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About the cover: Jim Wisecup, assistant chief pilot for Air Methods Corporation, is HAI's new chairman for 2018–19. Jim talks about his 31 years in the helicopter air ambulance sector and the issues facing the helicopter industry in a profile beginning on p. 12.

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ROTOR® magazine invites its readers to submit articles about the international helicopter community for publication. The publisher reserves the right of final approval based on subject matter and space availability. Letters to the editor are also welcome. For information about submissions, please contact Gina Kvitkovich, director of publications and media, at 703-683-4646 or rotor@rotor.org.
As this is my first column as chairman of HAI, let me introduce myself. My name is James Wisecup. Most people call me Jim.

I began flying helicopters in 1969 in the US Army. After a fairly brief active-duty army career, I spent a few years in the National Guard and Army Reserve in my home state of Texas. After my army service, I flew for offshore operations in the Gulf of Mexico, the North Sea, the North Atlantic, the South China Sea, and offshore California before shifting to the helicopter air ambulance (HAA) sector.

I was a line pilot, check airman, and then chief pilot for Rocky Mountain Helicopters, which was the largest HAA operator at the time. I am currently an assistant chief pilot for Air Methods Corporation, one of the largest air medical companies in the world.

Safety and training are my passions. Safety, because both our operating costs and public acceptance of our industry depend on our ability to improve our safety record. Training, because that is how I think we will reduce accidents, most of which are caused by human factors.

The most important thing we can do to improve our industry is to pass along to the next generation of pilots and maintenance technicians what we have learned over the years. You may call this storytelling. Some people call it training.

After all, none of us will live long enough to make all of the mistakes ourselves. If we don’t learn from the mistakes of others, we will die trying. Be your brother’s keeper, as his actions can affect your profession.

I am proud to have spent my career in aviation. There are so many jobs that are done by helicopters — more than the average person realizes.

However, things are changing.

Drones, or unmanned aircraft systems (UAS), seem to be the latest technology threatening our industry. But are they really a threat? Yes, they will increasingly take over surveillance, inspection, and reconnaissance missions. But that makes sense. These often mundane missions can, in many cases, be done more safely, economically, and efficiently with UAS.

We tend to get rigid about how we “always” done things. Instead of telling those drone-flying kids to get off of our lawns, however, let’s remember two things: First, there are still missions that can only be done by helicopters — our industry may change but it’s not going away. Second, we know that drones are here to stay — newer, cheaper technology tends to stick around — so let’s figure out how to integrate their operations into the airspace that we all share.

Another external threat to our industry is the noise issue. Many well-meaning, well-organized groups throughout the United States have banded together to voice dissatisfaction with the noise being generated by helicopters overflying their homes and recreational areas. Although the noise from helicopters may not in fact be the loudest noise in these neighborhoods, it does seem to generate the most concern.

It is imperative that we listen to these groups to understand what the true issues are and, if possible, find a way to mitigate them. We can still do our job — but we may have to do it while flying higher or taking a route that doesn’t impact our neighbors as much.

Yes, there will be times when we won’t have a perfect solution to a noise complaint. But if we do all that we can to minimize the noise impact of our operations, it will go a long way to improve our relations with our neighbors. We need to both model and teach these behaviors to new pilots as well as the more experienced ones.

Another issue is the pilot and maintenance technician shortage. There are many factors affecting the personnel scarcity. Training is expensive, the military is not producing as many qualified people as in the past, and the competition for talent from the fixed-wing world is greater than ever.

We need to actively get into our local communities and reach out to younger individuals to educate them about the opportunities available in the helicopter world. Without pilots and maintenance technicians to fly and operate our machines, the rotors won’t keep turning. Please consider working with Helicopter Foundation International (HFI) for outreach opportunities and assistance.

Obviously, the safe operation of helicopters is a main focus at HAI, but I firmly believe that we can operate safely and still be responsible stewards of the helicopter world as well.

I am excited to be working with professionals such as you in the vertical-lift community, and I hope I can contribute to advancing our industry into the future. Let’s take advantage of our opportunities to ensure that the helicopter remains a vital part of the global aviation scene.

Cheers,

Jim Wisecup is the current chairman of HAI’s Board of Directors and assistant chief pilot for Air Methods Corporation.
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President’s Message

Get a Cardboard Box

We will get to why aviation professionals need a cardboard box in a minute.

But first, did you ever think you would see our industry move away from the word helicopter? It appears we are morphing into the vertical-lift industry, unmanned vertical industry, or the vertical urban air-taxi industry, take your pick.

I don’t disagree with this transformation. We are in an exciting time in our industry as different types of aircraft, such as drones, tiltrotors, and autonomous vehicles, come onto the civil market.

HAI supports those who make, operate, fix, maintain, overhaul, or supply all vehicles, manned or unmanned, that can operate in the vertical-lift mode and perform that wonderful maneuver, the hover. As one of the old guys in this industry, I started out flying helicopters and I intend to go out flying an aircraft called a helicopter — but I know that word is no longer big enough to hold all the facets of our industry.

In an effort to be more inclusive, HAI will look at changing our name to better reflect our membership, which includes those active in both manned and unmanned vertical-lift aviation. If you have any ideas on the potential rebranding of HAI, please let me know your thoughts.

Now about that cardboard box.

Many, many, many years ago, one of my mentors and I were discussing safety and corporate ethics. He noted that, regardless of the position you hold — owner, manager, pilot, maintenance technician, or customer — we are all part of the cultural team that controls safety and ethics. And yes, the two are closely related.

My mentor’s ethical philosophy — and mine — can be summarized as “do the right thing.” To achieve the desired result of zero accidents, we must employ this attitude in our everyday risk assessment and decision-making, on every flight, on every job.

To achieve zero accidents in our industry, we must acknowledge that we will not be able to transport every patient, meet the desires of every customer, ferry every corporate executive, or fly every tour flight or possible loss of your job.”

In our industry, we must go to work each day willing to accept negative consequences as a result of doing the right thing. If we cannot do this, then “doing the right thing” isn’t meaningful. “Doing the right thing … when it’s convenient” doesn’t have the same power.

This sounds tough, but when you consider the potential of a flawed decision — the loss of lives in the aircraft or on the ground — it makes sense. Your objective is to do your job each day in a safe, professional manner. When you cannot do that, then speak up.

“Also,” my mentor continued, “You need to get a cardboard box.”

I told him, “I understand everything you’ve told me, and I agree. But what’s with the box?”

He laughed and then explained. “The box is there so you can pack up your personal items before you walk out the door for the last time. Take it home, and then have dinner with your family and fly another day.”

Since that conversation, I have had a cardboard box close to me, in view, to remind me of his advice and my obligation to those who put their trust and lives in our care. I suggest you get your own box. It may help you get through some tough days.

Have I ever packed the box? That is another tale for another day.

That’s my story and I am sticking to it. Let me know what you think at tailrotor@aol.com.

As always, fly safe, fly neighborly — and keep those rotors turning!

Best Regards,

Matt Zuccaro is president and CEO of HAI.
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Minimal vs. Optimal

Aviation pioneer Jimmy Doolittle flew the first instrument approach on September 24, 1929. Actually, he flew two instrument approaches that day. The first one was in instrument meteorological conditions (IMC), but before witnesses arrived to document the milestone, the weather had cleared. Doolittle performed the second instrument approach with a hood, or blind, as it was referred to in that period.

Being able to see from the cockpit was no longer required for controlled flight — and this was only two years after Lindbergh’s historic nonstop solo transatlantic flight.

Lucky Lindbergh was lucky indeed. During his 34-hour flight, he encountered many poor weather conditions, including thunderstorms and sea fog. While there is no doubt Lindbergh logged a considerable amount of instrument flight time on his journey, I guess it doesn’t count when the term instrument flight — not to mention some of the basic instruments — had not yet been invented.

The helicopter is an amazing machine but perfecting vertical flight was not easy: more than 35 years separated the inaugural flight of the Wright brothers from Igor Sikorsky’s first helicopter ride in 1939. But we are fortunate that he persevered.

In addition to cruise flight, helicopters have the ability to hover and to fly very slowly for prolonged periods. This makes it a versatile machine with unique capabilities. However, because of its relatively high operating and maintenance costs, the helicopter is more of a tool in a kit bag for performing a job or task than a pleasure craft.

Because we use this magnificent tool to perform a job, that job often takes priority over the enjoyment of flying the machine. In a nutshell, we are paid to perform a job and the helicopter is the tool we use to accomplish it.

My question is this: does completing the job outweigh, or get in the way of, aeronautical decision-making? Yes, I know it’s a complicated question. I have not forgotten what it’s like to spend hours staring at a radar screen and pacing from the weather window to the computer screen, asking myself: If I were to get a flight request right now, what would I say?

The go/no-go question is complicated by the type of flight we have to accomplish, the time of day, the aircraft we are using, and the crew we have for the flight — and the weather we will be flying in. One of the biggest bets every pilot in command makes upon takeoff is this: I believe I can fly and land this aircraft safely in the weather I am experiencing now and the weather as forecast.

But what are the no-go weather conditions? In the United States, our regulator, the FAA, has something to say on this matter.

In the November/December 2017 FAA Safety Briefing magazine, a chart on page 2 defines visual flight rules (VFR) conditions as a ceiling equal to or greater than 3,000 feet and visibility equal to or greater than 5 miles. Marginal VFR is a 1,000-foot ceiling up to 3,000 feet and visibility from 3 miles up to 5 miles. The Aviation Weather Center of the

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1 I have been reading about aviation history, and the stories of some of our pioneers are quite inspiring. For instance, among other achievements, Doolittle helped to develop the artificial horizon and conducted research that lead to the development of instrument flight; earned the first Ph.D. in aeronautical engineering awarded in the United States; won all three major air races of the day (and then retired, commenting, “I have yet to hear anyone engaged in this work dying of old age”); and was awarded the Medal of Honor for an air raid on Japan — a mere four months after Pearl Harbor. Not bad for a fixed-wing guy, huh?
National Oceanic and Atmospheric Administration (NOAA) uses the same definitions (see table 1).

However, another government source gives a different set of requirements — and these requirements are regulatory. 14 CFR 91.155, Basic VFR Weather Minimums, states that a helicopter may operate in weather clear of clouds and with a half-mile visibility during the day in Class G airspace. At night, the requirements are weather clear of clouds and 1-mile visibility in Class G airspace.

These requirements seem to be linked to 14 CFR 170.3, Definitions, in which VFR is defined as “rules that govern the procedures for conducting flight under visual conditions. The term ‘VFR’ is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements.”

That all sounds reasonable, but the next entry in the list of definitions in 14 CFR 170.3 is the one for visual meteorological conditions (VMC): “meteorological conditions expressed in terms of visibility, distance from clouds, and ceiling equal to or better than specified minima.”

### How many weather-related accidents would be avoided if we used the higher minima for helicopter cruise flights?

Regardless of this definition, ask any pilot or flight student what the minimum weather for VFR is and you will get a response of 1,000 and 3. This pilot and student understanding is fully supported by precedent, FAA literature, and NOAA. Anything below 1,000-foot ceiling and 3 miles visibility is considered and published as instrument flight rules (IFR) — and I believe that criteria is appropriate for most helicopter missions.

I understand there are circumstances in which we may be able to safely use our helicopter tool in weather conditions this low, such as utilities, agricultural, and construction work. Sometimes conditions exist where there is a low ceiling, but the visibility is unlimited below the deck. However, let’s keep in mind that these are technically IFR conditions.

If you attempted to fly in these conditions in controlled airspace, you would have to be on an IFR flight plan in an IFR-certified aircraft, or flying on a special VFR clearance under the watchful eye of an air traffic controller. It is likely you have heard your favorite controller say, “The field is IFR — state your intentions.” Translated, that means: you are not on an IFR flight plan and you should be!

The helicopter air ambulance community has slightly higher VFR weather minimums. As defined in 14 CFR 135.609, an 800-foot ceiling and 2 miles visibility is required for day VFR flight in their local area in nonmountainous terrain. Again, as defined by NOAA and the FAA, these are IFR conditions.

As with many things surrounding standards within aviation, the weather requirements are the minimum standards for flight operations. They describe the smallest permissible values — not the optimum. In fact, flights made under weather-minimum conditions can and do end poorly, with weather as a causal factor.

The FAA has identified unintended flight into IMC, loss of control, and controlled flight into terrain as leading causes of accidents in general aviation, which includes all rotorcraft operations. We can help ourselves and our industry by not taking unnecessary risks with the weather.

It may be acceptable for a helicopter performing powerline work or drying cherries to operate with a half-mile visibility — the majority of its flight will most likely be in a hovering flight profile. For these missions, which utilize the unique abilities of helicopters, the minima published in 14 CFR 91.155 make sense.

