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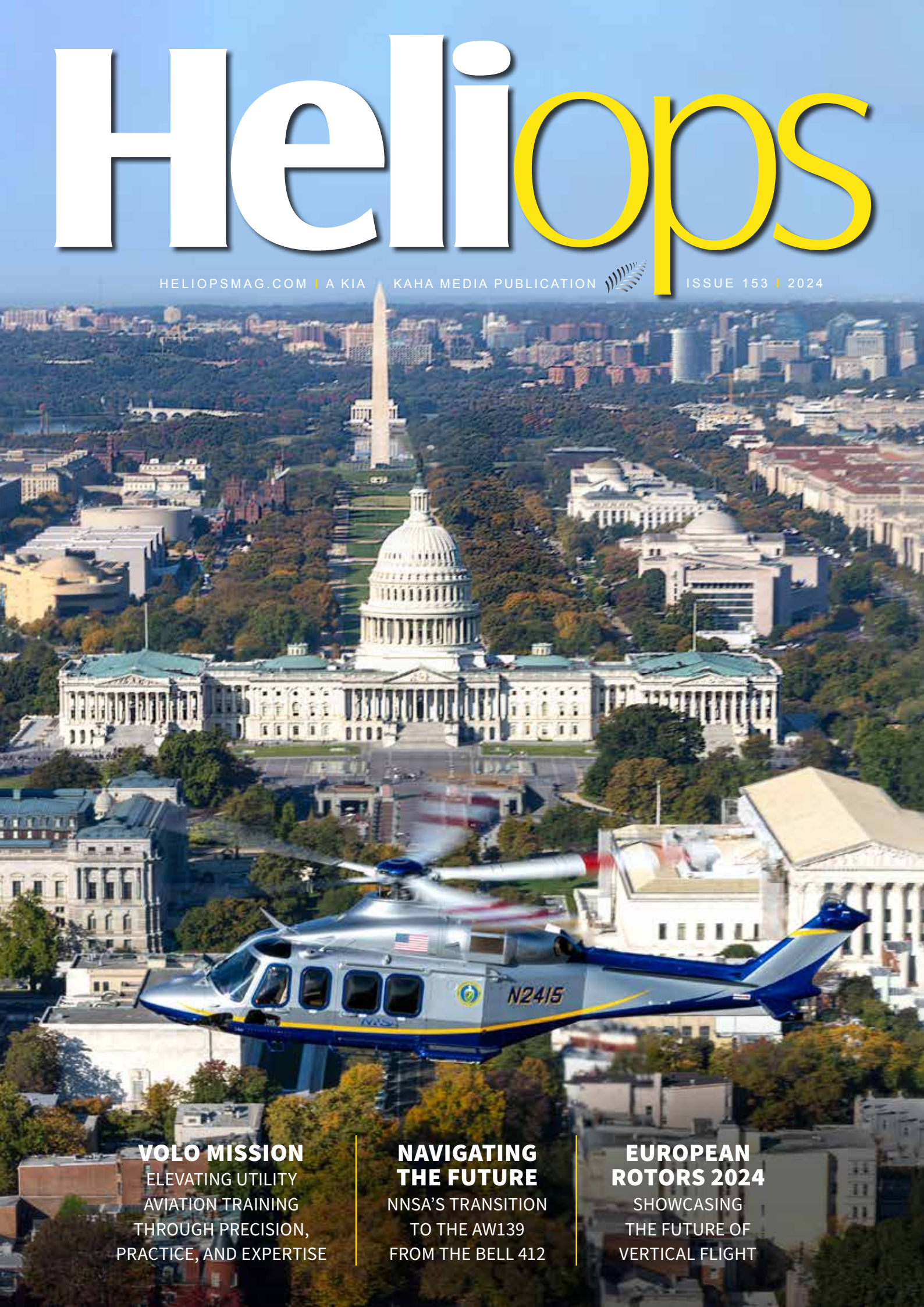

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ELEVATING UTILITY AVIATION TRAINING THROUGH PRECISION, PRACTICE, AND EXPERTISE

NAVIGATING THE FUTURE
NNSA'S TRANSITION TO THE AW139 FROM THE BELL 412

EUROPEAN ROTORS 2024
SHOWCASING THE FUTURE OF VERTICAL FLIGHT

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COVER PHOTO: An NNSA AW139 flies along in front of the Capitol Building in downtown Washington DC. Photo by Ned Dawson

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NAVIGATING THE FUTURE

NNSA'S TRANSITION TO THE AW139 FROM THE BELL 412

The National Nuclear Security Administration (NNSA) has one unwavering counterterrorism / counterproliferation mission: to protect the public from radiological hazards, both anticipated and unforeseen. The Nuclear Emergency Support Team (NEST) is NNSA's multi-mission nuclear emergency response capability that leverages the Department of Energy's (DOE) world-class scientists and technical experts to contend with the Nation's most pressing radiological and nuclear challenges.

PAGE 158

VOLO MISSION

ELEVATING UTILITY AVIATION TRAINING THROUGH PRECISION, PRACTICE, AND EXPERTISE

In the specialized world of utility helicopter operations, there's a growing gap in the number of pilots skilled in precision long-line and vertical reference flying. As older pilots retire, they leave behind a critical shortage of professionals ready to take on high-stakes missions like firefighting, heavy lifting, and precision placements.

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THE QUES TO ASK BI BUYING II AVIATION

Artificial Intelligen either the answer our future replace technological occu .com industry dep you ask. As descri Kennard's article i of Heli Ops (152) Perhaps. But Intel more nuanced tha

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Heliops

STIONS EFORE NTO AI

ce (AI) is, apparently, to all our problems, ments in all upations or the next ending on who bed in Paul 'Foo' n the last edition entitled "Artificial? ligent ?" it's a bit n that.

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EUROPEAN ROTORS 2024

SHOWCASING THE FUTURE OF VERTICAL FLIGHT

The European Rotors exhibition, held from November 4th to 6th, 2024, at the Amsterdam RAI Exhibition Centre, showcased the continued strength and international appeal of the rotorcraft industry attracting over 4,600 participants from around the globe.

PAGE 264

BATTERIES AND EVTOL

A fundamental case for, and enabler, for a shift eVTOL has been the increased capability of batteries as a power source. The publicity given to electric vehicle fires in recent times indicates that there may be a significant certification question associated with this technology. The question is could this impact the eVTOL industry? Mark Ogden delves a little into the issue to provide some thoughts and observations.

REGULARS

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LETTER FROM THE editor

MARK OGDEN

eVTOL aircraft are promising to reshape the future of vertical aviation but there are challenges ahead and whether investors, despite Government assistance, have the stomach for investing billions of dollars more into the technology. In this issue Paul Kennard, in his column, questions the financial viability of those aspects of the industry focussing on urban transport. Billions have been sunk and companies are now going to the wall and yet, we still don't have a certified eVTOL. Paul and I wandered the halls of last year's HAI show (now Verticon), looked over the Wisk and pondered if it was technology providing a solution looking for a problem. As I said earlier in the year, aircraft such as these are specifically focused on air mobility in the urban environment, the environment that the helicopter industry sought to address back in the 1950's and 60's – and failed.

Paul ponders the future of the industry given the collapse of German eVTOL company, Lilium and the financial struggles of Velocopter. Given the struggles the automotive industry to make money from EVs – even with huge subsidies in the form of tax breaks in many western countries, one has to wonder what success will the eVTOL industry have in the urban mobility market. It seems that when politicians try to manipulate markets, things invariably go wrong.

