training. Taking advantage of the FAA relief program, the school was able to offer some lectures online until Idaho moved to Stage 4 of its reopening plan, allowing classroom attendance again.

"The current Part 147 program played a big part in our decision [to close]," O'Halloran says. "AMT [education] is really complicated in terms of record keeping and detail. It requires more-involved manpower than any of our other programs. For a bigger school, that can be absorbed, but it's not as easily done for a small, rural school."

Moving to Performance-Based Standards

At Southern Utah University (SUU), the stakes couldn't have been higher. The school had just been certified to present the first aviation maintenance curriculum in the United States focused on helicopters, beginning with classes in January 2020.

Luckily, due to their recent work with the FAA in gaining approvals for the maintenance training program, the school administration had a strong relationship with their local FAA Flight Standards District Office and were able to receive approvals for virtual learning when the pandemic hit in the spring.

SUU began building the program in 2016, meeting the antiquated requirements of Part 147 while working with the FAA to build in a number of rotor-specific aspects to the curriculum. "We still have to teach the airplane curriculum,

SOUTHERN UTAH UNIVERSITY PHOTO

Part 147 Overhaul: 4,332 Days* and Counting ...

Jan. 8, 2009	Nov. 19, 2015	Oct. 5, 2018
An industry working group formally recommends broad changes to 14 CFR Part 147.	The FAA issues a notice of proposed rulemaking (NPRM) with sweeping changes to AMT education. However, the industry objects to many changes that limit flexibility in teaching, recommending instead that the Department of Education oversee how education is delivered and the FAA focus on learning outcomes, testing, candidate certification, facility equipment, instructor qualifications, and material requirements.	The FAA Reauthorization Act of 2018 is signed into law, mandating that the FAA release a new Part 147 by Apr. 5, 2019.

As of Nov. 17, 2020

but we built it so we are teaching the basics on airplanes, then going over and above to teach additional information on helicopters," says Jared Britt, director of global aviation maintenance training for SUU.

"For instance, the regulations state that students must learn about flight controls. We teach the basics on airplanes and the majority of that curriculum on helicopter flight controls. That said, these were workarounds," Britt says. "The regulation needs to change significantly for schools to provide the highest level of training to meet today's industry needs."

Britt chairs ATEC's Legislative Committee and is a strong supporter of the PARTT 147 Act. He believes the legislation will create a regulation that allows the industry the flexibility to meet workforce needs creatively and to embrace new ways of increasing the ranks of US aviation mechanics.

"We're training students to meet the airman certification standards, the ACS, which is a living, working document that governs curriculum and testing," Britt says. "Yet at the same time, Part 147 details everything we're supposed to teach and how we're to teach it. Some of those skills are antiquated, while other skills aren't required but are very much needed in today's marketplace."

Britt argues for developing a performance-based approach to AMT education. "Our argument is to let us build curriculum that adheres to the ACS and that highlights the skills and knowledge an applicant for certification must have. As they update the ACS, we update our training. Let the school's pass rate dictate the success in teaching."

The new rule would focus on what to teach and remove the rigid controls on how the schools teach the material. This would permit more creativity and flexibility in how the curriculum is presented. It also would allow industry participation.

"[The PARTT 147 Act] opens the door for partnerships with industry companies and groups to come in and donate equipment and information to help students graduate with better skills and knowledge to work on this technology," Britt says. "Schools [can] work with local companies to expand training. In the end, it's a reduction in cost because new A&Ps don't have to then go get more training in current technology that wasn't covered in Part 147 training."

Britt argues that this increased flexibility would also help AMT schools weather storms such as economic downturns and COVID by removing barriers to quickly changing curriculum to meet demand. "The rules as they stand are a barrier due to the red tape that must be navigated in 'normal' times," says Britt. "With the pandemic and the flexibility schools need to continue instruction, the rules become almost insurmountable obstacles.

"If I want to change any aspect of my curriculum, including how I deliver it, I need to get FAA approval for that change," Britt says. "If I needed to move all instruction online to keep students moving, for instance, I'd have to go to the inspector and have that inspector approve it. That's not getting it done efficiently.

"There was no flexibility for schools to change prior to the COVID-19 waiver," Britt continues. "That's one of the reasons why 20% of schools had to at least temporarily stop operating their AMT programs."

A Silver Lining?

While COVID has driven some schools out of business, the widespread disruption the pandemic has brought to every aspect of life means it has also created conditions favorable

Apr. 16, 2019

Eleven days after the congressionally mandated deadline, the FAA issues a supplemental notice of proposed rulemaking (SNPRM) for Part 147. The industry continues to object to yet another layer of requirements and approvals that schools must meet and obtain before implementing competency-based programs and providing content away from their primary locations. Together with the NPRM, this SNPRM doubles the length of the original Part 147. Again, the industry argues for the development of a modernized framework to meet workforce development needs, including the flexibility to develop pipeline programs with high schools and employers.

Dec. 12, 2019

Congress introduces bicameral, bipartisan legislation, the Promoting Aviation Regulations for Technical Training (PARTT) 147 Act (S. 3043 / H.R. 5427), directing the FAA to replace current training requirements with new, community-drafted regulation. The legislation is introduced with broad industry support.

The PARTT 147 Act would make it easier for industry companies and groups to donate equipment for AMT education, better preparing students for the modern aviation workplace. *(Editor's note: This photo was taken before COVID guidelines were established regarding mask wearing and social distancing.)*

to change. Schools that were already looking at ways to offer more flexible learning opportunities as a cost-saving measure are in a strong position today, as are those pivoting quickly to take advantage of moving online.

For one school in particular, the FAA waiver was just the break it needed to become one of the few full-hybrid model AMT schools.