But when you are using a helicopter to travel greater distances — taking off from one location and proceeding at cruise speed to another location — maybe you should use higher weather minima. How many weather-related accidents would be avoided if we used the higher minima for helicopter cruise flights?

Just because we can fly doesn’t mean we should. *Fugere tutum!*

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**Table 1. US Government Published Weather Minima**

<table>
<thead>
<tr>
<th>Source</th>
<th>Category</th>
<th>Ceiling</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAA 2017. “VFR ‘Not Recommended’ Research Underway,” FAA Safety Briefing, (Nov/Dek, p. 2)</td>
<td>Instrument flight rules</td>
<td>500 to below 1,000 ft AGL</td>
<td>1 to &lt;3 miles</td>
</tr>
</tbody>
</table>

* AGL = above ground level

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Zac Noble is HAI’s deputy director of flight operations and technical services. He is a dual-rated ATP, dual-rated CFII, and A&P/IA. Zac can be reached at zac.noble@rotor.org.
Before Google Could Translate

My first trip abroad was to the Soviet Union. As a youngster growing up at the end of the Cold War, I was not sure what to expect.

My stay with a host family was wonderful, and it turned out that the Russian family was a lot like mine: the kids complained about doing chores and didn’t like vegetables, but everyone loved Grandma’s cooking. It was eye-opening to see firsthand how many similarities we had.

My Soviet summer came to an end too soon, and I headed home … just missing the real excitement a couple of weeks later when, on August 18, 1991, Russian president Boris Yeltsin lead the resistance to an attempted coup. The coup was unsuccessful — but it set the stage for the breakup of the Soviet Union by the end of the year.

It was such a fascinating adventure, I had to go back. A few years later I returned, this time to the Russian Federation. By this time, I was a private fixed-wing pilot and had been working for some time with my dad at a small FBO that he ran at a local general aviation airport.

Along with other operations, we ran some cargo flights in Piper Navajos and Beech 99s. I don’t recall why, but at the time there was a lot of chatter in our area about the Soviet Antonov An-2 and its possible use in cargo missions. Naturally, when I returned to Russia, I was determined to discover if and how this single-engine biplane could be used in our operations.

I told my host family of my quest to talk to some pilots. A few weeks later, I found myself packed into their little Lada, headed out to a “surprise.” We drove through the beautiful wooded Russian countryside until suddenly, we pulled up at a little airstrip where members of an aeroclub were critiquing the aerobatic flight skills of their fellow pilots.

I was introduced to a number of the pilots and immediately hit it off. Several proudly introduced themselves as former members of the Soviet Air Forces, noting with a grin that they were trained to shoot down my country’s aircraft. I told them of my respect for their flying ability and remarked how great it was that we could now come together as friends with a shared love of aviation.

When I stop to think about it, this was quite a moment. What really separated me from my new friends? We grew up under two opposite political systems and, as they dryly remarked, we had considered each other to be enemies, trained to shoot each other down. But once we got over that minor historical speed bump, it was apparent that, just like my Soviet host family, we were more alike than different. We enjoyed talking about aviation and adventures, like any long-lost friends.

While watching the club members go through their aerobatic practice, I noticed a couple of An-2s parked on the far side of the grass strip. I asked all about them and the commercial prospects of bringing an An-2 to America. At least that’s what I think I said. I might have said, “I like chocolate ice cream” or even, in my rudimentary Russian, “Ice cream like chocolate me.” There’s really no way to be sure.

There was a commotion behind me and suddenly, a large pack was slapped on my back — a parachute, as it turns out. I was led to a Yak-52, the primary Soviet trainer aircraft, and promptly secured in the back seat.

At that point, my mind was racing, trying to remember exactly what I said about the An-2. I was hoping I hadn’t agreed to purchase a fleet of the aircraft. I was also thinking I didn’t catch a word about how to use the parachute. One of my new buddies bounded in and asked if I was ready to go. I wasn’t sure where we were going, but the only right answer at that point was “Da!”

Next thing I knew we were over the Gulf of Finland, an arm of the Baltic Sea. Then I heard over the headset the Russian equivalent of “Get ready.” My friend then took me through my first aerobatic experience. To say I was having the time of my life would be an understatement. I squealed like a little kid with such joy that my new friend burst into laughter as he took us through one aerobatic maneuver after another. He even let me do a few loops.

I was wishing we would stay up
forever, but alas we headed back to the field and he let me land, which was a new experience from my perch in the back. We rolled up to the ramp and relived our flight, talking till it was finally time to leave. I stayed in touch with my friends for quite some time until addresses changed and mail was lost. (This was, after all, before email.)

Why this trip down memory lane and how does it relate to HAI? Well, at HAI we work on your behalf to keep the rotors turning. We connect people and ideas to advance the industry. No matter where you live in the world, as HAI members we are connected by our love of aviation.

We may have grown up in different political systems, countries, and cultures, but we share a unique bond. Who knew that, just like me, Soviet kids didn’t like vegetables? It wasn’t until I was there, speaking and connecting with people, that I realized that we had many similarities we could build on — similarities that formed a bridge over our differences.

Flipping through the air over the beautiful Gulf of Finland with my new Russian buddy, the one trained to shoot down American aviators, we shared laughter and the sheer joy of the freedom of flight. It was an incredible experience brought about by a host family seeking to connect a kid and his crazy scheme for a Russian aircraft with the local Russian aviation community.

HAI, located just across the river from Washington, D.C., frequently works with regulators and legislators on issues important to our industry. But frankly, they wouldn’t be interested in working with us if we didn’t work for you.

Elected officials put a high priority on helping their constituents back home, and they know that HAI connects them with issues and solutions for those voters. Our power in advocacy comes from the grassroots strength of our members.

Advocacy works the same way in any country in which our members live. HAI is a resource for you to connect people and ideas. We have many affiliates throughout the world who can furnish expert analysis on local operational issues and opportunities. HAI is ready to help you make that connection.

This coming October, HAI will be attending and exhibiting at Helitech International in Amsterdam. If you are planning to be there, stop by our booth and let’s chat. Building networks and relationships is how we strengthen this industry and move it forward. We can all learn and build from each other’s experiences.

To craft common-sense aviation polices, our elected officials, no matter the country, need the expertise our industry can provide. Let’s learn from each other about how effective education and advocacy campaigns can be built. How have you been able to influence your government’s legislative or regulatory decision-making process? Share your victories as well as defeats. We can all learn, refine, and improve our approach in sharing our message about the positive contributions of the helicopter industry.

Finally, get involved politically. For HAI members in America, don’t forget that Congress has an August recess and the House is scheduled to be home in the districts campaigning. This is the perfect time for you to schedule a visit with your elected official. Invite them to your place of business and show them the good work you are doing for your community.

HAI international members, look for the same opportunities according to the openings in your elected officials’ calendars. Become a resource to your elected officials on aviation issues. Help them develop the best aviation policies possible.

By building stronger networks among the aviation community — and inviting others to understand our contributions to a healthy economy and safe communities — we will build a successful, united helicopter industry. In English, we call that “keeping the rotors turning.” How do you say it in your language? Let me know at cade.clark@rotor.org.

Cade Clark is HAI’s vice president of government affairs.
Jim Wisecup: HAI’s New Chairman

By Gina Kvitkovich

“O
ne of the good guys.” “A real gem.” “What happens when our industry gets it right.”

These are the types of comments I heard about Jim Wisecup as he was elected to the HAI Board of Directors and then was selected by his fellow directors as chairman of the association for the 2018–19 term. And spending an afternoon with Jim helped me to understand why he is so respected in the industry.

Jim is a highly experienced 16,000-hour pilot with a deep understanding of industry issues and an even better grasp of how we will solve every one of those problems: through people working together.

Deciding on Aviation

Jim grew up in the Houston area. After high school, he attended the University of Houston for a year, but he says that at 19 he was “too impatient” for college. (Fifty years later, Jim has more patience: he is finishing up his studies at Southern Utah University and expects to get a bachelor’s degree in aviation science in spring 2019.)

Even as a teenager, Jim knew that he wanted to fly for a living — his first ride in an airplane taught him that — so he joined the US Army. Unlike other services, the army did not require its pilots to have a college degree.

During his year in Vietnam, Jim flew for the MACV-SOG unit, which conducted special ops missions. Characteristically, Jim turns his year of living dangerously into a funny story, remarking that he had three engine failures caused by FOD (foreign object damage). The first was caused by a mortar round, the second by an artillery shell, and the third by a rocket-propelled grenade. He earned several decorations, including a Purple Heart, Silver Star, Bronze Star, and multiple air medals along the way.

Jim was discharged in April 1971 and then went to work for the US Department of the Interior. He had used his GI Bill benefits to get his fixed-wing ratings and was also working as a fixed-wing instructor. But his real goal was to find a job flying helicopters.

At this time, the helicopter industry was flooded with US Army–trained pilots and maintenance technicians, so finding a job in the helicopter industry wasn’t easy, even for an experienced pilot. Luckily, one of Jim’s fixed-wing students mentioned that he would soon be quitting his job at Offshore Helicopters in Sabine Pass, Texas.

Armed with that intelligence, Jim
applied for a job at Offshore but was told that there were no openings. Jim didn’t share that there soon would be, and sure enough, he was offered the newly open position.

He started flying offshore in 1974 — pilot #5 of five pilot positions. After three years, when Offshore’s chief pilot left, Jim was offered the position. “I was probably the only one of the four pilots left who showed any desire or aptitude for the job,” says Jim.

Over 10 years of operations, Offshore went from five helicopters to 40, and from five pilots to 85. In 1979, when Bristow Helicopters bought Offshore Helicopters, Jim became chief pilot for Bristow’s US operations. After spending a year-and-a-half working for Bristow in the Gulf of Mexico, he was transferred to Bristow operations in Scotland and then to Malaysia as a training captain.

In 1984, Jim moved to Arctic Air as chief pilot — after several years abroad, he was eager to get back to the United States. He was working in California in 1987 when he got a call from Larry Kelly, whom he had worked with in the Gulf of Mexico (and with whom he later served on the HAI Board of Directors). Kelly urged Jim to apply for a job in Tulsa, Oklahoma, flying air medical missions for Rocky Mountain Helicopters.

Jim’s interview for the job was with John Heiskel, vice president of air medical operations for Rocky Mountain. Heiskel turned out to be someone who had interviewed with Jim for a job in the Gulf — and then didn’t get it. Luckily, Heiskel didn’t hold a grudge.

Jim has been flying in the helicopter air ambulance (HAA) sector ever since. Rocky Mountain Helicopters was acquired by Air Methods in 2002, and Jim is now an assistant chief pilot at the company, which operates 300 bases serving 48 US states.

Flying air medical has its own rewards, says Jim, who no longer flies patient transport flights. “I miss it sometimes, but not at four o’clock in the morning when it’s 10 degrees outside.” From thousands of transports, three or four patients have returned to say thanks, says Jim, and that makes it all worthwhile.

Success in a Small World
As you listen to Jim talk about his career, a common theme keeps popping up: how many jobs were the result of someone he had worked with reaching out with a recommendation or job offer. Jim laughs this off, explaining that “he has friends in low places,” but he goes on to explain that aviation is a small industry and the helicopter sector is a very small part of that — “Which is really good if you’re a good guy, and it’s really bad if you’re not.”

Jim believes that part of success in any job is how you treat the people — all the people — that you work with. “If you have looked out for people, then they will look out for you.”

He was fortunate to work with several people who influenced his management style. Jim Overstreet, the director of operations at Offshore Helicopters, was one. “He was a genuinely nice guy and didn’t have to be a horse’s butt to get things done,” says Jim. “He treated people fairly, and that got me going in the right direction as far as management style.”

Jim also feels fortunate to have...
worked with Heiskel, who was part of the management team at Rocky Mountain Helicopters and then Air Methods until his retirement two years ago. “One of the most honorable people I’ve ever met, and he got things done.”

Jim would like to see more industry recognition of the importance of mentoring, not just for new pilots and maintenance technicians, but also for people in midcareer. “Human factors is about more than safety; it’s also about how we treat people,” he says.

**A Just Culture**

Jim is grateful to have worked with companies who seemed to have developed a just culture before that term became an industry standard. “If you willfully and knowingly violate federal aviation regulations or company policy, you’re done, you’re gone. But if it’s an honest human mistake — well, we’ve had people make some big ones and they’re still working for us,” he says.

Jim has been training pilots since Vietnam. “I was a unit instructor pilot, and I really enjoyed that because I felt like I could pass along my experiences to the younger pilots or the newer pilots. I say younger — I was 20 years old at the time.”