With a second Trump Administration being likely to kill off any tax breaks for EVs (even with Elon Musk being an integral part of the Administration), it will be interesting to see how the auto market reacts and the knock-on effect, if any, on the eVTOL industry.

As I have also said in the past, the potential of eVTOL technology and its applicability in supporting the military and

even industry sectors such as EMS, is huge – that is where I think the demand will be and that's where the money will be.

While watching some programs about EV fires, a thought popped into my head about how the certification standards being proposed by the FAA and EASA will address this issue. My story on that is in this issue. To me, the smart approach is the hybrid concept (reflecting that part of the EV market that is growing). I think that the separation of the batteries from the passenger compartment seems to also be a good idea in minimizing the fire risk associated with the powerful lithium-ion batteries.

We published a separate edition to cover the Hurricane Helene response – this is another area where eVTOLs could make a difference – eventually. But when considering the present, the helicopter once again proved to be a vital tool in saving lives, fulfilling Igor Sikorsky's original thoughts about the role of helicopters, "The many interesting flight activities and great variety of service rendered by the helicopter are well known, the most important being the saving of many thousands of lives."

The number of lives saved by helicopters now number in the millions.

Mark

Mark Ogden has been in aviation since a teenager. An ex-Australian Navy pilot instructor and instrument examiner on a variety of aircraft, Mark also spent 7 years as an accident investigator for Australia's Bureau of Air Safety Investigation and Australian Transport Safety Bureau. He was also for a time, the Royal Air Force Central Flying School Agent for the Royal Australian Navy. Mark can be reached at oggy@kiakahamedia.com

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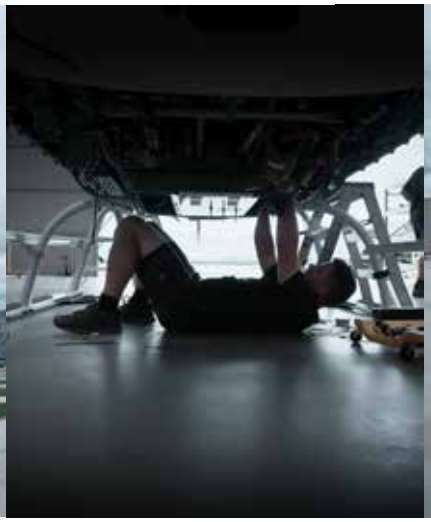

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Safran sign SBH in China

Safran has signed the first support-by-the-hour contract for the Arrius 2R engine in China with Reignwood Aviation used on their Bell 505s.

TracPlus partners with Avincis

TracPlus has been selected by Avincis to deliver operational intelligence and tracking across their fleet of around 220 aircraft.

Airbus Helicop

Airbus Helicopters has oper
a £55 million ($73mil) invest
meter) HQ has eight helipad
site is also home to around

OHS UK order

Offshore Helicopter Service
its contribution to the growi
energy industry sector in the

ters UK opens new HQ

ed its new facility at Oxford Airport following tment. The 125,000 square ft. (11,700 square ls and can house over 30 aircraft internally. The 250 staff.

two AW139s

s UK has ordered two AW139s to strengthen ing demand for rescue missions supporting the e North Sea.

LCI Support Torres Strait with AW139s

LCI has delivered two new AW139s to Babcock Australasia for emergency medical services operations across the Torres Strait and the Northern Peninsula of Queensland, Australia.

GMR orders 28 Airbus helicopters

Global Medical Response has placed an order for 28 Airbus helicopters, including six H125s, five H130s, 14 H135s and three H145s, as it continues expanding its air medical fleet.

Airtelis signs contract for H145s

Airtelis has signed a framework agreement for the purchase of up to five H145s, including the firm order of one, to be operated by Airtelis' subsidiary Oya Vendée Hélicoptères.

Spectrum Aeromed partners with Bangkok Hospital

Spectrum Aeromed has collaborated with BDMS Medevac Center, Bangkok Hospital Headquarters, to develop the new Aeromedical Transport Training Center equipped with the latest advanced air ambulance solutions, to serve as a key training ground for medical professionals across the region.

Airb Donauwör reduci emissio

Airbus has collaborated Mercedes-Benz Special Trucks ROHR to implement an ele helicopter refueling eEconic tru their Donauwörth plant in Germ

S-92A MGB rec life extension

Sikorsky have announced that received FAA certification to c one-time life extension for spe main gear box housings on its leveraging the HUMS data col from more than 300 aircraft a million fleet flight hours.

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AW169 for NRH

Northern Rescue Helicopter, an EMS provider in New Zealand's North Island has added an AW169 to its fleet as it moves towards operating a fleet of five AW169s by 2025.

Intermountain Health lease AW109 ETD VxR

Utah based Intermountain Health has leased the first AW109 GrandNew Enhanced Training Device Virtual Extended Reality and adds an AW109 GrandNew to its fleet.

100th B505 Sold in Europe

Bell has signed purchase agreement for the 100th Bell 505 in Europe to private operator, Adam Fawsitt, through their UK Independent Representative, HelixAv.

FAA approve Aerolite Medical Interior on H135

Aerolite AG has received a Federal Aviation Administration STC for a new H135 Helionix variant air medical interior, for various lightweight medical interior configurations that were previously certified through the EASA.

R550 UAV adds Automa Application

Rotor Technologies and AG-NAV have demonstrat aerial application system that allows users to fly R agricultural UAV using AG-NAV's Guia Platinum na

Schweizer adds Italian se

Schweizer have added Elicuneo of Boglietto, Ita and Service Center. They will serve Italy with S sales, maintenance and Schweizer-backed custo

ted Aerial

ed an integrated automated
otor's R550 Sprayhawk
vigation system.

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omer support.

H175 delivered to GZP

The first H175 has been delivered to the aviation force of the Guangzhou Public Security Bureau and will be used for public service missions and support emergency management. The GZP fleet includes two H145s delivered in 2016 and 2019 respectively.

Avincis awarded Spanish SAR contract

Avincis has been awarded a further five-year contract for maritime SAR services in Spain, the Maritime Safety and Rescue Society (SASEMAR), valued at €305 million.

Helicopter Institute adds B429

Helicopter Institute have announced the addition of a Bell 429 to its fleet, enhancing its commitment to the Beyond Factory Training initiative, along with a Level 5 FTD.

Westair signs lease for H225

Westair Helicopters has signed a lease agreement with Milestone Aviation for a single H225 for supporting offshore operations in Namibia, Africa.

FAA certificatio Skyryse One

Skyryse, the creator of SkyOS, operating system for flight, ha Airworthiness Certificate for it

Airbus partne on 3-axis auto

Airbus Helicopters has par development of a new 3-a which is expected to be or

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ts first Skyryse One aircraft.

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opilot

tnered with Garmin on the
xis autopilot for the H130 and
n the market by 2025.

Fort Worth PD adds Bell 505

The Fort Worth Police Department has signed a purchase agreement for a second Bell 505 joining their first model delivered in 2021.

Ontario Provincial Police order H135s

The Government of Ontario has ordered three H135s for the Ontario Provincial Police in Ottawa, the Greater Toronto Area and in the OPP's North West Region.

AVIC continue AC332 testing

The Aviation Industry Corporation of China have announced that the AC332 has completed high temperature flight tests at Pucheng Neifu Airport in Shaanxi Province completing 19 flights totaling 12 hours.

China take delivery of H175

The Rescue and Salvage Bureau of the Chinese Ministry of Transport has taken delivery of two SAR configured H175s with both aircraft were delivered by Airbus Beluga Transport Qingdao, China.