Wichita State University Tech (WSU Tech) in Kansas had already started the process of providing online learning prior to COVID. The curriculum had already been loaded into the school's online learning tool, and the faculty had already created most of the program's Level 1 labs. Additionally, WSU Tech students are required to have laptops, making a sudden transition to online learning, such as happened this past spring, easier.

"We got our COVID operations manual approved by the FAA three days after the school announced an all-online environment," says Jim Hall, WSU Tech dean of aviation and manufacturing, National Center for Aviation Training. "We did synchronous online learning throughout the spring, then came back to complete Level 3 labs in June."

During the transition, the faculty was able to complete a hybrid operations manual, which was approved in June. Now the program can offer three hours of online material every day, requiring students to be in class only four hours a day. Previously, the school offered two cohorts, one during the day and one in the evening. The new hybrid system frees enough classroom space to add a third four-hour shift of students.

In the short term, the third shift allows WSU Tech to offer more socially distanced options while still significantly increasing enrollment. Already, enrollment is up 50 students, or 30% per trimester, and the school has hired three new instructors.

"Upward to 60% of schools want to move to this model," Hall says. "I'd been working with our PMI [primary maintenance inspector] at the FAA for quite some time trying to go to a hybrid model and had encountered a great deal of resistance up until COVID. Part 147 is such a mess.

"If COVID hadn't happened, I fully believe I'd still be battling to get this off the ground," Hall says. "Now, thanks to the COVID-induced deviation, we're in a better position to implement new changes once a new 147 is released."

The Future of Part 147

As the industry awaits the movement of the PARTT 147 Act through Congress and potential further action from the FAA, members of the rotorcraft community can still add their voices to the conversation.

ATEC's website hosts a page dedicated to the subject of Part 147 reform, supplying information and advice on how to support the PARTT 147 Act's movement through Congress. You'll find additional information on both the FAA's proposed rule and the PARTT 147 Act, along with ways to urge your representative and senators to support the bill.

Another way to drive desired changes in AMT education, suggests ATEC's Maguire, is through revisions to the ACS, the FAA's standards that drive AMT education. An FAA–industry working group is currently working to update a number of different airman certifications, including those for A&Ps.

Changes to the ACS will directly drive more helicopter-specific curriculum in the FAA knowledge tests and therefore in the technical training needed to meet those standards, says Maguire. While the FAA doesn't publish a rolling draft of the ACS, the public can review it on the ATEC website and submit comments to AFS630comments@faa.gov.

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Your Mission, Our Mission: KEEP THE ROTORS TURNING


ARIZONA

Arizona suffered multiple wildfires during the spring and summer of 2020, with one ranking as the fifth-largest ever in the state. As ideal weapons against these blazes, helicopters were deployed early and often, but the fires just kept coming.

A Photo Essay by Mark Bennett

Arizona often sounds the starting gun for western North America's wildfire season due to its climate (hot and dry) and widespread vegetation that dies or goes dormant (which, either way, dries out), starting in the spring. Those conditions and fuels then meet either lightning or, four times out of five, human sources of ignition such as untended campfires, tow chains dragging and sparking on the road, flicked cigarettes, fireworks, or any number of easily preventable causes. Then it's conflagration time.

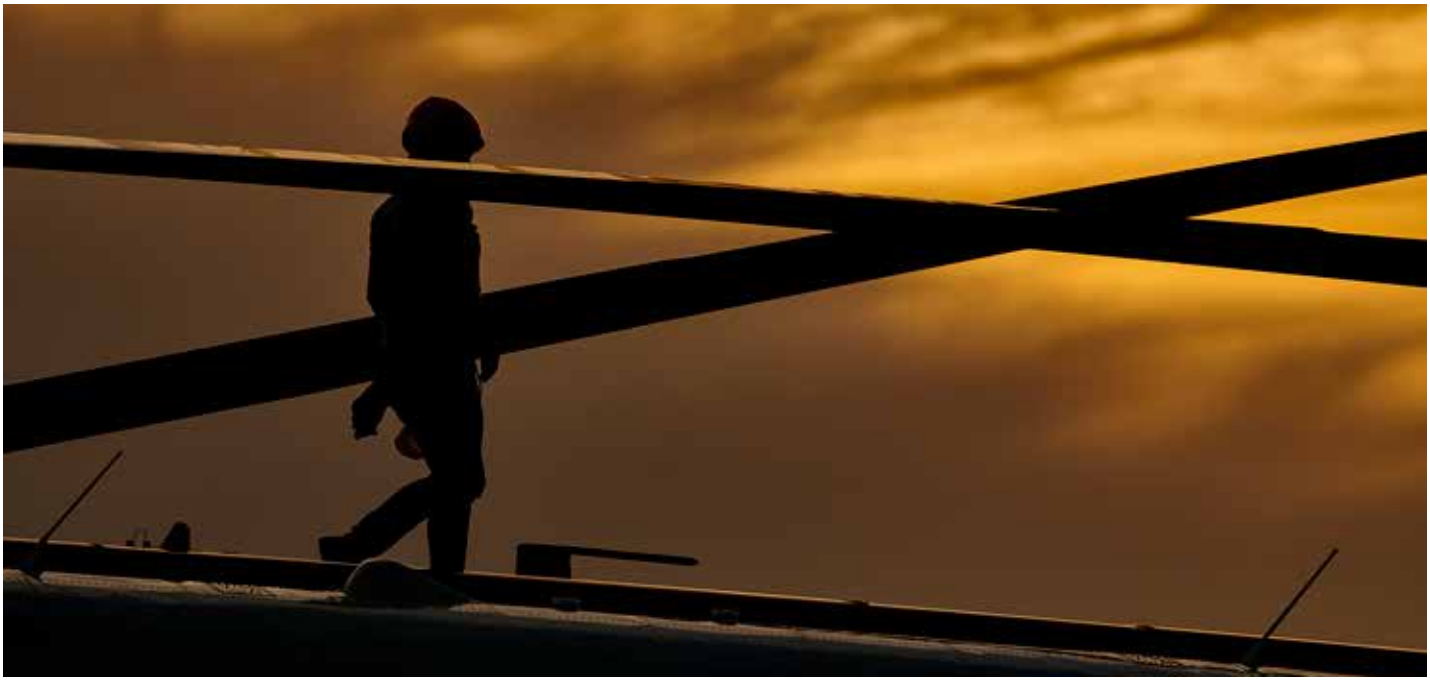
Once lit, Arizona's varied terrain can accelerate a fire's spread and hamper its control. Rugged canyons spread fires both upslope, as you would expect, but winds can become twisted in those canyons, driving the fire also down or across to the opposing face. That terrain also hampers access by ground crews and air crews alike. Even relatively flat expanses of grasses pose challenges, as winds both drive the fire directly and carry embers far beyond the involved area, igniting noncontiguous lands.