In his current job as assistant chief pilot, Jim is responsible for all training on Air Methods AgustaWestland 109 and 119 aircraft and single- and multi-engine airplanes (the company divides chief pilot responsibilities by airframes). He is a check airman for the Bell 407 and occasionally flies ferry flights. He is also a designated pilot examiner.

While some pilots may enjoy the daredevil aspects of flight, Jim takes the opposite tack: “You can make it as safe or as dangerous as you want. I liked to make it safe, which is why after 50 years I’m still here.

“Not that I haven’t made mistakes,” he says. “But I feel like I’ve learned from those mistakes and I try to learn from the mistakes of others.” That’s an attitude he encourages in others.

It’s hard, he says, when a young, enthusiastic student pilot doesn’t make the grade. “They’ll say, ‘I’ve failed.’ And I say, ‘The only way it’s a failure is if you fail to learn from this.’ Just understand where you fell short and don’t do it again. It’s not a failure, it’s an opportunity to learn.”

**Industry Issues**

Jim would be the first to acknowledge that the helicopter industry has some opportunities to learn. While unmanned aircraft systems, or drones, are a current hot topic, Jim believes that drones will become simply another tool in the aviation toolbox.

“There are jobs that drones should be doing, because they can do them as well or better than helicopters,” he says. “But there’s enough jobs that need helicopters, as well as pilots and maintenance technicians. That’s where we should be concentrating our efforts. What we can do best, let’s do it. What they can do better, they should do that.”

Noise complaints are another long-term issue for the industry. Through his work with Air Methods, Jim was part of industry efforts to reduce helicopter noise in the L.A. basin. He credits education and outreach by area industry groups to the local helicopter community for reducing noise complaints, but he also points out that similar grassroots campaigns targeting helicopter noise are springing up in other areas.

Tied up with the noise issue is preemption — which is another way of saying that the FAA is ceding its regulatory authority over US aviation to Congress and the states. If this trend continues, rather than one set of aviation regulations that apply to the entire United States, aviators could face a complex arrangement of laws and regulations, right down to communities designating specific altitudes for overflights.

Jim’s optimism about the industry’s ability to make headway on these issues in part stems from his experience. Yes, making good regulations is a challenge, but Jim
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can also cite progress made on several issues.

For example, when Rocky Mountain Helicopters first tried to use night-vision goggles (NVGs), the FAA threatened it with violating 14 CFR 91.13, Careless or Reckless Operation. It took a court case to change that, and NVGs have since steadily become more common in HAA operations.

“It took us 10 years to get the first ship outfitted with them and five years to get the second one. In the next 10 years, we went from two aircraft being equipped to 100 percent,” Jim says.

“That’s really been a huge game changer in the air medical industry. We had a year in 2008 where there were 17 fatalities in HAA operations from CFIT [controlled flight into terrain] accidents at night, with unaided vision. The number of those has dropped drastically.”

Making a Difference
Jim has been attending HAI HELI-EXPO® since the 1970s (“back when HAI was still HAA”), but he really got involved in HAI when he was working for Rocky Mountain Helicopters. He was an active volunteer, serving on the Air Medical, Flight Operations, and Heliport committees.

Jim remembers hammering out recommended changes for the 2004 Heliport Design Advisory Circular (AC 150/5390-2B) with other members of the Heliport Committee. “It wasn’t always fun in those rooms, but we did get a lot of good things done, and it’s nice to think that I played a part in that. I’ve gotten a lot out of the industry, and I think being active in HAI is a way to put something back in,” he says.

Next Steps
Jim has been married to his wife Jessica for 31 years. Together, they have a blended family of five children (one from his first marriage, two from hers, and two children together) and six grandchildren.

He is proud of having a hand in raising five adults who are now on their own, busy with their careers. They are scattered around the United States: California, Colorado, Pennsylvania, Oklahoma, and Virginia. Luckily, Jim and Jessica enjoy travel, and the couple looks forward to spending more time on the road after Jim retires.

Meanwhile, Jim is happy to continue his work at Air Methods. “I’ve stayed there for a number of reasons. One, air medicine is a place where we do some good, and I thought I had things to contribute to our pilots. It felt like the right place to make a difference — helping pilots to be better pilots, our managers to be better managers, and my check airmen to be better check airmen. Because if we can help each other, it’s a whole lot easier.”

Gina Kvitkovich is HAI’s director of publications and media.

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More than 100 people helped HAI welcome its new Board of Directors on June 25 as the association held its annual reception to mark the end of the fiscal year and the installation of the new board. Old friends and new connections mingled over hors d’oeuvres as they congratulated the board on another year of serving HAI members.

During the reception, outgoing Chairman Daniel B. Schwarzbach of the Houston Police Department passed the gavel to James O. Wisecup of Air Methods Corporation, who on July 1 took over as chairman of the Board of Directors (read more about Wisecup in his profile on p. 12 and his chairman’s column on p. 4).

HAI President and CEO Matt Zuccaro also honored Schwarzbach and outgoing board members Torbjorn “TC” Corell and Chuck Aaron with plaques to commemorate their time as HAI volunteer leaders. ⚙️

### New Board Members, New Vision

At the reception, Matt Zuccaro introduced Douglas Barclay and Jack Matiasevich, two new directors selected by HAI members during elections this spring.

“We are pleased to welcome both Douglas and Jack to our Board of Directors,” says Zuccaro. “Each of them brings significant experience from their respective branches of our industry, which should blend very well with the other directors.”

Barclay is the vice president and director of Kachina Aviation, a helicopter operator located in Nampa, Idaho. He received his A&P license in 1980 and inspection authorization in 1991. Barclay served in the US Army and has worked for several helicopter companies, advancing through levels of responsibility. He joined Kachina Aviation in 1993. Barclay serves on the HAI Aerial Firefighting Committee and has been a member of HAI for 20 years.

“I am greatly humbled to be elected to the HAI Board of Directors. I hope to do as well as my predecessors,” says Barclay. “As a newly elected member to the board, I intend to listen to the advice of our members and work on their issues with my fellow board members.”

Matiasevich has flown for more than 24 years and has accumulated more than 11,000 flight hours, working in utility, aerial firefighting, single-pilot helicopter air ambulance, agriculture, and construction. Devoted to safety, he is a representative of the FAASTeam and holds five CFI ratings and three ATP certificates in addition to his IS-BAO auditing credential. He is a 15-year member of HAI and an active contributor to HAI’s Utilities, Patrol, and Construction Committee.

“I am thankful to all those who voted for me, and I look forward to serving the membership at large,” says Matiasevich. “I strongly feel we need to encourage and promote active participation between the HAI committees and show the value and impact a collective body can make. With all of the work we need to accomplish, I am confident we can continue to make an impact.”
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Where Is the SH09? Kopter Gears Up to Deliver

By Dan Reed

A Swiss company founded in 2007 with the goal of launching a brand-new helicopter design has yet to deliver a finished aircraft. Expected certification dates have come and gone. Ten years is a long time to wait, especially for a company that has taken in at least $430 million from unusually patient investors without delivering a single finished product.

But leaders at Kopter — which until February was known as Marenco Swisshelicopter — are confident not only that they will deliver their first SH09 single-engine helicopter sometime in the first half of 2019 but that, within a decade, Kopter will rank among the top three civil helicopter manufacturers in the world.

It’s an ambitious outlook, to say the least.

But that’s pretty much the marching orders given to Andreas Löwenstein when he was hired as CEO on January 1, 2017. The 25-year aviation and defense industry veteran came to Marenco after the company’s board, dominated by Russian investor Alexander Mamut via a family trust headquartered in Cyprus, pushed founder Martin Stucki into retirement.

Stucki, a Swiss helicopter pilot and engineer, is rightly credited with identifying a potentially huge, underserved segment of the global helicopter market: operators looking for an all-new, technologically advanced single-engine helicopter that offers the size and capabilities of a twin-engine aircraft. But Stucki and his small team of engineers repeatedly were frustrated by unexpected technical delays and an inability to advance their promising new product through the European Aviation Safety Agency’s (EASA) certification process.

So Löwenstein and a new team of industry veterans were hired away from companies like Airbus, Leonardo, Rolls-Royce, and even Bell to get the ball across the goal line as quickly as possible. Collectively, the new management team has 220 years in the helicopter industry.

“The company had been driven by people who did not come out of the helicopter industry,” Löwenstein
says. “It was led by a group of brilliant engineers. But we needed to bring [the initial product, the SH09,] to certification. That means you need a team that is skilled and experienced in the certification of aircraft and, most importantly, that is trusted by the certification authorities.”

The process to certify a new aircraft design is always measured in years, but Löwenstein says one reason for the SH09’s slow progress was the size of the Marenco team. “The certification scope you have to cover is so broad. The documentation you have to produce is so thick. You cannot do it with 140 people, which is about what we had when I arrived. We also had to shape the product support operation, build the sales team, and create an assembly-line process, all in order to win certification. So we needed to bring in people with lots of experience in each of these areas.”

By late 2016, it was clear to all involved that Marenco Swisshelicopter had a solid foundation — the design of the SH09 was both innovative and on target. But it also was obvious that the company was struggling to put all those other important elements together in order to earn certification. That’s why the change in leadership had to be made.

With founder Martin Stucki no longer involved — whose Martin Engineering Consultants gave rise to the Marenco brand — that made-up word no longer seemed relevant. And Swisshelicopter is such a long word — and one that proved to be very hard to pronounce by many nonnative German, French, and English speakers — that the new leadership determined that it, too, had to go.

The company needed a shorter, pithier name that would stick in helicopter buyers’ minds and roll off international tongues with ease. And, indeed, Kopter, with a K to capture the company’s Swiss/Germanic heritage, has seemed like an inspired choice since the new brand was introduced on February 1 of this year.

**Building toward Certification**

In the roughly 18 months that Löwenstein has been on the job, the company payroll has more than doubled in size, to around 300. Another 50 or so employees are expected to be added by year’s end.

Since Löwenstein’s arrival, the company’s headquarters and engineering teams have been relocated to a new, larger facility in Wetzikon, east of Zurich. The company has staffed up its dynamic testing facility in Ennetmoos, south of Zurich.

Staff have been added at Kopter’s certification management office across the border in Siegertsbrunn, Germany. And new staff are being added and trained at the company’s primary manufacturing and assembly plant in Mollis, south of Zurich. Because that facility’s maximum production capacity will be a little more than 50 units per year, Kopter also plans to start final assembly lines in the United States and Asia as production ramps up.

Meanwhile the SH09 now has completed more than half of its flight-test program. Flight testing began in earnest in 2014 but had to be put on hold for more than a year when a problem with excessive vibration was discovered. A redesigned bearingless rotor and new, slightly stiffer rotor blades solved that problem, and flight testing resumed in 2016.

Kopter earned its Design Organization Approval from EASA back in February. That’s a necessary precursor to the SH09 earning its final type certificate, which the company expects to happen in 2019.

**A Concept for Today’s Market**

There was never a doubt that Stucki’s initial vision of a full cabin-class helicopter powered by a single turbine engine would have strong appeal in the market. The SH09 offers significantly more cabin space and flexibility than its single-engine Bell 407 and Airbus H125 competition — as well as more cabin space than the twin-engine Airbus H135 and comparable cabin space to the larger, pricier H145.

“We’re able to offer a helicopter with a cabin that’s as big as or bigger than the H145 at a price close to the H125 and the 407,” says Larry Roberts, a longtime U.S. helicopter sales executive with both Airbus and Bell whom Löwenstein hired in late 2017 to lead Kopter’s sales efforts in North America. “Twin-engine cabin and performance for single-engine acquisition and operating costs is a very, very attractive offering, we think.”

The combination of the SH09’s lightweight, all-composite monocoque body — which borrows heavily from the world of Formula 1 racing — and a powerful HTS900 engine from...
Honeywell capable of delivering 1,020-shaft-horsepower should give the SH09 excellent hot-and-high performance characteristics. That seems befitting for a helicopter whose originator, Stucki, actually flew medical rescue missions in the Swiss Alps.

And when it’s not tasked with flying in especially high altitudes, that combination of lightweight construction and a powerful engine will give the SH09 a significant advantage over the competition in terms of internal or external carrying capacity and range.

Assuming the production version meets its design goal of an empty weight of 1,300 kg (2,866 lb) — each of the four test vehicles has been overweight, but sequentially less so — the SH09 will be capable of carrying passengers, equipment, and cargo with a combined weight that slightly exceeds the aircraft itself. It’ll also be a fast helicopter, capable of cruising at speeds of up to 140 knots with a full load.

Those operating characteristics and its low purchase and operating costs versus its twin-engine competitors make the SH09 ideal for the North American helicopter air ambulance (HAA) market, Löwenstein says.