Third ACH145 for KUHN A

KUHN Aviation has ordered a third ACH145, follo ACH145 orders this year, including the first North new Mercedes-Benz Style Edition interior.

Bulgaria chooses Airborn Technologies for upgrade

Airborne Technologies has been selected to serv special mission equipment on the entire fleet of Guard over the next four years.

Aviation

owing on two previous
n American order for the

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vice and modernize all
the Bulgarian Border

PHI start H175 operations

Two H175s have officially entered service with PHI Aviation in Australia, supporting their offshore energy transportation, search and rescue and medical evacuation operations.

New rescue for Tai Rāwhiti

The Eastland Rescue Helicopter team has replaced its BK117 with a new BK117B-2 owned by Philips SAR Trust and is leased to the Eastland team via its operations company Search and Rescue Services Limited.

Leonardo opens logistics hub in UK

Leonardo has opened a £30M Single Site Logistics Hub for helicopter maintenance in their South West, UK Yeovil base, replacing eight ageing buildings with a state-of-the-art new integrated facility.

CHC opens new hangar

CHC Brazil has begun operations at a new hangar, at Macaé Airport, to support contracts with Petrobras operating three AW139s and expanding to seven aircraft by the end of 2025.

First MD 500E

Thoroughbred Aviation, in Le
completion of the first MD 5
Service Center.

POLAIR adds

Meridian Helicopters has be
in Townsville as part of a 10
capabilities operating two H

to MD 530F delivered

exington, KY, has announced the successful
500E to MD 530F conversion at an MD Authorized

H135 in Townsville

een appointed to deliver POLAIR capabilities
year contract to bolster the region's aerial
H135s.

AirCare expands emergency response

The University of Iowa Health Care and Air Methods are increasing Quad Citizens' access to life-saving critical care services by opening a new helicopter base in Davenport, Iowa.

Rega receives hospital IFR authorisation

Swiss Air-Rescue Rega is the first helicopter operator in the world to be granted authorisation to use new instrument flight procedures at a hospital. The new approach flight procedures will benefit patients who will be able to be flown to Interlaken Hospital.

New AW109 for Magpas

UK based Magpas AA has taken delivery of an AW109 SP to replace the charity's previous helicopter, which was unable to fly when the service's aviation provider was suddenly sold in a pre-pack administration deal earlier this year.

Nova Scotia order H125

The government of Nova Scotia has placed an order for four H125s as part of a complete fleet renewal for the Department of Natural Resources and Renewables.

Omni and GDH

The first H160 has been del
Group via a lease with GDH
operator in Latin America of

HUMS for Nor

GPMS International has par
deliver Foresight MX HUMS
Pumas.

HF add first H160

ivered to the Omni Helicopters International
F, with Omni Táxi Aéreo, becoming the first
f the type.

Toho Air sign for AW139

Tokyo based Toho Air Service have signed a contract for the supply of an additional AW139 for Tokyo-Ai land shuttle services that operate a commuter helicopter service linking together the six major Izu islands.

mad Aviation AS332

rtnered with Precision Support Services to
S to Nomad Aviation for their two AS332 Super

Østnes Helicopters orders 10 Airbus H125s

Østnes Helicopters, the official distributor for Airbus Helicopters in the Nordic countries, have announced a contract for ten Airbus H125s.

MARK OGDEN

DJI - FUTURE

DJI, Da-Jiang Innovations, is headquartered in Shenzhen, Guangdong in China and is probably the most dominant consumer and professional drone manufacturer in the world. DJI has grown to a worldwide force in just 18 years since its simple beginnings in 2006. While it claims to be a privately owned and operated company, it is backed by state owned entities and as a Chinese company, subject to the requirements of the Chinese Government and Chinese Communist Party (CCP) – those two entities are essentially the same thing. DJI apparently holds some 90% of the world's consumer drone market. DJI also acquired then struggling Swedish camera manufacturer, Hasselblad, in 2015.

The company was successfully sued by US company, Textron, in 2023 for patent infringement regarding flight controls and automatic hovering and position holding on other vehicles.

There aren't many competitors to this juggernaut and this, along with its associations with the Chinese Government has put it squarely in the crosshairs of the US Government and this could have serious ramifications for its future profitability.

In 2017, DJI's problems with accusations of software vulnerabilities and accusations of the potential of information transfer to the Chinese Government. Various reviews have countered such claims but even so, many Western Governments banned their agencies and defense forces from purchasing DJI equipment. Then-President Trump signed an executive order in 2021 requiring the removal of Chinese-made drones from U.S. government fleets. In September this year, the US House of Representatives approved a bill to ban the operation of new drones made by DJI in the US. The bill, which still requires approval from the US Senate, seeks to prevent future DJI drones from operating on the US communications infrastructure although the proposed ban would not affect DJI drones already in use. The bill does not accuse DJI of having done anything wrong but rather, it is claimed, as addressing the US national security concerns about potential Chinese impact on its infrastructure. If passed, the legislation

is intended to prevent future versions of DJI drones cannot be imported, marketed, or sold in the US. I'm not sure how this would impact tourists and photographers travelling in or through the USA.

If the Senate passes the bill, the impact on DJI which holds nearly half the market in the USA, will be significant. With President-elect Trump now due to take the reins of US executive power with majorities in the House and Senate, the likelihood of the bill passing has significantly increased. Adding to the woes of DJI would be if other western nations follow the same path in banning this Chinese technology – whether these countries want to or not, the US could exert considerable influence under its national and international security blanket. Interestingly, while the US is intending to ban Chinese technology drones, Chinese-made EVs (which would presumably also connect to US infrastructure) appear to be facing a similar ban as well as a significant tariff imposition.

In September, the Biden administration proposed a ban on Chinese connected-car technology. I can see President-elect Trump continuing down this path as well as his plans for huge tariffs as part of his plan to fend off cheap Chinese EVs. Basically, anything Chinese that could potentially connect to the US communications system could be in trouble – again, not just in the US but also other countries (the EU is looking to pile tariffs on the Chinese EVs and security 'concerns' could be just another string to the bow).

Chinese EV manufacturers have set up plants in Mexico trying to take advantage of the North American free trade arrangement, but this is already in the crosshairs of the new Administration. DJI is reportedly exploring setting up US manufacturing lines and servers but in my mind, if there is any intention of using Chinese-made technology, then I can see the that move failing.

Perversely, the Chinese are the last to pontificate about free trade given their propensity to use trade as a political weapon – just ask the Australians who had the temerity to ask for an investigation into the origins of COVID 19. Blanket bans and exorbitant tariffs on Australian products ensued. I guess they set the standard!

If DJI is effectively shut out of the US and maybe other western markets, DJI will suffer but local companies will rise to take its place, although the costs are likely to be much higher. The next six to twelve months will be interesting. **HO**

Mark Ogden has been in aviation since a teenager. An ex-Australian Navy pilot instructor and instrument examiner on a variety of aircraft, Mark also spent 7 years as an accident investigator for Australia's Bureau of Air Safety Investigation and Australian Transport Safety Bureau. He was also for a time, the Royal Air Force Central Flying School Agent for the Royal Australian Navy. Mark can be reached at oggy@kiakahamedia.com

TERRY MIYAUCHI

SAR SAFETY BY THE NUMBERS

This past month, I had the unique opportunity to participate in an international alpine search and rescue conference. The primary focus of the week-long event was on operators that conduct all aspects of high-level mountain search and rescue, including an air rescue congress. Although the individual congress gatherings were based in Greece, there were 51 different aviation operators present, representing a total of 37 different countries from around the world. A very diverse group indeed, but with it, a not-surprising level of commonality amongst the operators as a whole. A shared common goal of providing safe and effective mountain SAR services for the ultimate protection of life and limb was at the forefront.