What's needed are tools to quickly bring the fight to the fires.

Opening spread: Flames sweep across the Mazatzal Mountains 40 miles northeast of Phoenix. This remnant of the Bush Fire, so named for its proximity to the nearby Bush Highway, ranks as the fifth-largest wildfire in Arizona's history.

These pages: Columbia Helicopters had two Boeing CH-47D aircraft working on wildfires during the 2020 season in Arizona. This one was stationed at a small airfield called Grapevine, near the Bush Fire, whose smoke colored the setting sun.


COLUMBIA
N473CH



Above: "Reg" Armstrong, a supervisor with Fort Apache Helitack, at San Carlos Apache Airport (GLB), outside Globe, Arizona, waits for the call to deliver firefighters and equipment in the earliest moments of a new fire. This helitack unit is part of the US Bureau of Indian Affairs, one of several federal agencies involved in wildland firefighting.

Right: Pilot Santi Garcia positions sunscreens in the Mountain Air Helicopters Eurocopter AS350 2B1 that is contracted to support the Fort Apache Helitack crew.

Opposite, clockwise from top: The Erickson S-64F known as Bubba departs the San Carlos Apache Airport near Globe; at Falcon Field (KFFZ), in Mesa, it gets an up-close inspection by pilot Nik Shoemaker; a good scrubbing is administered by mechanic Dean Lowery (snorkeling from lakes means lots of dirty water is flung onto the aircraft by rotor wash).

Helicopters are critical to halting, or at least managing, these conflagrations, and Arizona hosts a broad collection of the craft during the height of its fire season, starting in the spring and running typically to July. The helicopters are shuffled around as fires erupt and spread. Then, when the weather in the state enters its "monsoon" season—midsummer, with higher humidity and frequent rain—the powers that be send the aircraft first north, then farther west, to states heading into their own fire seasons.

Above: A Kaman K-Max, operated by Mountain West Helicopters, heads to the Thumb Fire across the chasms of the Grand Canyon with a Bambi Bucket slung on its line.

Left: A Hillcrest Aircraft Co. Bell 205A-1, contracted by the US Forest Service to transport Price Valley (Idaho) Heli-Rappellers, launches toward the Thumb Fire from the Grand Canyon helibase.

Right: This MD 900 is a permanent resident at the Grand Canyon, operated by Papillon Helicopters on a 365-day contract, and flown exclusively for the National Park Service. It has a nickname, too: the Bumblebee.

Below: Bumblebee pilot Heather Saur, in the green flight suit, confers with National Park Service firefighters and police in preparation for the medical evacuation of an injured firefighter from the park.

Above: The inside of the windscreen of this Sikorsky S-61V, operated by Siller Helicopters, is marked with notes for quick reference while working the fire.

Left: Mitchell Childree, mechanic, standing, and Sean Smith, crew chief, pause for just a moment as they secure the former VIP helicopter for the evening.

Right: The S-61V settles down at Safford Regional Airport (KSAD) after a long day battling the Bringham Fire in eastern Arizona.

Like so many things this year, the 2020 fire season has been different. Arizona has endured its hottest summer on record, with rainfall just 33% of its seasonal average. While most aircraft were sent north on schedule, fires continued to plague the state, and firefighting helicopters were diverted from its neighbors as late as the end of October.

Arizona's long-term forecast? A warm and dry winter, followed by another hot summer, with 100% chance of helicopters in the air.

RECENT ACCIDENTS & INCIDENTS

THE ROTORCRAFT ACCIDENTS AND INCIDENTS listed below occurred from Jul. 1 to Sep. 30, 2020. The accident details shown are preliminary information, subject to change, and may contain errors. All information was obtained through the official websites included below, where you can learn more details about each event.

Australia – Australian Transport Safety Bureau (ATSB):
bit.ly/2P3ZF1S

Britain – Air Accident Investigation Branch (AAIB):
bit.ly/2sPEF0W

Canada – Transportation Safety Board of Canada (TSBC):
bit.ly/3c6evf2

New Zealand – Transport Accident Investigation Commission of New Zealand (TAIC):
bit.ly/32DOod0

United States – National Transportation Safety Board (NTSB):
bit.ly/2IueqZa

July 2020

Robinson R44
Welch, LA, USA
Jul. 2, 2020 | NTSB CEN20LA286
0 injuries, 0 fatalities | Personal flight

Helicopter sustained substantial damage impacting terrain after reported loss of engine power.

Enstrom 280
Des Moines, IA, USA
Jul. 3, 2020 | NTSB CEN20LA261
1 injury, 0 fatalities | Personal flight

During approach, pilot suspected loss of engine power and attempted autorotation, resulting in impact with terrain.