European rules require HAA helicopters to have two engines. But no such requirement exists in the United States, where helicopter air ambulances typically are asked to carry heavier loads and fly greater distances to and from hospitals than their European counterparts.
Technology plays a big part in the SH09’s competitive advantage. “It’s not only because of the engine,” Löwenstein explains. “When you compare the layouts of the competing aircraft you are comparing a 1974 Chevrolet with a 2018 Chevrolet. With the 2018 model you are using much lighter, but just-as-strong or stronger composite materials rather than steel and aluminum. That means you can use that weight savings to have a much larger passenger compartment.

“And greater cabin size means a much more capable mission envelope,” says Roberts. It can carry up to seven passengers in transport or sightseeing configuration. It can be a spacious executive transport. And in the EMS role you can add a second patient, if your litter configuration will allow it. Or you can put more medical equipment and/or a second medical person onboard.”

In addition to the SH09’s mission-stretching power and range, its economics hold the potential of changing the HAA helicopter business. With operating costs roughly 35 percent lower than twin-engine helicopters commonly used by HAA operators — not to mention its lower purchase price (2019 list price of $3.34 million), the SH09 quite literally could turn struggling HAA operations into profit-makers.

“Currently most U.S. [HAA] companies need to handle 35 to 40 flights per month just to cover their expenses on the helicopter,” Roberts says. “But our helicopter’s lower acquisition and operating costs will mean that their breakeven number on missions flown each month will be much lower.”

The SH09 will come standard with a glass cockpit that features enhanced graphics, integrated navigation equipment that give it full IFR (instrument flight rules) capability, and a two-channel FADEC and four-axis autopilot that will expand mission capability, says Roberts. “With all the capacity, power, range, and technology that our helicopter will bring to the market, EMS operators will be able to accept more missions that they probably would have had to turn down previously.”

The Waiting Is the Hardest Part

Roberts admits to some impatience because he “can’t put anybody in one of our machines yet. But I do think that we’ve already got 31 to 35 [North American customers] who I’m pretty sure will want this helicopter.”

Yet those North American customers may have to wait until 2021 or so to actually take delivery of a SH09.

Nearly a year away from its expected first delivery, Kopter already has 63 firm orders on its books, plus around 100 letters of intent (LOI) from customers who’ve ponied up little or no cash, but who are keenly interested in getting their hands on the aircraft. Based on his experience and analysis of the global and regional economies, Löwenstein expects about 70 of those LOIs to turn into firm orders.

“We’re getting very close to selling out our first three years of production capacity,” he says. But, he adds, Kopter is keeping production goals for its first couple of years “reasonable and cautious” as its Swiss production team gains experience.

Löwenstein says Kopter’s “Swissness” will be a key feature of the aircraft. Kopter is banking that the international aviation industry will find attractive the Swiss reputation for manufacturing precision, exacting engineering, operational reliability, and acute attention to detail. These qualities will undergird Kopter’s operations, beginning with its expectations for its suppliers and going all the way through production and final assembly. Indeed, even after Kopter opens final assembly lines in other parts of the world, Löwenstein expects the company to build most of its helicopters’ major dynamic subsystems and components in Switzerland before shipping them out to those assembly lines.

But because of the Swiss facility’s limited capacity and its distance from what the company expects to be its biggest markets, by year four of full production, Löwenstein expects Kopter to be turning out more than 100 aircraft a year from at least two final assembly lines, one in Switzerland and, most likely, one in the United States. In fact, one of Roberts’s responsibilities is scouting out U.S. locations where there already is the kind of helicopter culture that Kopter wants. The Dallas–Fort Worth area, home to both Bell and Airbus North America engineering, sales, and headquarters staffs, is a leading candidate, though Roberts also is scouting potential locations in Florida and New England.

“We will start delivering to our community of launch customers here in Switzerland and in Europe, which are highly stable helicopter operations.
with stable operating environments, out of our facility here in Switzerland. These operators will help us introduce our helicopter into the market in a stable and effective manner,” says Löwenstein. “But I do expect to be among the top three producers of helicopters in the SH09’s class within 10 years, so we will be ramping up rapidly after that.”

Demand in that market segment, Löwenstein says, “is strongly correlated to world economy. And we expect the economy to be strong.”

Looking Ahead (Just a Little)
Kopter foresees very strong demand for the SH09 among operators now flying competing aircraft designed 25 or more years ago. Those models, Löwenstein says, are reaching the end of their design life cycles. As a result, modern designs, like the SH09, will bring highly sought and much-needed new technologies, new materials, and lower operating costs to the market.

The Kopter SH09, he says, will benefit from being both the first clean-sheet design in its class in a quarter century and the first all-composite helicopter in that same class.

“The single-engine market is aging badly,” he says. “There will be significant replacement need. And I’m quite convinced now that we have growth driving the market, particularly in the single-engine market, around the world.”

The SH09’s expected success, Löwenstein hinted, likely will lead to a second new aircraft from Kopter sometime in the next decade. He won’t talk about specific plans but coyly talks about how “when you bring in a team of young and talented engineers, you will not leave them idle.”

For now, though, those engineers and Löwenstein’s management team are focused on reacting quickly to any new problems uncovered by the flight-test program. “Our engineering team is now mature enough to face the unforeseen event. That wasn’t always the case. And it makes me feel now that we can achieve in 2019 what we’ve promised” — delivery of a certified aircraft.

“Our rotor system has been turning for more than 500 hours now,” he added. “We have been doing lots of validation of major parts of the flight envelope. And we have had no indication that we will have to face any more major issues. But if we do, I believe we are prepared to handle it very well.”

Dan Reed is an award-winning journalist who has covered the airline industry, aircraft manufacturing, aviation, aviation safety, and related fields for 29 years, first for the Fort Worth Star-Telegram and then for USA Today, where he also served as Texas bureau chief. Now a freelance writer and communications consultant, Dan and his wife are the parents of three adult sons. They live in Fort Worth with Bella, a relentlessly energetic 93-pound Labrador Retriever.

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Learning to Fly Drones

Stories and photos by Mark Bennett and PJ Barbour
It’s an exciting time in drone aviation. This is an industry making it up on the fly, figuring out basic questions about maintenance, operations, and training — just as a previous generation did with helicopters.

Among the many questions to be answered about using drones in your aviation business is this: how do we start?

If you haven’t already launched your first drone, here’s a look at some people who have and who are figuring out some of the basics of drone training.
Elizabeth Rohe and Jessica Bautista use drones as a story/image/video collection tool in their work as digital journalists for the town of Gilbert, Arizona, southeast of Phoenix.

The two had limited aviation experience: Bautista had flown her husband’s drone, and Rohe had flown a co-worker’s.

Both are hard-working, Type A students, so they took studying for the Part 107 exam seriously. They enrolled in an online course, studied together for a few weeks, and each passed much above minima.

The two recommend building flight time as the best way to learn more about flying drones. “The more I go out and fly, the more comfortable I get,” says Rohe. “You’ll encounter other situations so you’re always learning.” In practice, they work as a two-person team — a remote pilot in command and a visual observer — which is not required by the FAA but is encouraged.

The two journalists stress that technology is not what drew them to drones. “We love using drones, not just because they allow a completely different perspective, but because that new perspective inspires us to push the envelope, creatively, when it comes to videography,” says Bautista.

They are members of a Facebook group, Amelia Droneheart, which promotes women in the UAS industry. As Dronehearts, they want to inspire other women to become part of this new wave of aviation.
MESA FIRE DEPARTMENT

Mesa, Arizona, is the third-largest city in the state and one of the first to add UAS to its fire department two-and-a-half years ago. The department’s three operators, all sworn firefighters, work with two drones and train with two others. They also plan to add two more operators in the near future.

Total investment for all four aircraft plus accessories was about $12,000, a tremendous savings compared to manned aircraft.

Deputy Chief Brian Kotsur explains, “We fly on search and rescue, commercial fires, inspections, preplanning for safety hazards, and water rescues.” This last mission can include not just feeding video to a ground station but might also involve dropping a personal flotation device to a person in trouble.

Training was obtained first through local trainer John Nunes. A more intensive course was later taught by Nunes in the Phoenix area but completed and certified through the University of North Florida’s Institute of Police Technology and Management. The training included 40 hours of classroom work and more than 25 hours of flight training, including mission-specific training.

The department conducts ongoing training as well. In 2017, it flew its UAS for 116 hours, three-quarters of which were training hours; responding to 14 incidents consumed 30 hours.

Kotsur tells of one incident when the drone made significant contributions to the department’s activities. “It was a large commercial fire where I was assisting the commander in the command post. The fire appeared to be extinguished but I was able — with the drone — to see that it was, instead, reigniting in a remote part of the building.”

Rather than packing up, the crews reengaged and were able to fully extinguish the blaze.
SCOTTSDALE SWAT TEAM

Scottsdale, Arizona, is considered a resort destination. Less so in the summer, when temperatures can climb to 120 °F, but a different kind of heat can be expected when someone threatens public safety — the police department’s SWAT unit. And where that unit goes, so go drones.

The Scottsdale PD SWAT unit has been flying drones since 2016 with six pilots, all sworn officers. They fly a range of missions, including crime scene investigation, accident reconstruction, and overwatch and SWAT missions.

The SWAT team uses a smaller drone (see photo below) to perform indoor reconnaissance. This drone is less reliant on GPS, which allows it to be flown indoors with a higher degree of accuracy, and even smaller drones, with obstacle avoidance sensors, are being considered. According to Sgt. Austen George, “Budgeting is the biggest limiting factor, but we would also like to get a larger drone that can carry both visual and FLIR cameras, with greater endurance.”

Flying a drone is harder than it may seem, even for seasoned pilots. For one, your frame of reference in relation to the aircraft will change, depending on the drone’s location and trajectory. Is it in front of you, heading away? Is it behind you, heading in your direction? This is very different from sitting in a cockpit, where you move with the aircraft.

Sgt. Austen George, with the Scottsdale PD, left and above, near, and Det. Paul Larsen suit up for SWAT duty, armed with not just sidearms but with drones.
CHALLENGER AEROSPACE

Challenger Aerospace of Reno and Las Vegas, Nevada, employs not just a larger drone, compared to most, but a level of training not common in the industry — intensive, multiple-day, hands-on training with a hexacopter that spans 7 feet. The training course as laid out by the Chinese manufacturer of the drone runs eight days, but the training is exclusively hands-on — the manufacturer provided no documentation.

Although the FAA considers drones to be aircraft, one way in which they differ from conventional aircraft is that when you unwrap your brand-new drone, it most likely will not be accompanied by the detailed manuals for operations and maintenance that accompanied your helicopter. This is one area where you will want to leverage your previous aviation experience to fill in the gaps.

Challenger now is designing and manufacturing multirotor drones as large as 12 feet across, with up to eight rotors. Unlike the imported multirotor aircraft, Challenger’s indigenous systems will include full documentation and training materials, and the company intends to address an area they see lacking: mission-specific training.

To satisfy that need, Challenger will be opening a 5.5-acre facility adjacent to their 12,000-square-foot manufacturing space outside Las Vegas, allowing them to build, test, and train in one location.

Mark Bennett worked for McDonnell Douglas Helicopter/Boeing for a decade, then in 1999 cofounded an aerospace-only marketing agency. With nearly 30 years of photography and design experience serving the aerospace and defense industries, he founded AeroMark Images to shoot and write for both industry and media. You can contact him at mark@aeromarkimages.com.
Video producers like myself are always looking for new ways to improve our skill sets. This could be learning a new software tool or discovering a new way to capture video. Using unmanned aerial systems (UAS), or drones, to capture video required both. As someone with no other pilot certifications, earning my Part 107 certification was an eye-opening process that is already paying off.

When drones first started coming onto the market, I was intrigued. But their price and size kept me from being really interested. Now there are drones for professional use that can shoot 4K video, can be held in one hand, and can be programmed to make movements that could never be done with a flight joystick. The applications for my line of work were too good to pass up.

OK, I Get It
In January 2018 I bought my first drone: a DJI Mavic Air. As a recreational drone pilot, I felt it was my duty to learn some basic rules so I didn’t hurt anyone or get into trouble. So I read my manual and did some research — thanks, Google! — to find out what I could and couldn’t do, and where I could and couldn’t fly. My research told me that I should never fly above 400 feet, and I should never fly within 5 miles of an airport.

Because I live in the Washington, D.C., area, my drone flights were severely restricted. There is a 15-mile ring around the city where no drone flights are permitted without FAA authorization. Even if you are outside that zone, there are three major airports in the metropolitan area, as well as several military bases and general aviation airports.

I hadn’t really had a chance to see what my drone could do until I decided to bring it on a Caribbean island vacation. I was absolutely blown away by the footage I was able to capture with this drone. NOW I was hooked.