There was a great sense of pride that could be felt amongst the attendees. Countless stories of incredible mountain rescues were told, some of which were so high in elevation, that extended periods of crew oxygen were required. Aircraft and crews incredibly operating at the extreme performance limits, both human and mechanical. Some of these stores were of lessons learned, some were recoveries for family closure, and many resulted in the certain saving of life and limb. Helicopters indeed save lives.

There was as prominent and expected conference theme of aviation safety, to include a very interesting presentation and follow-on discussion on a 10-year history of helicopter accidents and incidents for the group. The data-based presentation had a unique focus in that it only included the operators with a prominent focus on mountain SAR operations.

What were the reported standout accident and incident rates for these mountain and alpine air rescue operations? Although the data sampling was admittedly not all-inclusive, there was a total of 87 SAR accidents and incidents included in the 10-year period. Other than a standout high

incident of rotor strikes (categorized as part of CFIT), the remaining primary causes remained the same as the broader helicopter industry regardless of the specialty mountain SAR operations. Power line and wire incidents were number two, with inadvertent IMC being a close third. Although the high percentage of rotor strikes was alarming, it is perhaps not of surprise, given the close proximity to ground that mountain SAR helicopters operate.

The overall standout causation factor for all accident and incident types for this segment report was human error, also not of surprise. Just as with this SAR group, each helicopter mission segment within our broader industry has its unique safety challenges, as does the overall rate of incidents and accidents. The constant regardless of segment is the undeniable high rate of human factor errors. Even when there is a mechanical component failure that leads to an incident, we often find that the helicopter maintenance procedures and directives were not being properly followed. This aspect alone is what puts the total percentage of accidents due to human error, at well over 90%.

Needless to say, the ultimate goal for our broad aviation industry safety as a whole is zero accidents and incidents. In looking at our broader aviation industry as a whole, the standout sector is within the Part 121 airline industry. For the past 10 years in the U.S., there have been more than 90 million commercial flights in the national airspace system. These flights have carried 7 billion passengers, with only 2 fatalities. In comparison the general aviation accident rate including fixed wing, for the same period was approximately 0.94 for every 100,000 hours flown. Per the US Helicopter Safety Team, we know that the commercial helicopter fatal accident rate for the same 10-year period was 0.77 fatal accidents per 100,000 flight hours flown.

Some might argue that a comparison to the airline industry is an unfair comparison given the nature of helicopter operations, and especially the nature of public safety operations like mountain SAR. One could easily argue that the airline flights are highly repetitive and thus able to have a very high level of automation, while every mountain SAR flight is uniquely complex and unknown. They would be right, but does it matter? Mountain SAR operations are indeed more complex with unique challenges, as is the helicopter industry as a whole…but this is exactly the reason why we need to ensure an even more robust focus on safety-first. In understanding that our helicopter business is inherently dangerous, it becomes absolutely imperative that we not

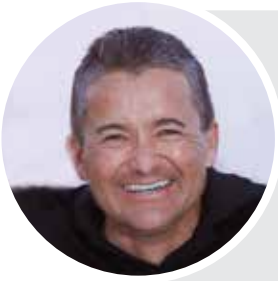
only verbalize safety-first, but that we act on it. There is a difference, a big difference.

Saying the words "safety-first" is perhaps one of the most widely utilized and even cliché catch phrases in aviation safety discussions. We claim to operate from a safety-first perspective, write policies that require safety-first and even verbalize to each other the actual words of safety-first. And why wouldn't we? Would we ever claim to be safety-second? Of course not, but perhaps a better question to ask ourselves is if we are truly operating in every regard as safety-first? Or are we perhaps just paying it lip service and reality putting other priorities first without realizing it? Again, there is a difference.

If human error continues to be the bottom line on almost all incidents and accidents, then the bottom line needs to be a focus on the human aspects, starting with ourselves individually and those around us. If we do not collectively confront ourselves and each other as crewmembers in our known weak points, we will continue to have accidents. If we do not properly enforce our policies as aviation managers, we will continue to have accidents. As crewmembers, if we push our limits beyond policy, regulation and aircraft performance, our segment we will continue to have incidents. If we do not change our safety-first approach in these areas, there is a very high likelihood that we will have repeat accidents over the next ten-year period.

An incredible and well-deserved congratulations and thank you to our SAR helicopter segment members. Thank you for the mission you perform and the lives you save. Thank you for your safety-first attitude in which you do it. Be safe!

Recognizing the profound impact of worker morale as part of our helicopter operations safety is imperative. A positive safety culture isn't just about compliance… it's about inspiring one another to feel invested, valued, and motivated. Organizations and individuals like the ones I was recently privileged to visit in Africa help us pave the way to greater safety! **HO**



Terry Miyauchi started his aviation career in the mid-1980s and served in the U.S. Army as an AeroScout pilot. Through the years, he has worked as a pilot, instructor pilot, standardization pilot, safety officer, regional manager and most recently retired from the Arizona Department of Public Safety where he was the Aviation Commander. Terry hold a bachelor's degree in Professional Aeronautics and master's degree in Aviation Leadership, both from Embry Riddle Aeronautical University. He has amassed more than 7,000 commercial helicopter hours in more than 12 helicopter types and holds FAA pilot ratings in helicopters, airplanes, gliders, and lighter-than-air balloons.

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JENNY SVEDBERG

Jenny Svedberg grew up in the southwest Swedish countryside with her parents and two brothers. She first encountered a helicopter when one landed in a field near her home. “I was about seven years old, and my eyes were wide as plates – just WOW!! That image and feeling followed me my whole life. Something clicked, and I just knew I really, really wanted to learn how to manage those machines. They’re an aircraft that, in many ways, make the impossible possible.”

Jenny loved animals and, when she was younger, even had her own horse. One day, he got sick, and they were forced to put him down. Jenny was devastated. Her brother had just started riding motocross, so in an effort to cheer her up, her dad invited her to the track to try it out for fun and to get her mind off things. There, she discovered a new passion: more speed, higher heights, and more adrenaline than she ever got from horses! It came naturally, and she was good at it.

Jenny says that, as a kid, she was and still is, in some ways, a dreamer. But their dad got in early, letting her and her brothers know there were only two options in life as far as he was concerned – “If you want to party and do that kind of stuff, that’s fine! Do whatever you want. But if you’re all in, I’m all in; I’m going to help you with whatever I can.”

“It was a bit of a life-changing moment for us, really,” Jenny nods. “But it was an easy choice: WE GO ALL IN.”

“I felt it more meaningful to work hard and really master something. That drives me. I’m grateful to my parents for highlighting that at that time.” A dream to fly helicopters, however, felt impossibly expensive. “And I thought to become

a pilot, you just had to be a bit superhuman. Back then, I didn't feel I stood a chance."

When she finished school, Jenny got a job at the airport cleaning airplanes and loading cargo at night. "One night, I saw a technician crawl in one of the aircraft engines and thought to myself, 'Hmm… that seems interesting.'"

"I sneaked out and talked to the guy, telling him my dreams

of becoming a pilot. He told me that if I wanted to fly, I should become a technician first to enhance my chances of getting a job." The first thing Jenny did when she got home was apply to every tech school in Sweden she could find. A few months later, she was accepted into NFTS in Luleå, northern Sweden, and then got her first job as a helicopter technician in the Air Force.