MBB BK 117
Wooster, OH, USA
Jul. 4, 2020 | NTSB CEN20LA264
0 injuries, 0 fatalities | Air ambulance flight

Helicopter sustained substantial damage after foreign object debris (FOD) blew into the rotor systems, resulting in forced landing.

Robinson R44
Broome Airport, Western Australia, Australia
Jul. 4, 2020 | ATSB AO-2020-033 / NTSB WPR20WA210
2 injuries, 2 fatalities | Private flight

Helicopter impacted terrain after in-flight separation of tail rotor and loss of control.

Robinson R22
Rio de Janeiro, Brazil
Jul. 6, 2020 | NTSB GAA20WA122
1 injury, 0 fatalities | Noncommercial flight

No description available.

Bell UH-1H
Payson, AZ, USA
Jul. 7, 2020 | NTSB WPR20LA211
0 injuries, 1 fatality | External-load flight

Helicopter impacted terrain while delivering supplies via longline for a firefighting crew.

Robinson R22
Venice, LA, USA
Jul. 8, 2020 | NTSB CEN20LA282
0 injuries, 0 fatalities | General aviation flight

Helicopter sustained substantial damage after loss of engine power and autorotation to swampy terrain.

Robinson R44
Ketchikan, AK, USA
Jul. 10, 2020 | NTSB ANC20CA068
0 injuries, 0 fatalities | Air taxi flight

No description available.

Aerospatiale AS355
Rifle, CO, USA
Jul. 11, 2020 | NTSB CEN20LA273
2 injuries, 0 fatalities | Aerial observation flight

Helicopter experienced loss of control in flight and impacted terrain.

Bell 206
Kenai, AK, USA
Jul. 16, 2020 | NTSB ANC20CA070
0 injuries, 0 fatalities | External-load flight

No description available.

Hiller UH-12D
Mehama, OR, USA
Jul. 17, 2020 | NTSB WPR20LA224
0 injuries, 1 fatality | Agricultural flight

Helicopter was destroyed after impacting terrain for undetermined reasons.

MD Helicopters MD 600
San Andreas, CA, USA
Jul. 20, 2020 | NTSB WPR20LA228
0 injuries, 0 fatalities | Aerial observation flight

Helicopter experienced low-altitude engine failure and a hard landing after smoke was reported in the cabin.

Robinson R44
Dickeyville, WI, USA
Jul. 20, 2020 | NTSB CEN20CA300
0 injuries, 0 fatalities | Agricultural flight

Helicopter sustained substantial damage to the main rotor blades after striking power lines.

Robinson R44
Thorburn Lake, Newfoundland and Labrador, Canada
Jul. 20, 2020 | TSBC A20A0027, NTSB GAA20WA118
2 injuries, 1 fatality | Private flight

Helicopter experienced loss of control in flight and collided with terrain.

MD Helicopters MD 600
Thompson Falls, MT, USA
Jul. 21, 2020 | NTSB WPR20LA235
0 injuries, 0 fatalities | Agricultural flight

Pilot experienced a loss of engine power during descent and continued landing.

Brantly B-2B
Monrovia, IN, USA
Jul. 24, 2020 | NTSB CEN20LA304
0 injuries, 1 fatality | Test flight

Helicopter impacted terrain during low-altitude flight for unknown reasons.

Leonardo AW139
Goulburn, New South Wales, Australia
Jul. 24, 2020 | ATSB AO-2020-038
0 injuries, 0 fatalities | Air ambulance flight

Helicopter experienced near collision with terrain during single-pilot night-vision goggles air ambulance flight.

Robinson R44
Whitehall, MD, USA
Jul. 24, 2020 | NTSB ERA20CA260
Injuries unknown, fatalities unknown | Positioning flight

No description available.

Robinson R44
Dakota, IL, USA
Jul. 27, 2020 | NTSB CEN20CA313
0 injuries, 0 fatalities | Agricultural flight

Helicopter sustained substantial damage to main and tail rotors after main rotor blade struck an obstacle.

Robinson R44
Hebron, NE, USA
Jul. 27, 2020 | NTSB CEN20CA316
1 injury, 0 fatalities | Agricultural flight

Helicopter sustained substantial damage after loss of power and subsequent autorotation due to fuel contamination.

Bell OH-58A
Holtville, CA, USA
Jul. 30, 2020 | NTSB WPR20LA247
1 injury, 0 fatalities | Agricultural flight

Helicopter collided into haystacks after experiencing loss of engine power.

Robinson R44
Steam Plains, New South Wales, Australia
Jul. 31, 2020 | ATSB AO-2020-040
0 injuries, 1 fatality | Agricultural flight

Helicopter sustained substantial damage after striking power lines and colliding with terrain.

August 2020

Eurocopter EC130
Knoxville, TN, USA
Aug. 3, 2020 | NTSB ERA20LA273
0 injuries, 1 fatality | Personal flight

Helicopter settled into river during approach to hover near riverside landing area.

RECENT ACCIDENTS & INCIDENTS

Hughes 369
Delia, KS, USA
Aug. 5, 2020 | NTSB CEN20CA334
Injuries unknown, fatalities unknown | General aviation flight

No description available.

Hughes 369A
St. Louis, MO, USA
Aug. 6, 2020 | NTSB CEN20CA326
0 injuries, 0 fatalities | Flight type unknown

Helicopter landed hard during practice autorotation.

Bell 206
Marathon, TX, USA
Aug. 8, 2020 | NTSB CEN20LA328
1 injury, 3 fatalities | Aerial observation flight

Helicopter impacted terrain during attempted emergency landing due to pilot-reported airframe vibrations.

Robinson R44
Logan, IA, USA
Aug. 8, 2020 | NTSB CEN20LA330
1 injury, 0 fatalities | Agricultural flight

Helicopter experienced loss of engine control in flight, impacted terrain, and rolled onto its right side during attempted emergency landing.