As a video producer, having a drone is a game changer. Places I never dreamed of getting shots from (unless I was renting a helicopter and working on a Hollywood film) were now accessible to me ... with a drone that cost less than $1,000 ... that I could pack in my carry-on luggage.

Now that I was a drone convert, I wanted to be able to use my drone for commercial shooting. Again, I knew that I had to do the right thing and become a certified drone pilot if I wanted to use my drone commercially. (Working for an aviation association, I knew that I needed to take FAA regulations seriously). An FAA Part 107 certification would enable me to turn my hobby into a tool for my career.
### First-Time Pilots

**Eligibility**
- Be at least 16 years old
- Be able to read, speak, write, and understand English (exceptions may be made if the person is unable to meet one of these requirements for a medical reason, such as hearing impairment)
- Be in a physical and mental condition to safely operate a small UAS
- Pass the initial aeronautical knowledge exam at an FAA-approved knowledge testing center

**Remote Pilot Certificate Requirements**
- Must be easily accessible by the remote pilot during all UAS operations
- Valid for two years – certificate holders must pass a recurrent knowledge test every two years

**Application Process**
- Schedule an appointment with an FAA Knowledge Testing Center (KTC), which administer initial and recurrent FAA knowledge exams
- Pass the initial aeronautical knowledge test
- Apply for a remote pilot certificate by completing FAA Form 8710-13, FAA Airman Certificate and/or Rating Application, using the electronic FAA Integrated Airman Certificate and/or Rating Application system (IACRA)
- When an applicant has completed the Transportation Security Administration security background check, a confirmation email will be sent with instructions for printing a copy of the temporary remote pilot certificate from IACRA
- A permanent remote pilot certificate will be sent via mail once all other FAA internal processing is complete

### Existing Pilots

**Eligibility**
- Must hold a pilot certificate issued under 14 CFR Part 61
- Must have completed a flight review within the previous 24 months

**Remote Pilot Certificate Requirements**
- Must be easily accessible by the remote pilot during all UAS operations
- Valid for two years – certificate holders must pass either a recurrent online training course OR recurrent knowledge test every two years

**Application Process**
- Complete the FAA online training course ALC-451: Part 107 small Unmanned Aircraft Systems (sUAS)
- Apply for a remote pilot certificate by completing FAA Form 8710-13, FAA Airman Certificate and/or Rating Application, using the electronic FAA Integrated Airman Certificate and/or Rating Application system (IACRA)
- Present for signature the completed FAA Form 8710-13, along with a photo ID, proof of a current flight review, and the online course completion certificate or knowledge test report, to a Flight Standards District Office (FSDO) representative, an FAA designated pilot examiner (DPE), an airman certification representative (ACR), or an FAA-certificated flight instructor (CFI).
- The FSDO representative, DPE, or ACR will issue the applicant a temporary airman certificate (a CFI is not authorized to issue a temporary certificate but they can process applications for applicants who do not want a temporary certificate)
- A permanent remote pilot certificate will be sent via mail once all FAA internal processing is complete
The Part 107 Exam

Studying for and passing the FAA Part 107 exam was surprisingly simple, even for me. My first step was to download the FAA study guide (bit.ly/Part107StudyGuide), which included about 80 pages of information about basic aeronautical information, such as METARs, weather patterns, and airspace designations.

Even though I didn’t have any other pilot certifications, I already had an interest in aviation, which helped me when reviewing the study material. I learned a lot by watching air traffic using an app called FlightRadar24. A friend who is also a Part 107 pilot served as a mentor and helped me prepare for the test.

The test itself consisted of 60 multiple-choice questions. I took the test at a PSI Testing Center that was located at a small airport in southern Maryland. (You can find your closest testing center on the FAA website.) You have up to two hours to complete the test, but it only took me an hour.

For more information about the process of becoming a Part 107 pilot — whether you’re a first-time pilot like me, or an existing pilot — see figure 1. You can also get all the information you need by visiting bit.ly/Part107Pilot. For a current pilot, the process is pretty simple. Because you already know the aeronautical material, you basically have to learn the drone-specific information.

After spending a total of about 12 hours preparing for the test, which consisted of studying the FAA’s Remote Pilot – Small UAS Study Guide and taking a day-long course taught by an FAA-certified instructor, I’m happy to say that I passed on the first try.

I am now certified for the next 24 months, and I can fly commercially. I’m excited to see the opportunities this will open for both me and HAI. ⭐️

PJ Barbour is HAI’s video and multimedia producer.

The DJI Mavic Air is no larger than the magazine you are holding right now — but for about $1,000, I got a drone that shoots 4K video and fits in a carry-on.
Kills microbial growth in jet fuel and prevents fuel tank contamination

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Your tax-deductible donation will go to HFI programs that preserve and promote the rich heritage of vertical aviation and support the next generation of pilots and maintenance technicians.

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Questions? Contact Allison McKay, vice president, at allison.mckay@rotor.org or 703-302-8476.

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helicopterfoundation.org
Among the technological fantasies offered by science fiction, *Star Trek*’s holodeck is one of the most intriguing. The holodeck offered the Enterprise crew the chance to interact with a realistic 3D environment. This could be any place, for any purpose — training for a mission on an alien planet or, as a break from shipboard life, spending an afternoon hiking on a forest trail.

The 24th century, inhabited in fiction by Captain Picard and his crew, has arrived early. Science fiction is quickly becoming science fact, as virtual reality/augmented reality/mixed reality, or VR/AR/MR, is being adopted for a broad variety of commercial and personal uses.

If you think that VR/AR is solely a toy for gamers, think again. Yes, it’s a booming leisure activity — and it’s also a social and business phenomenon. Health care providers use it for diagnostics; the Pentagon for combat training; real estate agents to show off homes; and automobile makers to build virtual prototypes of new vehicles, to list only a few examples.

With the commercial aviation sector booming around the world, demand for AR smart glasses in the maintenance, repair, and overhaul (MRO) field is skyrocketing. Major MRO players, such as Air France Industries, Monarch Aircraft Engineering, Lufthansa Technik, and AAR, are adopting smart glasses as a way to help their maintenance technicians work faster, more efficiently, and well, smarter.

**The Future Is Now**

First, let’s clarify our definitions.

- **Virtual reality (VR)** refers to computer-simulated reality that’s an immersive experience for the user. Think video games.
- **Augmented reality (AR)** is a real-time view of an actual physical environment whose elements are supplemented by computer-generated sensory input such as

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*Vuzix M100 Smart Glasses are one of the most popular brands of smart glasses with aviation mechanics.*

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sound, video, or graphics. Many businesses already use AR for practical commercial applications.

- **Mixed reality (MR)** is the blending of virtual and augmented realities to produce new visual environments in which physical and digital objects co-exist and interact in real time. In this hybrid environment, synthetic content interacts with the real world, akin to the police monitors in the movie *Minority Report*.

Strictly speaking, much of the use of this technology in MRO actually represents a form of mixed reality, but many in the industry prefer to use the terms “AR” or “smart glass.”

In a recent white paper, Bank of America/Merrill Lynch Global Research predicts that VR/AR/MR is on track to have 300 million users by the early 2020s, with the potential to capture two-thirds of our leisure time and 50 percent of our leisure spending.

According to the research group Statista, smart AR glasses shipments were 150,000 in 2016. By 2022, that number is forecast to be around 22.8 million units. That’s a 15,200 percent jump in just six years. And that increase is also reflected in sales. Industry consulting firm Digi-Capital forecasts that annual revenue from VR/AR is on track to reach $108 billion by 2021, up from only $3.9 billion in 2016.

Prices for smart AR glasses vary. For business-oriented “enterprise” applications, a pair of AR glasses can cost anywhere from $1,500 to $2,500, depending on the features and functions. If you are thinking of incorporating smart glasses into your business, you should know that they typically need other equipment, such as a tablet or smartphone, to be used to their highest capabilities.

By 2021, one out of every 10 wearable devices will be smart glasses, according to Juniper Research. The number of US workers who use smart glasses is expected to grow from 400,000 in 2017 to more than 14 million by 2025.

**Using Smart Glasses in MRO**
Major smart glass brands most popular with aviation mechanics right now include Google Glass, Epson Moverio, and Vuzix M100. Paul Boris, chief operating officer at Vuzix, a leading supplier of VR/AR smart glasses says that AR-specific smart glasses are revolutionizing MRO for airplanes and helicopters.

Before joining Vuzix, Boris worked at GE Digital, creating “smart factories” for General Electric. That company is a global industrial colossus, so when it comes to disruptive technology — ground-breaking products that shake up an industry or create a completely new one — Boris knows what he’s talking about.

“Our M100 and M300 AR smart glasses are the devices that aviation mechanics, for both fixed-wing airplanes and rotorcraft, increasingly use throughout the enterprise,” Boris said. “AR smart glasses are transforming mechanic training as well as logbook entry. They also allow
operators to keep track of inventory and monitor the supply chain.”

With smart glasses, mechanics can input logbook data along with photos and video. This data becomes part of the record, providing additional context and information for supervisors. Seeing is believing, and smart glasses allow maintenance technicians to record what they see.

Smart glasses can do more than just record data. They also provide maintenance technicians with access to manuals and instructions, checklists, and training videos — without stepping a foot away from the aircraft. As hands-free devices, smart glasses enable mechanics to look up details in a manual while simultaneously working on the aircraft.

If a problem suddenly comes up and the mechanic needs help from a supervisor or co-worker right away, the traditional means of conference might be through, say, FaceTime on a smartphone. But that’s not secure and it’s not efficient.

“Now, with smart glasses, the mechanic can conduct this informational exchange with other parties much faster and converse with the data right in front of them,” Boris explained. “The experts they’re conferring with can literally look over the mechanic’s shoulder.”

Mechanics using smart glasses have an advantage when it comes to one of the biggest issues in aviation maintenance: paperwork. “Mechanics are stuck with a huge amount of spreadsheets, binders, and all kinds of paperwork,” says Boris. As an example, he cites aircraft maintenance logbook entries — the conventional way of making them, versus the smart glass way.

“A conventional logbook entry might contain a few cryptic words. But now mechanics can walk directly around and through the aircraft, wearing AR smart glasses, and input the data in real time from the physical location,” he says.

“Data and pictures are logged in simultaneously. Smart glasses allow proven proximity to the matter at hand. It makes for better compliance. These devices feature forward-facing cameras for better, more accurate data. If ever contested, the information is inarguable.”

Not Your Father’s Career
Aviation mechanics are the unsung heroes who keep aircraft and helicopters in the air. And there aren’t enough of them. Aircraft operators and MRO outfits are grappling with this shortage. It threatens safety as well as bottom lines.

Smart glasses are one of the latest solutions to address this shortage. They act as “force multipliers” that can enhance the productivity of individual mechanics.

Major MRO players, such as AFI KLM E&M, Monarch Aircraft Engineering, Lufthansa Technik, and AAR, are creating new aircraft mechanic courses that provide certification for MRO work. Familiarity with smart glasses is increasingly making its way onto
the curriculum.

Contrary to public misperception, aviation maintenance technicians aren’t just wrench turners. The job is complex and high tech; they require sophisticated computer skills and training. But many technical-minded youngsters don’t believe it. When contemplating careers, they listen instead to the siren song of Silicon Valley.

One strategy to recruit young AMTs is to emphasize the exciting technologies now transforming airplane and helicopter work, such as smart glasses.

“A lot of people, especially parents of kids getting ready for college, don’t fully realize that the MRO field is a high-tech profession,” says Richard Aboulafia, vice president of analysis at The Teal Group, an aerospace consultancy. “But being an MRO mechanic is a well-paying, secure, and respected job. There’s more to technology than Facebook. Aircraft operators are starting to market MRO openings as being prestigious.”

Aboulafia confirms that wearable technology is one of the hottest trends in airplane and helicopter maintenance. “More and more mechanics are using smart glasses and a watch, such as the Apple Watch, connected to a tablet,” he says.

“This interconnectivity gives MRO technicians the ability to receive enhanced, step-by-step instructions while out in the field. It makes it easier to multitask. Wearable devices in MRO gives technicians the advantage of viewing data and communicating this data via voice or video displays, all hands-free.”

Training itself has become quite futuristic. AFI KLM E&M designed a virtual learning web-based tool that allows students to study EASA qualifications anywhere and anytime. This tool is enhanced by the use of smart glasses.

New-generation helicopters require mechanics with technological savvy. Consequently, MRO schools are requiring more training in computer science. The importance of keeping current with new technologies is emphasized by AFI KLM E&M Director of Business Development and Sales Ian Bartholemew. “MROs must be a step ahead of the game, be ready to adapt to changes, and have well-structured training plans in place to allow technicians to be able to deal with future aircraft.