"There, I got to work with the Super Puma, Black Hawk, and AW109. Every time I checked out a machine and the pilots

came and got it, I was like, 'OK… have fun!' and in awe, I'd watch them take off and do the thing I've always dreamed of. Deep down, I knew this wasn't really where I wanted to be."

Five years passed, and Jenny developed homesickness when a combination of life-related matters cropped up all at once. It was time to move home, where she went all in and embarked on a thrilling and fulfilling motocross racing career. "I love the challenges and toughness of racing, both mental and physical. It was the perfect combination of full focus and giving it your all – making decisions in split seconds, choosing lines, and pushing yourself beyond your fears and perceived limitations."

"You're also handling setbacks like bike breakdowns and injuries, though I've been quite lucky. There's a mindset that

has to develop – resilience – in order to keep on going when it's tough and find a way through."

But that nagging need to fly never really left.

"One day, I saw a random Instagram post from adventurer Annelie Pompe – who, today, is one of my best friends and inspirations. She had posted a helicopter picture and tagged the school where she was flying. I realized that school was quite nearby, and when I looked it up, I discovered they ran a two-year government-funded program to become a

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commercial heli pilot." Suddenly, the impossible dream felt possible. "I thought, 'It's now or never,' worked my ass off to afford all the different tests you had to do to apply – then went for it and got in!"

Jenny was 34 then, and life took a 180 turn in many ways. "It's been a hell of a year. Intense, though, challenging, sometimes stressful, and completely, totally amazing!"

The program she studied included six months of internship, and in the hangar beside her flight school was a company she'd been interested in for a while: STORM Heliworks. "One day, I got the opportunity to help them out on the ground with a mission, and I loved it!" Jenny ended up doing her

internship simultaneously with school; in her free time, she'd be refueling, loading and briefing passengers, and preparing for sling load operations.

By the time she finished training and took her skill test for CPL this summer, Jenny's internship was complete, and STORM offered her a job as a pilot.

"Now, a couple of months in, I've started to take on passengers and am doing sightseeing tours with the R44. I'm still doing the groundwork as well, and I love the variability. Sometimes, it's long days, of course, and you have to put many other things in life on hold, but the reward of personal growth alongside unique and inspiring co-workers is so worth it! Heli pilots are a special breed in many ways."

"I would be lying if I told you that I don't miss motocross, leaving that has been a little bit of a struggle, to be honest. Racing was a huge part of my life and my biggest passion – and it also feels like home. But I'm OK taking some distance from it. I'm really happy with what I achieved in the time I did get to spend in the sport."

Jenny is looking forward to the point where the heli feels truly

second nature, as it is when she's riding motocross. "When you get to that point that the machine is like an extension of you – the feeling of flow and total control and total trust – that's the best feeling in the world. Nothing beats that."

"It has been a ride. Literal blood, sweat, and tears have been shed to get here," Jenny grins. "But I'm so grateful, blessed, and lucky for the opportunities I got to go after my childhood dream – which I only ever thought would be a dream." **HO**

Bronni Bowen is a fixed-wing pilot and aviation writer who lives in Melbourne, Australia. She is passionate about the history and culture of General Aviation in Australia, and the role of women in aviation, it is a lifelong ambition of hers to fly and tell stories from the highlands of PNG.

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KEVIN HUMPHREYS

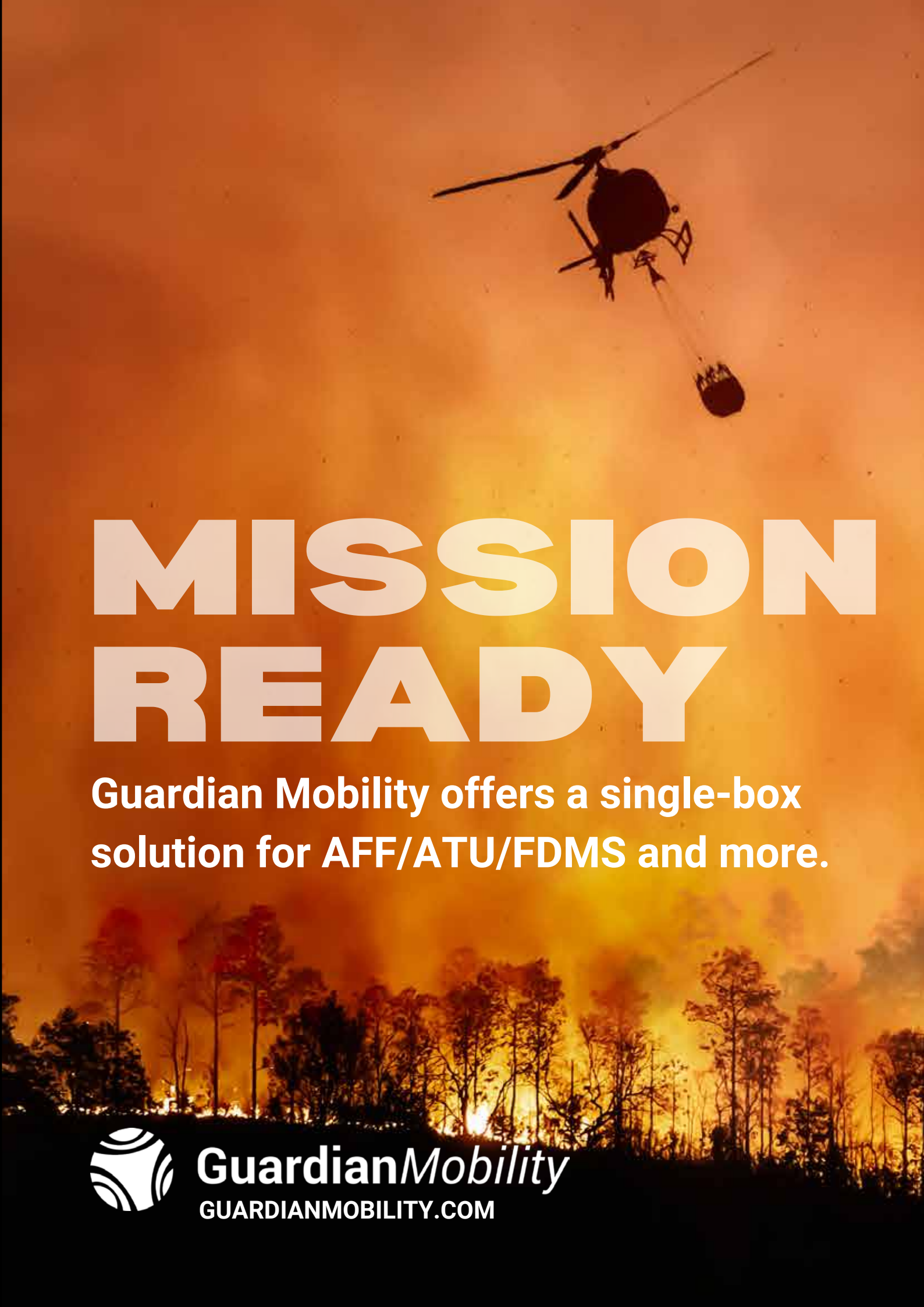
HOPE IS NOT A METHOD – OR IS IT?