Robinson R22 Beta
McArthur River Mine Aerodrome, Northern Territory, Australia
Aug. 16, 2020 | ATSB AO-2020-043, NTSB WPR20WA281
1 injury, 0 fatalities | Aerial mustering flight

Helicopter sustained substantial damage after rear drive belt broke and aircraft collided with terrain.

Aérospatiale AStar AS350 B2
Stewart, British Columbia, Canada
Aug. 17, 2020 | TSBC A20P0080
0 injuries, 1 fatality | External-load flight

Helicopter was destroyed after impacting terrain.

Arrow-Falcon Exporters UH-1H
Coalinga, CA, USA
Aug. 19, 2020 | NTSB WPR20LA280
0 injuries, 1 fatality | Aerial firefighting flight

Helicopter impacted terrain after loss of control in flight.

Bell 205
LaVerne, CA, USA
Aug. 23, 2020 | NTSB WPR20CA284
1 injury, 0 fatalities | External-load flight

No description available.

Robinson R44
Pine Grove, OR, USA
Aug. 24, 2020 | NTSB WPR20LA283
0 injuries, 1 fatality | External-load flight

Helicopter impacted terrain for undetermined reasons.

Eurocopter AS350
Ninilchik, AK, USA
Aug. 25, 2020 | NTSB ANC20LA083
1 injury, 0 fatalities | Air taxi flight

Helicopter sustained substantial damage after loss of engine power, autorotative landing, and rollover on mountainous terrain.

Bell 206
Lagos, Nigeria
Aug. 28, 2020 | NTSB WPR20WA294
Injuries unknown, fatalities unknown | Noncommercial flight

No description available.

September 2020

Eurocopter AS350
Fort Greely, AK, USA
Sep. 6, 2020 | NTSB ANC20LA089
0 injuries, 0 fatalities | General aviation flight

Helicopter sustained substantial damage after passenger door departed aircraft and impacted main rotor blade.

Robinson R22
Fort Myers, FL, USA
Sep. 6, 2020 | NTSB ERA20LA310
0 injuries, 0 fatalities | Instructional flight

Helicopter experienced ground damage to tail section for undetermined reason during run-up and engine acceleration.

RotorWay Exec 162F
Kenansville, FL, USA
Sep. 10, 2020 | NTSB ERA20CA319
0 injuries, 0 fatalities | Personal flight

No description available.

Robinson R44
Willow, AK, USA
Sep. 14, 2020 | NTSB ANC20CA095
0 injuries, 0 fatalities | General aviation flight

No description available.

Eurocopter AS365
Perth, Western Australia, Australia
Sep. 29, 2020 | ATSB AO-2020-053
0 injuries, 0 fatalities | Training flight

No description available.

 By David Jack Kenny

Bad Assumptions

Unclear responsibilities between pilots can lead to a deadly outcome.

ISTOCK/JACOBLUND

A FLIGHT REVIEW CONDUCTED BY A CFI without significant make-and-model experience has come to be recognized as insidiously hazardous—especially when the client is also the aircraft owner.

It's natural for the instructor to believe the client knows the aircraft, while the client simultaneously trusts the instructor to keep them both out of trouble. The result can be a dangerous vacuum of authority, with each party expecting the other to take the initiative in responding to the unexpected. In a truly urgent situation, this ambiguity can be disastrous.

A similar, if more obvious, dynamic applies when an experienced airman not trained as an instructor serves as a novice's "safety pilot"—not in the 14 CFR 91.109 sense of training in simulated instrument conditions, but to guard against errors in procedure or judgment while flying VFR. Whether prompted by insurance requirements or general caution, the practice rests on the assumption that the high-timer will pay close attention and be quick to intervene when needed … neither of which is necessarily second nature to someone whose extensive pilot-in-command time doesn't include teaching.

Add in the potential fatigue from a long cross-country flight—say, to deliver a newly purchased aircraft—and perhaps creeping complacency after uneventful hours in the air, and the veteran's presence may provide less of a safeguard than either party believes.

The Flight

On Sep. 25, 2018, an Airbus Helicopters AS350 B3e departed from the company's factory in Grand Prairie, Texas. On board were four people: the 42-year-old private pilot and owner of the aircraft who'd just taken delivery of the helicopter; his two sons, ages 11 and 14; and the 53-year-old safety pilot, who was director of operations and chief pilot of two commercial operators that flew the B2 model of the AS350. The National Transportation Safety Board (NTSB) attributed his presence to "insurance coverage purposes," though he'd also become friends with the owner over the summer.

Three days, 20 flight hours, and more than 30 assorted "sightseeing, fuel, and rest" stops later, they landed at Juneau International Airport (PAJN) in Alaska. After refueling, they took off again shortly before 10 am on Sep. 28, bound for their next fuel stop in Yakutat on the Gulf of Alaska.

The owner was the pilot flying, as he apparently had been throughout the trip. His plan was to leave the safety pilot in Wasilla before flying the last 60 miles home to Anchorage.

After clearing the mountains west of Juneau, the helicopter descended to 500 to 700 feet, heading northwest along the coastline. As it crossed Glacier Bay National Park about 60 miles northwest of Gustavus, the pilot asked the others whether they'd like to land on a beach to stretch their legs. A minute later, the safety pilot pointed out a long stretch of beach to their right, and the pilot began a right turn. The safety pilot's hands were off the controls, and his feet were on the floor.

The pilot then twisted the throttle from the Flight to the Idle position and lowered collective slightly. Rotor rpm decayed into the gauge's yellow cautionary range within 5 seconds.

It's natural for the instructor to believe the client knows the aircraft, while the client simultaneously trusts the instructor to keep them both out of trouble. The result can be a dangerous vacuum of authority.