“This means having to plan five to 10 years ahead to ensure that we are not caught out by the change in aircraft,” Bartholemew says. “We plan to develop simulation tools and explore other new learning and teaching techniques, ensuring we are fully prepared for the next generation of aircraft and technicians and have the technology to support them.”

Yes, there’s a worldwide shortage of sufficiently trained mechanics. But the industry has the “vision,” so to speak, to meet the challenge head-on. 

John Persinos is managing editor of Personal Finance and chief investment strategist of Breakthrough Tech Profits. He is also an analyst at the Teal Group aerospace consultancy. Persinos has received numerous journalistic awards, including the Royal Aeronautical Society’s Aerospace Journalist of the Year Award in 2001 for his work as editor-in-chief of Rotor & Wing magazine. He served as editor-in-chief of Aviation Maintenance magazine and publisher of the website Aviation Today.com, and also attended the Bell Helicopter Training Academy. Contact him at johnpersinos5@gmail.com.
HAI Aids HEC Operators with FAA Exemptions

Following a months-long grounding of US-based human external cargo (HEC) helicopter operations because of certification issues, the first helicopter operator has received its FAA-approved exemption and will be able to resume operations shortly.

Due in part to efforts by HAI staff members, the FAA approved the exemption for Haverfield Aviation on July 13. The Pennsylvania-based company expects to resume HEC flight operations as soon as the appropriate changes are incorporated into its Part 133 Rotorcraft Load Combination Flight Manual and approved by its flight standards district office.

“HAI worked tirelessly on behalf of Haverfield Aviation to ensure the HEC exemption process was moving through the complex system of the FAA,” says Brian Parker, president and CEO of Haverfield.

“Chris Martino and Harold Summers [respectively, HAI’s VP of flight operations and its director of flight operations and technical services] were always available and kept Haverfield Aviation promptly updated. HAI certainly contributed to the successful approval of the waiver. Haverfield and its customers that rely on HEC are greatly appreciative of HAI’s assistance.”

The issue came to light earlier this year, when operators learned that the FAA was increasing its focus on compliance with the HEC requirements of 14 CFR Part 27 or 29. The agency had determined that the cargo hooks used for HEC operations were not certified for that use. The hooks, which have been used for decades in HEC operations, have never been implicated in any accident or incident.

Later in the spring, the FAA then requested all operators halt HEC operations until the companies complied or had received an exemption pending certification. The grounding affected operators using MD 500/Hughes 369 helicopters.

Haverfield’s exemption requires them to use an emergency anchor, or belly band, as a secondary safety device in case the cargo hook fails. The exemption also requires the operator to provide training on the use of the emergency anchor and to follow other best practices for HEC operations.

HAI became involved after being contacted by several member companies that had halted their HEC work at the request of the FAA. HAI began working to help resolve the issue while also calling for the operators to work sensibly and safely while waiting for the exemption process to proceed.

Haverfield joined 18 other operators in applying for an exemption. HAI stepped in as a neutral third party between the FAA and the operators, helping to facilitate discussion, address issues, and assist in resolving specific issues, including proper wording on applications for exemption. HAI also served as a central point of contact for the FAA and the operators.

“We served as a liaison, connecting the operators with the FAA. We understood that these companies needed to get back to work, but we also appreciate that we needed to find a solution that would keep everyone in compliance with FAA regs,” says Harold Summers. “We coordinated the communication between the industry and the FAA on a weekly, sometimes daily, basis to speed up and streamline the process.”

While several of the affected companies submitted requests for exemption, the FAA selected one application — Haverfield’s — that came closest to being complete. “Now that it’s approved, it will serve as a template for the other operators to use for their applications,” adds Summers. By modeling their exemption applications on Haverfield’s, other operators can receive summary approval by the FAA.

Founded in 1981 and an HAI Regular Member since 1994, Haverfield Aviation is a provider of aerial power line inspection, maintenance, repair, and construction support services for the North American electric utility industry.
April 24, 2017
Commercial helicopter operators are required to have a radio altimeter in accordance with 14 CFR Part 135.160, Radio Altimeters for Rotorcraft Operations.

October 24, 2018
Commercial helicopter operators who have been operating with an OPSPEC A160 deviation must be in compliance with 14 CFR Part 135.160, Radio Altimeters for Rotorcraft Operations.
Industry Experts Answer Your Questions
Hot Topics in Finance and Leasing
By Members of HAI’s Finance and Leasing Committee

Q Why are hourly-cost maintenance programs (HCMPs) often required when financing or leasing a helicopter?

An HCMP, often referred to as “paying by the hour,” is a program that allows operators to fulfill maintenance requirements, stay on top of costs, and reduce risks, regardless of whether the helicopter is financed or leased.

An operator enters an HCMP program with either the manufacturer or an independent entity and pays a flat hourly rate per flight hour to have a guaranteed percentage of all qualified scheduled and unscheduled maintenance costs covered. The client reports flight hours either monthly or at agreed-upon intervals and pays the subsequent flight-hour invoice while the HCMP covers the agreed-upon percentage of maintenance costs for the term.

Finance and leasing entities usually mandate HCMP programs because of the strategic and financial benefits to their customers and the overall reduced risk of the investment. In addition to streamlining the maintenance budget to a flat hourly rate per flight hour, HCMPs also maintain the residual value of the helicopter. Valuations of aircraft with HCMPs are higher than valuations of aircraft without them.

Furthermore, HCMPs also protect both operators and lenders/lessors from certain financial risks because the necessary funds for future maintenance are accrued in real time. In addition, the risk of qualified unscheduled failures is borne by the HCMP service provider, who may also assume the risk of some other variable costs, such as mandatory service bulletins and airworthiness directives.

The lending and leasing communities usually mandate the use of HCMPs to combat value loss and mitigate the financial risk of maintenance costs.

Kyle Sale is director of business development for Jet Support Services, Inc. (JSSI).

Q How are aircraft registration structures such as owner trusts used to facilitate financings of and investments in aircraft leasing companies?

Helicopter leasing companies and aircraft lenders and investors recognize the value of having aircraft on the US registry and are familiar with the benefits of using owner trusts. Even if aircraft are based outside the United States, N-registered aircraft generally maintain their value better than aircraft registered elsewhere, and when the leasing company is ready to dispose of the helicopter, it is already registered in the United States, where the market for aircraft sales is strong.

Also, lenders often prefer the US registry because of the well-established US judicial system and legal precedents regarding the enforcement of security interests. Finally, when managing fleets of aircraft, uniformity in registration avoids the need to keep track of and conform to different sets of rules.

Some leasing companies have foreign ownership or control issues and may use an owner trust to comply with the US registration requirements. For example, a leasing company may have more than 25 percent of its interests owned by non-US citizens or have a controlling party such as a president who is not a citizen. Leasing companies may prefer to use owner trusts for other reasons too, such as enabling easy transfers of beneficial interests to accommodate a future business restructuring.

Owner trusts are often integrated with complex finance structures for other reasons. A trust is sometimes used as a party to a lease or sublease, and they may be used to protect the interests of particular lenders or investors in the event of a default or as a conduit for payments.

Jeff Towers is vice president and general counsel at TVPX.
Q In contrast to four to five years ago, we no longer hear about big lending transactions in the helicopter space. Are lenders doing new helicopter deals?

True, there was a flurry of capital markets activity in 2013–14, as new helicopter lessors were formed. Then along came the downturn in the energy markets, with oil prices plummeting and, in at least a couple of cases, ensuing bankruptcies of helicopter operators. This had a clear impact on lessors with exposure in the offshore market.

On the supply side, the current market is “issuer friendly” — that is, there is a significant supply of capital chasing all sorts of deals. However, helicopters have never had universal appeal, so this supply of capital does not uniformly impact all helicopters. Additionally, the supply of capital is far from monolithic. In fact, it’s more of a patchwork: large and small banks, nonbank lenders, other yield-driven capital pools, and a full range of appetites beyond.

On the demand side, helicopter transactions involving air medical, law enforcement, or onshore utility operations that utilize light-single, twin, and possibly medium helicopters are finding receptive capital markets. Credit quality continues to be an issue, however, and this is why we need lessors. Many operators need operating leases as they build their businesses, one contract at a time.

As long as lenders are willing to provide capital to lessors, and lessors can get returns attractive enough to keep equity investors interested, I predict the following: (1) Lease rates will have to adjust to the new reality of residual values, which for the most part were overstated versus current market values; and (2) The resulting increase in lease rate factors and, most likely, monthly payments will continue to bring needed capital into the market.

Clearly, operators need to be able to make money and to service higher lease rates with existing cash flows. This will likely contribute to helicopters remaining an inflationary asset class, as it has historically been. In the short run, this should be good for the OEMs, but there is no way for the capital markets to address the underbanked or unbanked segments of the market if lessors cannot profitably serve them.

Owners are supposed to be compensated for the risk of ownership. It would appear that the expected return was overestimated and the downside risk was underestimated. Stay tuned!

Joe Hawke is chief executive officer of Uniflight Global.
Visit the American Helicopter Museum and Education Center

By Martin J. Pociask

A visit to the American Helicopter Museum and Education Center (AHMEC) is a voyage back to a time when helicopter pioneers bravely tested the possibilities and limits of these machines. Located in West Chester, Pennsylvania, the museum is a fitting attraction for an area considered by many to be the one of the incubators of rotary-wing aviation in the United States (see the box on p. 49 to learn more about early rotary-wing aviation in the greater Philadelphia area).

From Idea to Reality
The AHMEC began as a simple wish: to commemorate the innovation and hard work of aviation pioneers from Pennsylvania’s Delaware Valley. In 1993, as the American Helicopter Society’s Philadelphia chapter celebrated its 50th anniversary, it charged a committee with establishing a lasting tribute to the local men and women who pioneered the development of rotary-wing aircraft. Many ideas were considered, such as a memorial or historical walk.

The committee decided to open a helicopter museum. Their decision was fueled in part by a pledge by Peter Wright, Sr., president of Keystone Helicopters, to donate three vintage aircraft to the fledgling museum. A major figure in the development of the commercial helicopter industry (and veteran of the storied Flying Tigers, a group of US pilots who volunteered to fly for China against Japanese forces in World War II), Wright was instrumental in establishing the museum.

On October 25, 1993, the AHMEC was incorporated as a nonprofit 501(c)(3) organization. Work began under Wright’s leadership, who took on the role of chairman of the board, and a dedicated team of volunteers. The initial goals of the museum were to: preserve the heritage of rotary-wing flight, halt the loss of artifacts significant to its founding and development, and recognize its contributions to society.

After an extensive search for the right location, the fledgling museum’s board rented an 18,000-square-foot vacant hangar at the Brandywine Airport (KOQN) in West Chester, Pennsylvania. The hangar had previously been a production facility for Messerschmitt-Bolkow-Blohm
Educators and volunteers developed the initial exhibit content and renovated parts of the hangar to create a museum space.

Additional financial support from individuals and corporations helped make the idea a reality. Membership grew to 800 founding members, and in just three years, on October 18, 1996, the AHMEC opened to the public.

In 2003, Frank Robinson, founder and president of Robinson Helicopters, made a generous contribution of $1 million to the museum, enabling the acquisition of the Brandywine facility as its permanent home.

Educating Society about Helicopters

Following through on his pledge, Wright donated a Piasecki HUP-2 Retriever helicopter as the museum’s first acquisition. Volunteers from Boeing (the original manufacturer, Piasecki Helicopter Corporation, had been acquired by Boeing) donated thousands of hours to restore it. The National Air and Space Museum provided a Piasecki PV-3, Bell Model 30, and Sikorsky XR4 on long-term loan.

Today, the museum features 32 civilian and military aircraft on display, both inside the museum and its grounds (see a list of the AHMEC aircraft collection on page 50). In addition to helicopters, the museum’s collection includes autogyros and convertiplanes.

Accompanying each ship on display is a description of that model, its technical specifications, and some explanation of how it was used or why it is significant. Some displays include video screens showing the aircraft in flight.

The museum relies on the work of its dedicated volunteers, who have contributed thousands of hours to the museum, enabling it to operate on a daily basis. They do everything from operating the facility, serving as docents (museum tour guides), and building and maintaining exhibits, to restoring aircraft and performing research. Many volunteers have experience flying, designing, or working on rotary-winged aircraft, and their work at AHMEC is a labor of love.

Facility features include an exhibit hall, classrooms, conference room, and a children’s play area. A restoration area contains the shop facilities needed to restore acquired aircraft to display condition. A Sikorsky R-6 is currently being restored by volunteers; next in line are a Kaman HH-2 and a Piasecki HRP-1.

For many years, the AHMEC held Rotorfest, a two-day air show and open house that drew thousands of visitors. Today, it often holds helicopter-themed events for aviation enthusiasts in the local community, such as a Father’s Day event, World Helicopter Day, and an annual fundraising gala.