I can't tell you how many times I heard the directing staff at the Royal Military College drum into us cadets that 'hope is not a method!' as whichever cadet it was stood in front of their peers to brief their master planned company attack. Invariably, there'd be some part of the plan that hadn't been fully fleshed out due to time constraints, and if the cadet was lacking confidence would blurt out something akin to '… and the artillery fire will hopefully commence at time…'.

"What is this hope shit Cadet X? Hope is not a method! You will not find hope delivering military effects or saving anyone on the battlefield! You either have a plan, or you don't, and if you don't, you better create one bloody quick because your soldiers won't be following you for long if you start talking about hope!"

And so it was, that the notion of 'hope' being some bullshit passive dreamy feeling that had no place in my vocabulary was firmly planted in my belief system. I would not have 'hope'; I would only ever have a 'plan'. Those who worked with me know that I parroted that same type of line many times throughout my career, and I do believe for good reason, because it's true. Hope is not a method to deliver military effects or save lives in the planning or operational execution phases. Indeed, I'm convinced that belief contributed to several successes in otherwise challenging conditions.

What I didn't realize was that hope, like so many other things in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life, has layers and nuances. Hope has no place on the battlefield when things are going well. However, ask almost anyone who has been in a situation of isolation, running low on ammunition or with a casualty, and they'll tell you they were quietly 'hoping' for the cavalry or casevac to arrive to help.

"Hope is not an emotion;
it's a way of thinking or a cognitive process."
Brene Brown

I've been reflecting a lot on my own experiences and the notion of 'hope' as I write my memoir. Needless to say, when I found this quote by Brene Brown, "Hope is not an emotion; it's a way of thinking or a cognitive process", it brought a new dimension to the mix. It both reinforced and challenged my experience at the same time.

In my keynote presentations and workshops, I rarely, if ever, use the word 'hope', yet that is one of the most common words reflected back to me from the audience and participants. 'You've given me hope'. 'Your story has demonstrated how important hope is for recovery'. But I didn't mention it.

I can see how some people believe I spoke about hope as I reveal my pathway back to health. I had milestones along the way. First, it was visualizing a small door in the distance from within my dark void with no idea how to get there, how to open it, or what lay on the other side, but believing it had to be better than where I was at the time. Then getting out of bed, shaving, and getting through a whole day without crying. Interestingly, I never saw them as hopeful; to me, they were necessary actions to take as part of my plan to recover my health. So, in fact, I was building my 'hope muscle' without realizing it because it was a cognitive process.

An important point to note here is to understand why you're taking those actions. Again, in my keynotes and workshops, I talk about having a Great and Noble Cause (GNC), something outside of and far bigger than you. When you find your GNC, it's motivating, stimulating and, paraphrasing Viktor Frankl, a person with a why can endure any 'how'. However, what I've found is that a large scale GNC works best for those in an average or better state of well-being

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and mental health. For someone who is already highly reactive and distressed, the concept of something far bigger than themselves seems so far distant it's impossible to reach, and they can then be prone to give up, like I almost did.

To keep in touch with hope, it's important for your GNC to be realistic about where you're at. Someone experiencing high levels of distress is not (and should not be) concerned about ending world hunger. They need to realize their GNC cause at that time must be their own survival. It's entirely appropriate to put their own oxygen mask on and be totally selfish to survive. As their health improves and the frequency of distress reduces to periods of reactivity, their GNC should expand to something bigger than them. As health continues to improve, moving from distress to reactive to calm, the GNC can also continue to grow.

As you can see, it's a thinking process to identify and pursue your GNC. As you pursue it, you are giving yourself hope. You are thinking yourself to health. Importantly, that thinking needs to be commensurate to the state you're in for progress to occur.

Compassion is the emotion you need. Hope is the method. How that hope looks and sounds will be different for different people. **HO**

Kevin Humphreys served in the Australian Army for 20 years flying Black Hawk and Chinook helicopters. He deployed on multiple operational and humanitarian missions around the world undertaking a variety of operational flying and staff roles including Commanding Officer. Following his military service, he spent the next decade as a civilian Search and Rescue pilot, including roles of flight examiner, Chief Pilot and Director of Operations. Kevin now plays a significant role in mental health advocacy. He is the Mental Health Ambassador for AIRBUS Australia Pacific, a Community Ambassador for Mates4Mates (Veteran's rehabilitation charity) and founder of Cor Infinitus which gives dignity and respect to the families of those who've served their nation and taken their own lives.

BRONNI BOWEN

MATT OTTO

Matt Otto was born with the desire to get into the air. "When I was 13, Rotor Work's Hughes 300C came to our farm in New Zealand to do some topdressing, and my younger brother Tom and I got a ride." Today, Tom and Matt both work in the industry, a direct result of their initial encounter with Hughes 300C.

Despite a burning passion from such a young age, Matt remembers navigating his fair share of obstacles before he could become airborne, the first affecting him before he even started his helicopter pilot training. "All through high school, I was disparaged by my teachers, told that I would never make it as a pilot and that, to be successful, I would have to go to university and gain a degree."

"It's pretty degrading being continuously told you won't succeed. I'm glad I didn't succumb to their despair – looking back now, a university degree wouldn't have enabled me to work in some of the incredible places that I have."

Instead, at 15, Matt began flying lessons in a B22 Bantam, a New Zealand-built Ultralite, going solo shortly after with Dave Reidman in Te Kowhai. He began his heli career at 17, enrolling in a flight training program at Ardmore, funded by a student loan and his life's savings to date. "It was a tight budget, but I got creative with my meals – who knew there were so many ways to prepare two-minute noodles and eggs?!"

Matt completed his training in the Schweizer 300CBi, achieving his commercial helicopter license by the age of 18. His career in the helicopter industry has been an exciting one, spanning over 15 years and multiple continents. He's had the privilege of working on a diverse range of projects, from agricultural work to wildlife

conservation, fighting fire, and precision drill moves, and under all kinds of work arrangements, including contracts, seasonal jobs, and permanent positions.

"My first job was as a loader driver for Outback Helicopters on remote Australian cattle stations. Although the hours were long and the pay modest, I was grateful for the opportunity to get my foot in the door. The role also afforded me some valuable ferry flying experience, which helped me build my skills and make industry connections. It was a challenging but crucial stepping stone in my aviation career."

The following eight years Matt spent back in New Zealand with Rotor Work, specializing in helicopter ag flying. This is where he really got his first break. "They were a great family to work for. I've been fortunate to have had several influential mentors throughout my career, but Ben Dellow stands out here. He not only guided me through my agricultural rating but also instilled in me a profound mindset of safety." Ben's mentorship extended far beyond flying skills; he was also an exceptional businessman who taught Matt the value of prudent financial decisions. "His ability to turn a dollar into two was truly impressive, and his entrepreneurial acumen has had a lasting impact on my approach to business and aviation."

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Seeking new challenges, Matt relocated to Canada for two years. Here, he was exposed to various projects, including fighting fires, moving drills, capturing black bears, and contributing to the caribou migration efforts, working with one of David Attenborough's videographers to obtain footage of the migration in the northern

Arctic of Canada. “One of my absolute career highlights was working alongside my brother, Tom, helping fight the Canadian wildfires of 2023, one of the worst seasons in recorded history.”

Between seasons, Matt has also flown for Alpine Helicopters, based in Wanaka, on the South Island of New Zealand. “Working with a good bunch of guys and flying the Southern Alps of New Zealand was unreal. Some of the areas we got to work in were purely untouched, and it was fantastic to be able to show the world what little old New Zealand has to offer.”