Seven seconds after reducing power, the pilot reached for the center console to mute the low-rpm warning horn. Rotor rpm continued decreasing to its recorded low of 254 rpm, and 18 seconds after the initial power reduction the helicopter crashed into Lituya Bay.

All four occupants were thrown from the wreckage. The elder son regained consciousness in the water and managed to make it to shore. He was eventually rescued by the US Coast Guard and hospitalized in Anchorage. The safety pilot's body washed ashore about three-quarters of a mile from the accident site. The bodies of the pilot and his younger son weren't recovered.

The Pilots

The aircraft owner–pilot had more than 1,000 hours of fixed-wing experience. He'd logged 59 hours in the Robinson R44 while earning his helicopter rating. On Jun. 4, 2018, he completed the factory AS350 B3e transition course with 3 hours of dual instruction in the aircraft and 1 hour of simulator time. He got another 1.5 hours of dual at the factory on Aug. 5, giving him a total of 4.5 flight hours in the accident make and model. Over the summer, he flew 18.3 hours in an AS350 B2 operated by the safety pilot's company.

The safety pilot's widow told investigators that the owner–pilot's skills impressed her husband and their company's check airman: both considered him "a really good stick." By the day of the accident, the owner–pilot had accumulated an estimated 103.8 hours of helicopter time.

The safety pilot held a commercial certificate with single-engine land, multiengine land, single-engine sea, and helicopter ratings, but he wasn't a flight instructor. Of his estimated 15,350 flight hours, 4,350 had been flown in the AS350 series. His company flew no B3 models, however, and during an interview with investigators, the surviving son said his father seemed much more familiar with the details of this model than did the safety pilot.

The Aircraft

The 2018 model helicopter had flown just 13.7 hours when delivered and about 40 hours by the time it crashed. It was equipped with a Genesys Aerosystems HeliSAS autopilot and stability augmentation system and an Appareo Vision 1000 cockpit image recorder that captured four frames per second. The FADEC (full authority digital engine control) system and the associated event data recorder (EDR) of the 952–shaft horsepower Safran Arriel 2D turboshaft engine recorded engine parameters and failure flags at 1-second intervals.

Normal procedure in the AS350 B3e is to twist the throttle from Idle to Flight during run-up and leave it there until completing the postflight engine and rotor shutdown checklists. Moving to Idle in flight would be done in a practice autorotation, but the NTSB noted that the beach wasn't an ideal landing zone for a full-down auto, and the survivor told investigators they hadn't done any autorotations on the way up from Texas.

The Analysis

By the time the investigators arrived, the wreckage of the fuselage had washed onto the beach and been partially covered by sand. More than 25 gallons of fuel were recovered on-site. Examination of the wreckage ruled out fuel contamination and showed no evidence of pre-impact failure of the engine, transmission, main rotor, or collective and cyclic controls. The tail boom and tail rotor were never recovered.

In the last 16 seconds captured by the FADEC and EDR recordings, the twist grip went from Flight to Idle to Flight to Idle and back to Flight. All recorded parameters responded appropriately to those inputs.

The Appareo recording captured not only images but also GPS coordinates and pitch, roll, yaw, and acceleration data. The last data stream showed that the helicopter was level at 618 feet and 116 knots, pitched

6 degrees nose down, before the pilot rolled the throttle to Idle. The instruments showed 395 rpm at 8.5 first-limit indicator (FLI).

Within 5 seconds, the FLI needle dropped to 1.75 and rotor speed decayed to 328 rpm; the only control input was slight left pedal by the pilot. The helicopter gained 12 feet of altitude while losing 4 knots of ground speed. The panel's Horn light illuminated 1.75 seconds later when the pilot muted the low-rpm warning. Rotor rpm was down to 290 at 1.25 FLI. The helicopter hadn't yet begun to descend but continued to slow, pitched 3 degrees nose up.

Four seconds later, "loose objects in the cabin showed an indication of a negative g-force." The twist grip was still at Idle, and rotor speed was 259 rpm. Slight forward-left cyclic inputs were recorded, but it was unclear who made them; both pilots had their hands on their grips. Impact occurred 6 seconds later. The helicopter fell 600 feet in the last 10 seconds.

The Takeaway

The details of the accident sequence defy ready explanation. Why did the pilot twist the throttle to Idle at 600 feet—after making 30-plus normal landings in the preceding three days? Why did his safety pilot fail to correct that move immediately, or at least after the panel's twist-grip annunciator lit up? And why did the pilot mute the low-rpm warning horn rather than lower collective?

With the bulk of the pilot's helicopter experience in the R44, whose low-inertia rotor system's susceptibility to blade stall made it the subject of a Special Federal Aviation Regulation mandating specialized training, the horn might have been expected to trigger him to instantly lower collective.

The survivor told investigators that both his father and the safety pilot froze on the controls—and that he knew something was wrong right away because the phone on his knee "flew up and stuck to the ceiling."

Shortly after the accident, he told a state trooper that his father looked "like a two-year-old … sort of in shock." He recalled both pilots "snap[ping] out of their trance" just a second and a half before the helicopter hit the water, with his father yelling, "No!"

Not at all unclear is that a high-timer's scrutiny of a new pilot doesn't necessarily provide the safety margin both expect—particularly if that high-timer hasn't cultivated a flight instructor's reflexive paranoia.

By Walter P. Chartrand

Ensure Fuel Purity with Soak Testing

The performance and safety of your aircraft depend on this procedure.

AT MY FIRM, AVIATION MARKETING SERVICES, we're often asked about soak testing, which is used to verify the purity of aviation fuel.

If you're responsible for—or depend on—fuel in your work, you likely know how important it is to perform a soak test after completing new construction or major repairs to tanks or piping. This applies to both fuel storage systems and servicing vehicles. Afterward, a laboratory evaluation of the fuel samples used in the soak test can detect any potential contaminants—from solvents used in coatings and linings, welding flux, preservative oils (corrosion inhibitors), valve grease, and other debris—that could compromise the performance and safety of the fuel.