The museum also hosts other special events, such as a family reunion and commemoration for the family of Harold Pitcairn, an aviation pioneer from the area who invented the autogyro and held a number of patents important in rotary-wing aviation.
"Stubby," a traveling educational helicopter (a Hughes 269A/TH-55A Osage) is the museum’s mascot and ambassador at schools, camps, and community events, such as the annual West Chester Christmas Parade and the Philadelphia Science Festival. Acquired in 1998 by the museum, Stubby is a nonflying interactive helicopter. Students can sit in the cockpit and operate the controls while docents teach the fundamentals of helicopter flight. The museum’s other traveling helicopter is the Cheerful Chopper, a Hughes 369 OH 6-OH 6A Cayuse.

Inspiring the Next Generation
Since its founding, the AHMEC’s mission has enlarged to include inspiring the next generation of engineers, scientists, innovators, pilots, mechanics, and inventors. The museum’s education programs for children in grades pre-K through 12 reach thousands of students every year, both at the museum and at locations in the community.

A field-trip destination for many Philadelphia-area schoolchildren, AHMEC has been voted Best Scientific Outing for Kids by Aviation History, Best Science Museum for Children by Philadelphia, and Best Educational Outing by Main Line Today. Who knows how many aviation careers started there?

AMHEC aviation education programs include:

- **Helicopter Hunt** – An interactive scavenger hunt to help children in grades pre-K–1 learn what a helicopter is and what it can do
- **Amazing Air!** – In this interactive workshop, children in grades 1–3 learn about air and how it contributes to flight
- **What a Drag: The Forces of Flight** – A workshop for grades 3 through 6 that demonstrates through experiments and activities how the four forces of weight, drag, lift, and thrust affect flying objects
- **Helicopter Ground School** – Young adults in grades 6–10 are introduced to helicopter controls and then experience what it feels like to be in the pilot’s seat
- **Helicopter Aerodynamics** –
Students in grades 11–12 investigate the characteristics of flight, including torque, gyroscopic progression, lift characteristics, and autorotation.

- **Vertical Flight: Yesterday, Today, and Tomorrow** – A program for high school students that can also be tailored for adults examines the history of helicopter development, present-day aircraft, helicopter pilot training, and future developments in the industry.

The museum has been recognized for its many education programs for children, such as Girls in Science and Technology (GIST), a collaborative effort developed by AHMEC and the Girl Scouts of Eastern Pennsylvania. In this fun, hands-on program, girls engage in classes in science, technology, engineering, and mathematics (STEM). Other AMHEC programs for children include an after-school program, workshops on topics such as robotics, and Science Saturdays.

---

**Delaware Valley, Pennsylvania: A Center of Rotary-Wing Innovation**

Although Igor Sikorsky was headquartered in Connecticut, many trailblazers in rotary-wing aviation lived and worked in the greater Philadelphia metropolitan area. Among the many vertical-lift pioneers who called the region home were:

- Gerard P. Herrick
- Drago K. Jovanovich
- Wallace and Rod Kellett
- Bartram Kelly
- Frank Koziolksi
- Haig Kurkjian
- Lawrence LePage
- Ralph McClarren
- Frank N. Piasecki
- Harold F. Pitcairn
- Haviland H. Platt
- E. Burke Wilford
- Arthur M. Young

The area was, and is, home to many pioneering aviation companies:

- Boeing Company (Ridley Township)
- Burk Wilford (Essington)
- Drago Jovanovich (Philadelphia)
- Kellett Autogiro Company (Upper Darby)
- Keystone Helicopter Corporation (Malvern)
- Leonardo/AgustaWestland (Philadelphia)
- Lockheed-Martin/Sikorsky Global Helicopters (Coatesville)
- Piasecki Aircraft Corporation (Essington)
- Piasecki-Vertol (Morton)
- Piasecki-Vertol Engineering Forum (Sharon Hill)
- Pitcairn Cierva (Willow Grove)
- Platt-LePage (Eddystone)
Preserving the History

In addition to the aircraft, the museum offers visitors other glimpses into the history and importance of rotary-wing flight. Its state-of-the-art theater shows historic footage related to the helicopter industry, and rotorcraft toys and models are displayed along the museum’s walls.

As the AHMEC grew its collection of papers and objects related to vertical flight, the Renzo Pierpaoli Memorial Research Library was established. It contains more than 12,000 documents, artifacts, films, and memoirs about the founding and evolution of the helicopter that visitors and members can access. Archives volunteer Larry Barrett serves as historian and museum curator, cataloging its many files.

Among the library’s holdings are some that have a special relationship with Helicopter Foundation International (HFI). The John Slattery Collection comprises 16 file cabinets containing photos, books, and other historical documents of the helicopter industry. A helicopter pilot, Twirly Bird member, and historian, Slattery founded HFI and served as its curator.

The foundation donated the collection he assembled over 50 years in the industry to AHMEC in spring 2003. Barrett and a group of volunteers have spent several years scanning, digitizing, and indexing the contents of the collection. The process is ongoing.

Visit the History of Our Industry

Today, more than 35,000 adults and children, from both the United States and abroad, visit the museum annually to learn about the history of rotorcraft aviation. If you — or someone you love — is a fan of these aircraft, then plan a visit to the American Helicopter Museum and Education Center. You won’t be disappointed.

The AHMEC Rotorcraft Collection

**Interior Display Models**
- AeroVelo Atlas
- Air Command Commander Sport
- Bell 47B
- Bell 47D-1/H-13D Sioux (M*A*S*H helicopter)
- Bell 47H
- Bell 204
- Bell 206A JetRanger
- Bell AH-1 Cobra
- Bensen B-7W Hydro-Gyroglider
- Bensen Gyro-Copter B-8M
- Boeing-Vertol CH-46E Sea Knight
- Boeing HH-47 CSAR-X mock-up
- Enstrom F-28A
- Galaxie XRG-65 Glatieopter
- Gyrodyne QH-50C (Drone)
- DSN 3
- Hughes 269A/TH-55A Osage

**Exterior Display Models**
- Hughes 369 (OH-6/OH 6A) Cayuse, aka Cheerful Chopper
- McCulloch J-2 Gyroplane
- Parsons Super Mac II
- Piasecki PV-14/HUP-2 Retriever
- Princeton GEM X-2 Air Scooter
- Robinson R22
- RotorWay Scorpion
- Sikorsky S-51/R-5
- Sikorsky S-52/H05S
- Sikorsky UH-34D Seahorse
- Sud-Ouest SO-1221 Djinn

Two RotorWay Scorpions with the Hughes 369 (OH-6/OH 6A) Cayuse, aka the Cheerful Chopper, one of the two helicopters in the AHMEC collection that travels to outside events.
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Your Mission, Our Mission: KEEP THE ROTORS TURNING
What Can We Learn from an Accident?

Accident Recovery: Direct-to Disaster

By David Jack Kenny

After an accident, it’s usually clear that someone made a mistake ... often more than one “someone.” The official investigation, reconstruction, and analysis by the National Transportation Safety Board (NTSB) is less concerned with apportioning blame than identifying those points at which different decisions might have interrupted the resulting sequence of events. Even so, experts can and do draw different conclusions about the relative importance of actions taken by the drama’s various actors.

The October 15, 2008, destruction of a Bell 222 air ambulance was notable in several respects. Its collision with a brightly lit radio tower on a clear night appears to be an early example of the dangers of substituting GPS-direct navigation for systematic flight planning. The accident led the then–vice chairman of the NTSB to issue a rare written dissent from the agency’s finding of probable cause. And the deaths of the pilot, flight nurse, paramedic, and 14-month-old patient intensified public scrutiny of the hazards of helicopter air ambulance (HAA) operations, especially in low visibility or at night.

The Flight
At 9:12 p.m., the Valley West Hospital in Sandwich, Illinois, requested a helicopter transport. The call was relayed through the dispatch center operated by Reach Air Medical Services in Santa Rosa, California. Reach’s local operator, Air Angels, Inc., accepted the flight immediately. However, departure was delayed by difficulties in determining which hospital could take the patient. The ship lifted off from the Air Angels base at Clow International Airport in Bolingbrook at 10:54 p.m., arriving at the Valley West helipad at 11:11.

At 11:38, prior to departing Valley West, the pilot called Reach Air Medical Services dispatch with the information required by company protocol, including the helicopter’s takeoff weight and center of gravity, an initial heading of 080 degrees, and an estimated flight time of 18 minutes for the 38-mile trip to Children’s Memorial Hospital in Chicago. Fuel supply was given as 1.5 hours. The exact time of liftoff was not reported but appears to have been about 11:49 p.m.

At 11:55, the pilot contacted DuPage Airport (KDPA), a Class D field with a 24-hour tower underlying the outer ring of Chicago O’Hare’s Class B complex. He gave his position as “over Aurora” at an altitude of 1,400 feet mean sea level (msl), or about 640 feet above the ground, and requested transit through KDPA’s airspace. The controller granted clearance but, because the flight was operating under visual flight rules (VFR), did not provide course guidance or obstacle warnings.

Radar track data showed the helicopter maintaining a straight-line course on a magnetic heading of 072 degrees, the direct route from West Valley to Children’s Memorial, at a constant altitude of 1,300 feet msl. The track ended abruptly at 11:58:25 p.m. at the site of a 734-foot radio tower. First responders found that the helicopter had struck the west side of the aerial about 50 feet below its top, crashed into a field, and caught fire.

Skies were clear, and the DuPage and Aurora airports reported 9 to 10 miles visibility. Surveillance footage showed that the tower’s two sets of high-intensity strobe lights were working before the collision.

Equipment, Personnel, and Procedures
Two months after Air Angels acquired the Bell 222 in 1999, they fitted it with a Garmin GNS 430 combination GPS and nav/comm radio. The unit had received a software update in January 2008, and its Jeppesen aviation database was last updated on June 1 of that year. The GPS was not certified for use under instrument flight rules (IFR). While its database included terrain and obstacle information, the software to display this had never been installed. Air
Angels’ director of flight operations (DFO) confirmed that their pilots relied on the 430 as their primary navigation source.

The helicopter was also equipped with an autopilot capable of holding headings and altitudes. Typical practice was to fly at 1,500 feet msl in the daytime and 1,500 to 1,700 feet at night, 700 to 900 feet above typical terrain elevations in the Chicago area, at 125 to 130 knots. The DFO recalled that the accident pilot’s most recent line check had been interrupted by a patient call, which he’d handled according to the company’s operations manual. He’d used the autopilot during the en route portion of the flight.

The 69-year-old pilot had flown helicopters in Vietnam. According to his ex-wife, he’d been shot down seven times, and as a result, “most situations did not cause him much stress.” After leaving active duty, he’d continued to serve in the U.S. Army Reserve but apparently in a nonflying capacity.

His civilian career as a professional pilot had begun in 2004. He held a commercial certificate with an instrument-helicopter rating and private pilot privileges for single-engine airplanes, and had renewed his second-class medical certificate the previous January. Nearly 3,200 of his 3,565 hours of total flight time were in helicopters. The DFO, a former U.S. Army OH-58 pilot, described him as “very reliable and conscientious” and said he “flew his landing approaches in a slow and meticulous manner.”

The NTSB’s factual report lays considerable stress on the fact that the aircraft did not have a terrain awareness and warning system (TAWS). Two and a half years earlier, the Board had recommended that the FAA require all HAA operators to outfit their aircraft with TAWS; the FAA initially responded by emphasizing preflight planning but also developed technical specifications for helicopter TAWS systems. 14 CFR 135.605, requiring installation and training in the use of approved TAWS equipment by all HAA operators, eventually took effect on April 24, 2017.

However, the report also acknowledges that the radio tower “was depicted on the Chicago Aeronautical Sectional Chart, the Chicago Visual Flight Rules Terminal Area Chart, the Chicago Helicopter Route Chart, and as an obstruction on the air traffic controller’s radar display.” It was widely known as the tallest structure in the vicinity of Air Angels’ base. As noted earlier, there was no apparent impediment to seeing its two sets of high-intensity strobes.

ATC’s Responsibility
Radarc coverage in the KDPA tower was provided by live feeds from O’Hare’s approach surveillance radar, which depicts the radio tower. The accident flight’s track, cited earlier, showed it flying directly toward that tower, whose location and height were also on the list of local landmarks and hazards that KDPA controllers were required to memorize during training.

The NTSB’s finding of probable

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cause included “the … controller’s failure to issue a safety alert” as a contributing factor. It cited paragraph 2-1-6 of FAA Order 7110.65, which requires ATC to “issue a safety alert to an aircraft if you are aware the aircraft is in a position/altitude which, in your judgment, places it in unsafe proximity to terrain, obstructions, or other aircraft.” The order also acknowledges that “it is virtually impossible to develop a standard list of duty priorities that would apply uniformly to every conceivable situation.”