Today, just for something wildly different again, Matt is employed in Papua New Guinea. “I fly to remote communities throughout the Highlands to ensure they have a reliable connection to the outside world. The terrain is rugged, and the weather unpredictable, but it is a great challenge and a good feeling helping communities and villages in need.”

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Based in Mount Hagen, Matt's days are filled with transporting personnel, equipment, and supplies. Each begins at 0600 with a thorough weather check and a cup of coffee. By 0700, he is airborne, flying either the Bell 407 or Bell 212. Some days, he performs aerial surveys and inspections; others, it's a lot of precision and long-lining work in order to keep telecommunications towers operational. Infamous for being one of the most dangerous places to fly in the world, the job comes with unique challenges, particularly high-altitude flying, often exceeding 10,000ft density altitude and in marginal weather conditions. In certain areas with an increased risk of civil

unrest, pilots and crew work closely with local authorities to ensure safe passage, often accompanied by armed police or defense force personnel to maintain security.

"By 1500-1600, we usually try to return to base to avoid worsening weather conditions. After a big day's work, we're looking forward to a hearty dinner and a cold beer. And we always make sure we are back in Hagen for Saturday – we wouldn't miss Steak Night!"

"My favorite aircraft here would have to be the Bell 212, as it has so much history behind it – and it is always a nice feeling having two

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engines over the jungle. Knowing that our work makes a tangible difference in the lives of Papua New Guineans is very rewarding."

When Matt isn't rostered on, he's generally back in New Zealand working on his investment properties, as well as dabbling in a bit of hunting, fishing, and diving, which he really enjoys in his downtime. With his more recent work overseas, Matt has felt the pinch of continuously being away from friends and family, experiencing time zone differences and limited connectivity, and missing important life events. "I am lucky to have a family that is supportive and understanding of the career goals that have taken me internationally, though; it does make the distance more manageable."

In the future, Matt is looking to progress into flying heavy helicopters, specifically the Super Puma operated by his current company. This will require more training, but it's a challenge he's eager to take on. "Eventually, I'd like to start my own business, but for now, I'm focused on gaining as much experience as possible to achieve my goal of flying heavy helicopters in precision long-line." **HO**

Bronni Bowen is a fixed-wing pilot and aviation writer who lives in Melbourne, Australia. She is passionate about the history and culture of General Aviation in Australia, and the role of women in aviation, it is a lifelong ambition of hers to fly and tell stories from the highlands of PNG.

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PAUL KENNARD

HOUSE OF CARDS?

On 24th October 2024, eVTOL company Lilium eAircraft warned the Nasdaq Index that it was facing insolvency after the German government declined to guarantee a €50m loan. It was the start of a pack of cards collapsing. The Bavarian Government also refused an application for significant support, and state sponsorship from other Governments failed to materialize despite the offers of using the funding to build facilities in those nations as an industrial offset. With a loss of Government confidence, investor confidence, unsurprisingly, evaporated. On 30th October, Lilium announced it would have to file for insolvency.

The (many hundreds of) million-dollar question that the eVTOL industry has to contend with is: Was Lilium's collapse an isolated incident, an outlier, or something more systematic for the sector as a whole? Does Lilium's imminent failure mean 'more of the eVTOL pie' for everyone else, or are the rest of the industry hearing the 'crocodile of fiscal reality' snaking up behind them? Is Lilium the start of a significant adjustment in the nascent sector? Is it the sounding gun for capital flight as investors cut off their credit lines and retreat back to other areas of Hi-Tech and Telecommunications?

IS THE INDUSTRY DOOMED FOR A SIGNIFICANT CULLING OF THE HERD?

Another German eVTOL company, Velocopter, has also faced struggles this year. In the Spring of 2024, it warned that

it was having to consider insolvency as it was struggling to generate new capital from fresh investors, and, as per Lilium, both the National and Bavarian governments had refused to guarantee additional loans. After weeks of uncertainty, finally, Velocopter announced that additional funding had been secured but was reticent about the source to keep the company solvent. However, it's also perhaps a stark reminder of the fragility of a market where Velocopter was valued at nearly $2Bn less than two years ago. As I write in mid-November, the Chinese conglomerate Geely is reportedly in talks about acquiring a controlling stake in the company as another funding crisis looms. The sums that the likes of Bloomberg are quoting suggest that $95m today is enough for an 85% stake in the business which infers an estimated value of $110m - barely 10% of the 2022 valuation.

That's really bad news for the industry as a whole - especially if the contagion spreads and investor confidence plummets.

WHY?

I've long been skeptical that the global 'demand signal' for eVTOL aircraft is anything like the scale that the industry has been bullishly pushing - no doubt keen to snare investors who have a 'Fear of Missing Out' (FOMO). We're manifestly not in 'Uber of the Skies' territory yet, and quite possibly never will be. Unlike Uber or Lyft, where anyone with a smartphone and a relatively economical car (in London, seemingly inevitably a Toyota Prius) can invest in a small business and start earning money, an eVTOL business faces significant barriers to entry.

PRIME AMONGST THEM IS THE COST

The Uber-style business model relies upon the fact that the likes of Toyota and, increasingly, Chinese manufacturers

will invest $Bns in designing, testing, building and marketing cars for huge global markets. At last count (2020), Toyota had produced over 15 million Prius' and although sometimes it seems they are all used as Ubers, most have been purchased for individual and fleet use. The R&D cost is amortized to almost nothing over so many vehicles, and all concerned benefit from the economies of scale that such prodigious numbers offer - in build, servicing and aftermarket spares recovery.

I've often had it quoted that designing, building, testing and certifying a modestly sized commercial aircraft is $1Bn. That figure relies upon the aircraft being designed within extant regulatory Certification Standards (CS) and having crews able to fly it under the aegis appropriate Flight Crew Licencing, an approved training program and a robust Type Certificate. The eVTOL industry's major problem is that it has none of these to fall back on. Worse, in many cases, the FOMO has driven companies to start designing and building against a less than fully formed regulatory environment - increasing risk and cost. As we used to say in mission planning - 'Plan early, plan twice...'. The fact that many of the eVTOL 'flock' are underwritten by non-traditional funding sources only adds yet more pressure - and those that have made their money work for them by short, two to three-year investment 'sprints' are unlikely to want to see their capital tied up for an 8 to 10-year development and certification schedule.

Especially when the end demand is likely to be much lower than that being hyped up by the industry and its supporters.

Unlike an affordable Uber-friendly Prius, a four to five-seat eVTOL is unlikely to cost much less than $3-5m. It's going to require significant funding to invest in a fleet. For the foreseeable future, even if operating in some form of Urban Airborne Mobility (UAM) network, the eVTOL is going to need a commercially qualified and type-rated pilot to fly it

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- especially is, as one suspects, a key facet of the initial Value Proposition is the rapid movement of well-heeled individuals in and out of significant conurbations from the large airports in their hinterlands. Firstly, how many cities are there where such a transport method is viable, and, secondly, how many people can really afford it? Thirdly, pilots are invariably not cheap and work to strict rules over currency and duty time. The first generation of eVTOL designs will need to provide either a version with two sets of controls or removable controls to permit initial conversion, recurrent training, and the provision of a check pilot as per current commercial aviation operations.

Is there a model where an expensive machine carrying, maximum, four passengers (and their luggage?) over 10-15 miles from the terminal to downtown at speeds not much faster than a train can generate enough revenue to make a profit - especially as the aircraft will need regular downtime for recharging? At $500k / remote piloted per aircraft it looks tough, at $4m plus an onboard pilot, it seems impossible to me.