Because soak testing is such an important step in purchasing fuel, any acquisition or modification contracts for new fuel systems or servicing vehicles should include a clause that requires the manufacturer or contractor to provide evidence that a proper soak test has been performed. The clause should also require that the test results verify the fuel meets the appropriate ASTM International specifications.

Let's review how to conduct a soak test and the various lab tests involved.

Fuel Systems, Storage Tanks, and Related Equipment

A soak test consists of filling a fuel system (stainless steel, aluminum, epoxy lined, or rubber bladder) with an adequate volume of the appropriate-grade fuel and, after following the recommended recirculation procedures, allowing it to soak for a period of time recommended by ASTM or the specific fuel supplier. Before putting the fuel in the system, be sure to retain a sample to serve as a control batch should testing reveal off-specification product.

By following the stringent requirements of Energy Institute (EI) Standard 1541, Requirements for Internal Protective Coating Systems Used in Aviation Fuel Handling Systems, you'll dramatically reduce the risk of fuel contamination. Adherence to this industry standard ensures that the proper coating materials were correctly applied and allowed to fully cure as recommended by the manufacturer, and that storage tanks (including piping, pumps, valves, meters, filter vessels, and so on) are filled to the normal level and the fuel recirculated completely at least once and allowed to soak for a minimum of four days and a maximum of seven.

At the end of the designated soak period, obtain a 1 gallon sample from the new or repaired system and send it off for laboratory evaluation. The best location from which to obtain a sample is the low-point drain. Remember to displace an adequate volume in the sampling piping to ensure a truly representative sample of the tank bottom.

Fuel-Servicing Vehicles and Hoses

All fuel-servicing vehicles with tanks and piping made of aluminum or stainless steel should have the appropriate fuel circulated throughout the system. Fueling vehicles (whether new, repaired, or those that have undergone an extended period out of service) should be filled to the normal level and the fuel recirculated completely at least once and allowed to soak for at least an hour. You may obtain 1 gallon representative samples of fuel from any combination of multiple low-point drains and combine them into a single sample.

For proper soak testing, every fueler loading hose and

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every aircraft fueling hose must meet industry standard EI 1529/IOS (International Organization for Standardization) 1825 for hoses and assemblies. The hose must initially be filled completely with the appropriate fuel and allowed to soak for at least eight hours. The fuel in the hose must then be disposed of properly and the hose refilled.

To verify the absence of any manufacturing residue, you must perform an appearance check of the fuel for discoloration. The fuel should then be recirculated in an amount equaling at least twice the volume of the hose, back into storage, upstream of filtration. Follow up with a hose-end nozzle strainer inspection to confirm the absence of any particulate contamination.

Lab Testing of Avgas and Jet Fuels

In the case of avgas 100LL (aviation gasoline 100 low lead), the critical aspects of contamination are interfacial tension (how well water separates out from the fuel) and gum contamination, which leads to engine anomalies. The tests that should be performed on avgas 100LL are:

- ASTM D4176, appearance
- ASTM D381, gum content
- ASTM D1094, water reaction
- ASTM D2887, simulated distillation (this test is more sensitive to residue and chemical contamination than the standard test for distillation, ASTM D86).

The tests for aviation turbine fuels (also known as jet fuels) are the same as those for avgas 100LL, with the addition of the following:

- ASTM D156, Saybolt color test
- ASTM D3948, MSEP (microseparometer analysis, for water separation)
- ASTM D2624, electrical conductivity
- ASTM D3241, jet fuel thermal oxidation test (JFTOT)
- ASTM D56, flash point.

The JFTOT is notable because it reveals any change in volatility along with oxidation characteristics and evaluates insoluble and soluble materials that form deposits in the engine.

Correct Sampling

Fuel sample preparation, handling, and follow-through are all key to successfully testing aviation fuel. If a jet fuel sample is drawn through sample points that incorporate metals such as cadmium, brass, or copper, the JFTOT results may fail. Similarly, using galvanized piping (zinc) in avgas 100LL could alter the lab results.

Finally, make sure the sampling point is clean and flushed before taking a sample. Accumulated solid particulate matter or any free water should be removed, and final fuel samples should be clear and bright. Use a 1 gallon, approved epoxy-lined sampling container, and flush and triple-rinse it with the fuel to be sampled and tested.

FLIGHT PATH

QUICK FACTS

Ann Protheroe

Air Evac Lifeteam
Maryville, Illinois

CURRENT JOB

I'm a base mechanic for Air Evac Lifeteam, responsible for maintaining a medical-transport Bell 206 L4. I also travel to assist other base mechanics or cover for them when they're off duty.

FIRST AVIATION JOB

US Marine Corps intermediate-level jet engine mechanic for the T400 and T700 engines for the Bell UH-1N and AH-1W.

FAVORITE HELICOPTER

The UH-1 Huey. I just love the sound of the blades as they chop through the air.

How did you decide helicopter aviation was the career for you?

I had worked for over nine years on fixed-wing aircraft and decided I wanted something more technically challenging. I felt that helicopters fit that need perfectly.

Tell us about your first helicopter ride.

My first helicopter ride was in a Bell 407. We flew along the Gulf Coast of northwest Florida. I always enjoy the beauty of flying along the coast.

What advice would you give someone pursuing your path?

Never stop learning. Aviation is an ever-changing career.

Who has inspired you?

There have been and continue to be many people who inspire me. The ones who inspire me the most are people who doubt my ability. Those are the ones who inspire me to go above and beyond to become the best mechanic I can be.

What still excites you about helicopter aviation?