A contrarian viewpoint might note the pilot’s clear interest in avoiding a well-lighted hazard that was shown on all relevant aviation charts and was also familiar to him from more than two years of low-altitude HAA flights in that area.

Why?
Though we’ll never be certain why this accident happened, one possible clue emerged from the investigators’ interviews with the Air Angels’ DFO. He described the helipad at Children’s Memorial as “not optimal” thanks to a tall steeple near its northeast corner and an elevator shaft on its north side. The pad itself is 13 stories up and so small that a helicopter as big as the Bell 222 must perch with its tail boom hanging over the edge. The pilot wasn’t familiar with the site, and during an interview with the NTSB, the DFO speculated that “at some point” he would have looked it up in the Illinois Hospital Heliport Directory.

“Might the pilot have engaged the autopilot long enough for a quick review of the landing site in the heliport directory? It’s certainly not impossible — and could explain why he was seemingly heads-down during a VFR flight at night.

Differing Opinions
NTSB Vice Chairman Christopher Hart, himself a pilot and former FAA safety official, vigorously disagreed with the majority’s finding that “the controller’s failure to issue a safety alert as required” contributed to the accident. His three-page written dissent stressed that “for VFR pilots, seeing and avoiding obstacles is solely and exclusively the responsibility of the pilot in command … with no exceptions.” Hart also noted internal ambiguities that made the cited FAA order “not particularly compelling in this instance.”

Greater pilot complacency and reduced willingness of controllers to provide services to VFR traffic could also be unintended consequences of any suggestion that controllers share responsibility for obstacle clearance under visual flight rules.

The Takeaway
From the original gyroscopic attitude instruments through GPS, the Wide Area Augmentation System (WAAS), and ADS-B, technological advances have improved safety while expanding capabilities … but they have also created new failure modes, both human and mechanical. Autopilots make single-pilot IFR possible in helicopters but with the attendant risks of misprogramming, instrument or processor malfunction, or simple inattention. The incredible precision of GPS navigation raises concerns about increased collision risk, especially over busy waypoints.

No one has more at stake in managing these trade-offs than pilots, who are the first to pay the price for any errors, whether their own or someone else’s. They — and their employers — might benefit from healthy skepticism about the safeguards they think they’ve bought.

David Jack Kenny is a fixed-wing ATP with commercial privileges for helicopter. He also holds degrees in statistics from Stanford and the George Washington University. From 2008 through 2017, he served as the statistician for AOPA’s Air Safety Institute, where he authored eight editions of its Joseph T. Nall Report, multiple other research findings, and nearly 500 articles for popular audiences. He’d rather be flying.

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Autumn Marie Cabaniss
Caldwell, New Jersey, USA
Current Job: Pilot/charter manager at Zip Aviation in New York City
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Favorite Helicopter: Bell 407 GXP

Q Your current role?
A In addition to being a pilot, I manage aircraft scheduling, plan routes, and ensure FAR/GOM compliance for on-demand charters to ensure optimal business output.

Q Your most memorable helicopter ride?
A My most memorable flight was the first time I flew into New York City and circled the Statue of Liberty. Being from a small town in the heartland, New York City was a place I had only seen in movies, and I never imagined I would end up flying here.

Q What advice would you give to someone pursuing your career path?
A Shake as many hands and make as many friends as possible. The people you meet will be your network of colleagues and friends throughout your career. The rotorcraft community is very tight-knit and getting involved is the best thing you can do to open up opportunities.

Q What still excites you about helicopter aviation?
A Walking out to the helicopter each day still excites me. The quick pace and challenge of using noise/traffic abatement routes, calling FBOs, hovering between parallels, calling out traffic, and getting a landing clearance all at the same time is something I never would’ve imagined myself capable of in a solo pilot environment. Now it’s all in a normal day’s work.
Beckah Piro
Corbin, Kentucky, USA
Current Job: Base mechanic for Air Evacuation Lifeteam
First Aviation Job: Marine Corps Aviation
Favorite Helicopter: VH-60N White Hawk

Q Your current role?
A I am currently a base mechanic, which means I work a single home base where our aircraft reside, or sometimes up to four other bases at a time. I do daily checks on the aircraft, talk with my crew, and schedule maintenance. Previously, I was based at the Presidential Squadron HMX-1 in Quantico, Virginia.

Q What advice would you give to someone pursuing your career path?
A Your happiness is what makes the aviation community safe. There is a sense of pride knowing you are an important factor in keeping people in the air safe. Take that to heart and keep your head focused. Remember, honesty is all that really matters in the end.

Q What do you think is the biggest threat to the helicopter industry?
A I’d say complacency and/or dishonesty. You have to have respect to survive in this industry — respect for your license. You will be filtered out if you cannot pay attention to what you do day-to-day.

Q How did you get to where you are now?
A When I left the Marines I had to figure out life without the service. It wasn’t the easiest transition, but I knew I had great experience under my belt. I went down to Bakersville School of Aeronautics in Nashville, Tennessee, and got my airframe and powerplant license. I worked with a couple different aviation companies before I figured out that the fixed-wing and helicopter worlds are completely different.
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Calendar of Events

2018

August 13–15
31st National Training Aircraft Symposium
Embry-Riddle Aeronautical University
Daytona Beach, Florida, USA
commons.erau.edu/ntas

August 19
World Helicopter Day
“Celebrating helicopters and the people that operate them”
worldhelicopterday.com

August 29–30
Aerial Firefighting Asia Pacific 2018
Tangent Link
Wollongong, Australia
aerial-firefighting-asia-pacific.com

September 10–12
Third Global Remotely Piloted Aircraft Systems Symposium (RPAS/3)
International Civil Aviation Organization
Chengdu, China
icao.int/Meetings/RPAS3

September 18–21
44th European Rotorcraft Forum
Delft, The Netherlands
erf2018.org

September 26–27
HFI Workforce Sustainability Round Table
Helicopter Foundation International
Alexandria, Virginia, USA
Email Allison.McKay@rotor.org

September 26–28
ASA+FNA 30th Anniversary Conference
Aeromed Australasia and Flight Nurses Australia
Hobart, Tasmania, Australia
aeromedconference.com

October 2–4
2018 CHC Safety and Quality Summit
CHC
Dallas, Texas, USA
chcsafetyqualitysummit.com

October 16–18
Helitech International 2018
European Helicopter Association
Amsterdam, The Netherlands
helitechinternational.com

October 16–18
NBAA Business Aviation Convention & Exhibition (NBAA-BACE)
National Business Aviation Association
Orlando, Florida, USA
nbaa.org/events/bace/2018

October 22–24
Air Medical Transport Conference 2018 (AMTC 2018)
The Association of Air Medical Services
Phoenix, Arizona, USA
aams.org/events/amtc

October 25–26
Helicopter Tour Operators Safety Conference
Helicopter Association International
Long Beach, California, USA
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October 30 – November 1
7th Asian/Australian Rotorcraft Forum (ARF 2018)
AHS International and Rotor Korea
Jeju Island, Korea
arf2018.org

November 7–10
Indo Helicopter 2018 Expo & Forum
Jakarta, Indonesia
indohelicopter.com

November 13–14
HAI Firefighting Safety Conference
Helicopter Association International
Boise, Idaho, USA
rotor.org/firefightingconf

December 4–7
2018 Ag Aviation Expo
National Agricultural Aviation Association
Reno, Nevada, USA
agaviation.org/convention

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Dr. Carrol Max Voss Flies West

Dr. Carrol Voss, the founder of AGROTORS, Inc., and a pioneer in the use of helicopters in aerial application, died June 10 at his home in Maine at the age of 98.

Voss joined the Navy Air Corps during World War II, serving as a flight instructor for PBY and PBM “flying boats.” He met his wife, Wilma “Jo,” who was also in the Navy at the time, and they married in 1945.

Voss continued his education and interests in entomology and aviation following the war, earning a doctorate at the University of Wisconsin. In the late 1940s, Voss received his helicopter pilot’s license and started working in the industry. After nearly a decade of working with helicopters and agriculture, he started his own company, AGROTORS, Inc., in 1958. The company became a leader in aerial application operations, later opening a flight school in the mid-1960s.

Voss served as a consultant with the World Health Organization, helping to establish aerial application programs for insect infestations in Africa. He was also a consultant for agricultural spraying in India, the USSR, and South America.

Voss began working with HAI in 1953 when it was still Helicopter Association of America. He was active in the Agriculture Committee and helped to produce a safety video about flying in the wire and obstruction environment. His son, Tim, who was also active in HAI, took over AGROTORS when the elder Voss retired in 1985.

Voss was the recipient of the Twirly Birds Les Morris Award (1995) and HAI’s Lawrence Bell Lifetime Achievement Award (2001). AGROTORS also received HAI’s Sikorsky Humanitarian Service Award (2000) for assisting with mosquito eradication in New York.

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These awards recognize outstanding achievement in vertical aviation by helicopter professionals. Go to rotor.org/salute and nominate an exceptional individual or organization today!

Anyone may submit a nomination, and anyone may be nominated. This year, we have a hard deadline for nominations of **Monday, Sept. 24, 2018**.

The 2019 Salute to Excellence Awards will be presented on Wednesday, March 6, in Atlanta.
Coming Back Home to Aviation

Austin Rowles has been around aviation professionals practically his entire life. When he was very young, his father started a flight school called Palm Beach Helicopters. “My family rode out three hurricanes [in Palm Beach County, Florida], and after one of those hurricanes destroyed the office, we rebuilt there. Every major event that has occurred in my life has been in some way, shape, or form caused by aviation.”

After high school, Rowles decided to major in computer science. Though his love of computers still runs deep, after a year of study in that field he decided to come back to his roots and pursue his other passion, aviation. “A combination of watching my father pour his blood, sweat, and tears into this industry, and seeing my brother’s father-in-law work as a maintenance technician drove me to come back home.”

Rowles applied for and won a 2018 HFI Maintenance Technician Certificate Scholarship. He is working on his airframe and powerplant certifications and will finish his private pilot rating this summer. In addition, he has been working with his brother’s father-in-law at his shop on Meacham Airfield in Fort Worth, Texas. Rowles has done everything from a full four-phase inspection of a King Air C90 to fabricating instrument panels for multiple Cessna models.

“Rowles’s ultimate career goal is to eventually run his own Part 147 school that concentrates on the rotorcraft side of the aviation industry. “I believe rotorcraft are heavily neglected in our current schools, and I hope to be a driving force to fix that.”

When asked what advice he would give others considering a career in aviation, Rowles says, “This industry revolves around a single word: networking. Skill is always important — you should always strive to be the best at whatever it is you want to do — but when you’re shooting for that director of maintenance position at that popular company you’ve always wanted to work for, it helps to know the right people.

“Go to as many meet-ups as you can. Write names down and never forget a face. There are so many wonderful people in this industry, so it’s a pleasure just getting to know everyone.”

Allison McKay is vice president of Helicopter Foundation International.
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<td>HAI ROTOR Photo and Video Contest</td>
<td>703-683-4646</td>
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<td>contest.rotor.org</td>
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<td>HAI Salute to Excellence Awards</td>
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<td>HAI Social Media</td>
<td>703-683-4646</td>
<td>703-683-4745</td>
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<td>Heli-Mart, Inc.</td>
<td>714-755-2999</td>
<td>714-755-2995</td>
<td>helimart.com</td>
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<td>Hertz</td>
<td>800-654-2200</td>
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<td>hertz.com/hai</td>
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<td>HFI: Donate to HFI</td>
<td>703-683-4646</td>
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<td>HFI Golf Tournament</td>
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<td>HFI Heritage of Helicopters</td>
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<td>HFI: Land and Live</td>
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<td>HFI Scholarship Program</td>
<td>703-683-4646</td>
<td>703-683-4745</td>
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<td>Jet Support Services, Inc. (JSSI)</td>
<td>312-644-4444</td>
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<td>jetsupport.com</td>
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<td>KING Schools</td>
<td>703-683-4646</td>
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<td>rotor.org/SaveOnFIRC</td>
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<td>onPeak</td>
<td>855-211-4898</td>
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<td>Pacific Southwest Instruments</td>
<td>951-737-0790</td>
<td>951-273-7149</td>
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<td>Pilatus Business Aircraft Ltd</td>
<td>303-465-9099</td>
<td>303-465-9190</td>
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<td>Precision Fuel Components LLC</td>
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<td>425-513-6788</td>
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<td>Robinson Helicopter Company</td>
<td>310-539-0508</td>
<td>310-539-5198</td>
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<td>Tri-Star Technologies</td>
<td>310-536-0444</td>
<td>310-536-9322</td>
<td>tri-star-technologies.com</td>
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