Knowing that maintaining the helicopters will save someone's life who might not otherwise get the care they need as quickly. Every time I see my helicopter fly off, I smile knowing that we [on the team] have all done a good thing.

What challenges you about your work?

Avionics and electrical issues challenge me; they're like puzzles you have to figure out one piece at a time.

If you couldn't pursue your career, what would you like to do instead?

I'd like to work with a company that makes furniture out of salvaged aircraft. That would allow me to be creative and still have a connection with aircraft.

"The people who inspire me most are the ones who doubt my ability. They inspire me to become the best mechanic I can be."

What issue do you think poses the biggest threat to the helicopter industry today?

I think the biggest threat is the lack of quality helicopter mechanics. It takes a large amount of knowledge and a larger amount of dedication.

Complete this sentence: I know I picked the right career when ...

I watch the aircraft I've been working on fly off into the sky. It gives me a great sense of accomplishment.

Complete this sentence: I love my job, but not when ...

I get a call in the middle of a winter's night and realize a 30-minute ground run is required and it's -3°F outside. Brrrrr…

What are your career goals?

One of my career goals is to gain more experience and education in avionics, due to the increasing use of more up-to-date technology.

How did you get to where you are now?

I'm where I am in my career today because of my hard work and dedication to my profession.

 By Jaasmin Foote

HAI Scholarship Recipient Nic Tillim

Student aspires to use piloting skills to help wildlife conservation.

NIC TILLIM HAS KNOWN FLYING helicopters would be his life's mission since his father introduced him to aviation at the age of three.

Nic's dad works for a prominent family in Johannesburg, South Africa, that operates a private fleet of aircraft through its aviation business Fireblade Aviation. The company conducts a variety of missions, including game conservation, charter, and tour flights.

Most of his father's missions didn't permit Nic to ride along when he was growing up, but Nic relished the work photos his father would show him when he returned home. Nic was certain that, one day, he'd follow in his dad's footsteps and pursue a career in aviation.

In March 2018, a year after graduating high school, Nic started flight training at Henley Air in Germiston, South Africa. He received his private pilot license (PPL) in November of that year, gaining 50 flight hours.

"Achieving my PPL and 50 flight hours was one of the greatest moments of my life," Nic recalls. "Firstly, because it meant achieving the goal I had set for myself in my teenage years, and secondly, because I was fortunate enough to be able to do the training."

"Achieving my private pilot license and 50 flight hours was one of the greatest moments of my life."

Nic credits his success to setting both short- and long-term goals, which helped keep him on track.

"Having short-term goals during my training was, and still is, very important," Nic says. "This is a career that takes a long time to make real progress in, so short-term goals are the stepping-stones that keep me focused and moving forward. At the same time, I always keep the end in mind."

Creating goals was also essential for success because flight schools in South Africa require students to be extremely independent. Students are given 18 months to complete their PPL, which includes eight exams, and courses aren't conducted in a classroom. Instead, students are responsible for teaching themselves their curriculums at home and scheduling flight hours with their instructors. Nic had a difficult time adjusting to this arrangement because he wasn't a straight-A student in high school and was used to receiving extra tutoring.

"You can't simply ask your professor a question about the reading—you must conduct research on your own, which can take time," Nic says. "A lot of people struggle in South Africa with the learning environment. A full ground school for all the subjects and extra tutors can cost $2,500. If you can't afford that, you have to teach yourself. I sat in my bedroom for two years studying."

School costs presented a challenge for Nic while he obtained his PPL. Then, at HAI HELI-EXPO 2019 in Atlanta, he stumbled upon the $5,000 HAI Commercial Helicopter Pilot Rating Scholarship.

"We went to HELI-EXPO in Atlanta for my 20th birthday present," says Nic. "That's where I signed up for my ROTOR magazine subscription and first saw the list of scholarships available from HAI."

Nic plans to use his scholarship to complete his last 100 flight hours for his commercial pilot rating and to build skills that will give him a leg up on other students competing for jobs in the field.

"Winning the scholarship is a huge honor for me, and I'm extremely grateful because I'm aware that very few students are given an opportunity like this one," Nic says. "I took this opportunity to finally contribute to my own future, which a lot of people aren't able to do until they've established themselves. Learning to fly helicopters is very expensive, and this scholarship will allow me to contribute toward my ratings for other aircraft, such as the Bell 206."

The Bell 206 is widely operated in South Africa, Nic notes, and he believes getting Bell ratings will make him more desirable to potential employers.

Nic's role models are the pilots at Fireblade Aviation, which operates out of the main airport and VIP terminal in his hometown. Nic has flown with several pilots at Fireblade in both fixed-wing and rotary aircraft. Most are former air force pilots who have always supported Nic's goal to become a pilot himself and have encouraged him to stay focused.

"They're my role models because they're passionate, experienced pilots who are happy to engage with me whenever I have a question or need advice," says Nic. Fireblade's pilots also provide Nic with hands-on learning experience, which is critical to helping him pass his exams, Nic says.

Nic's long-term career goal is to use his piloting skills to contribute to wildlife conservation and anti-poaching activities.

"Growing up in Africa, I got to see so many types of wild animals," Nic says. "I want to be able to look after them because we need them. The opportunity to help preserve their lives and habitats while also living my dream as a helicopter pilot is a job I'd embrace wholeheartedly."

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LAST LOOK

By Mark Bennett

Lazy T Ranch
Airbus AS350 B3e

The Lazy T Ranch is several thousand acres of pasture, hayfields, rolling hills, and dramatic canyons 10 miles southeast of Ten Sleep, Wyoming, as the crow flies. Or, in this case, as the Airbus AS350 B3e flies. The ranch uses the helicopter to monitor fences and outbuildings, locate cattle, and haul equipment and supplies with a newly acquired hook that can also carry a Bambi Bucket, in case wildfire strikes.

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