The industry must realise, eventually, that eVTOLs don't get a 'free pass' on over 120 years of aviation regulation just because they are 'different'. The same applies to consideration of power reserves (the equivalent to Diversion Fuel, FRF and MLA), weather limits en-route and at destination, and the frequency and fidelity of emergency training. If they wish to operate commercially, they must show compatibility at least with the spirit of current RW and FW charter / air taxi (Part 135) operations.

I've therefore yet to be convinced that the worldwide market for 'Phase 1' of eVTOLs is large enough to support more than the output from a handful of manufacturers. Of those, established aerospace companies such as Airbus will likely hold an advantage, having already proved repeatedly with other machines that they can demonstrate Acceptable Means of Compliance (AMC) to the regulators - I expect their

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City Airbus NextGen prototype to spawn a family of certified machines. As a multi-faceted business, Airbus can withstand any vacillation on the part of the regulators without having to push for (yet) another capital round to stay afloat. Others will not be so lucky. Even those ambitious and hitherto well-funded start-ups are not immune, as Lilium graphically illustrates. The second prototype of Vertical's VX-4 has just successfully completed its first untethered human-piloted flight, yet the company is not immune to fiscal constraints. Just as it embarks upon Phase 2 of its Test & Evaluation program, aiming for an ambitious 'break-even' point of 2030 (under an initiative entitled 'Flightpath 2030') and the ramp-up to the production of several hundred aircraft a year (if the demand is there...), they are still admitting to concerns over near-term funding - causing it to delay the likely Type Certification date of the aircraft back to 2028.

There's an old aphorism about escaping from a crocodile that's chasing you. You don't have to outrun it to survive, just be faster than the next slowest person. Lilium, sadly, appears to have already been caught, but the 'crocodile' still seems hungry. How many more eVTOL companies will succumb to its jaws, and how many will survive to deliver certified, viable and profitable products?

Who is 'the next slowest runner'? **HO**

Paul "Foo" Kennard is a former Royal Air Force CH-47 Chinook pilot, who specialised in Tactical Instruction, Electronic Warfare and Operational Test & Evaluation during a 23 year career, during which he flew operationally in Northern Ireland, Bosnia, Kosovo, Iraq and Afghanistan. Since leaving the RAF, he has established his own consultancy company where he continues to provide input into high technology rotorcraft and aerospace projects for governments and Industry. He is a key member of the NATO Next Generation Rotorcraft study team, specialising in Defensive Aids Suites, Degraded Visual Environment technology, Head Mounted Displays and teaming with unmanned aircraft.

GLEN WHITE

WHY WE CRASH HELICOPTERS: MIND OVER ROTOR

PART ONE

Glen continues his discussion on pilot knowledge and the ramifications of inadequate knowledge.

Helicopters coexist within peril's embrace, facing hazardous weather, malfunctions, and demanding missions. Yet, while the reason for mechanical malfunctions can be meticulously analyzed, the intricate maze of a pilot's psychology is less charted. The elaborate relationship between a helicopter pilot's mental processes and critical decisions can spell the difference between making it home safe or disaster.

Amid the myriad of helicopter flight displays, autopilots and electronics, a pilot's mind becomes the most sophisticated instrument in the cockpit; processing vast amounts of information at breakneck speeds. This mental machinery, refined through rigorous training and experience, is also susceptible to the nuances of emotions, biases, and innate human tendencies.

Understanding these psychological underpinnings is not just a matter of academic interest, it's a pivotal cornerstone in the quest for absolute aviation safety. Recognizing

these factors and proactively addressing them is the bedrock to preventing accidents. In the aviation industry, there is a tendency to focus on procedures and practices that often offer limited benefit in the pursuit of accident avoidance. With accident rates remaining largely unchanged over the past years, it may be time to confront the elephant in the room.

SITUATIONAL AWARENESS AND COGNITIVE LOAD

Situational awareness and the effects of cognitive load on situational awareness are the most important aspects of accident mitigation. Though these terms are often used at nauseam, these psychological facts are at the heart of most helicopter accidents.

In essence, situational awareness is a pilot's perception and understanding of their environment and its potential future state. Meanwhile, cognitive load is the mental 'weight' of everything a pilot has to think about and process in that environment.

Situational awareness within the helicopter flight environment is crucial because we often operate in a unique landscape which carries with it many added associated risks. Helicopters often operate at low altitudes, close to terrain and obstacles like power lines, trees, and buildings. This proximity to hazards requires pilots to have an acute awareness of their surroundings. Unlike fixed-wing aircraft that typically operate at higher altitudes, helicopters are more susceptible to collisions with obstacles, especially during takeoff, landing, and hover.

Additionally, helicopters are versatile and are frequently used in specialized roles such as medical transport, search and rescue, logging, construction, and more. These roles can

require hovering in challenging environments, precision maneuvers, and operations in confined spaces. For instance, a EMS call in mountainous terrain might require a pilot to be aware not just of the terrain, but also of the wind patterns, potential landing zones, and the activity of rescue personnel on the ground.

Weather changes also impact helicopters, especially given the low altitudes at which they operate. For example, sudden fog can drastically reduce visibility, making power lines and other obstacles particularly hazardous.

Moreover, the mechanical and aerodynamic complexities of helicopters, such as mechanical failures, performance at altitude, fuel calculations, and issues such as vortex ring state, mean that pilots must be continuously aware of the aircraft's performance envelope and the implications of their control inputs.

A loss of situational awareness in helicopter operations can have immediate and severe consequences. For example, during a hover, a slight drift without the pilot's awareness can result in a collision. Or in a rescue scenario, a pilot may become so focused on the task at hand that they may forget about fuel levels, potentially leading to fuel starvation.

Cognitive load on the other hand, refers to the total amount of mental effort being used in the working memory that can effect the situational awareness of the pilot. When the cognitive load becomes too great, the risk of errors or oversight increases because the pilot's working memory gets overwhelmed. This load can result from a single malfunction and or the combination of external forces that in cumulation have become so overwhelming that a "deer in the headlights" scenario develops.

An example of cumulative factors effecting a flight would be a helicopter entering congested airspace with passengers,

impatient from weather-induced delays, airing their grievances to the pilot, turning the cockpit into a symphony of complaints. As the pilot strains to catch each radio call, the incessant hum of discontent drowns out ATC instructions and a call is missed. Not pleased, ATC reprimands the pilot over the frequency, amplifying the the pilots stress level. When the pilot tries to enter the assigned squawk code one of the number keys on the transponder is unresponsive. As weather continues to deteriorate ATC instructors the pilot to immediately turn left 45 degrees for collision avoidance. Such an overwhelming cacophony of distractions and demands can precipitate a momentary lapse, with the potential to be tragically final.

To reach this overload of cognitive abilities the scenario does not need to encompass numerous back to back contributing factors. It can be as basic as the engine failing. When this occurs the pilots' environmental comfort of familiarity becomes altered to a point of confusion. The sound within the helicopter changes, the feel of the helicopter changes, the instruments are changing and caution/warning panel lights start to illuminate. This mental overload of change delays the pilots ability to analyze the state of the helicopter and crucial seconds tick by as the pilot stares in disbelief at the instrument panel. When the mind gets too bogged down, mental decision making comes to an abrupt halt.

Situational awareness is maintained and enhanced when cognitive load is managed efficiently. If a pilot is overwhelmed with information or tasks (high cognitive load), their ability to maintain good situational awareness can degrade. They might miss crucial cues, make poor decisions, or react slower to changing conditions.

Enhancing a pilot's situational awareness and expanding their capacity to handle cognitive loads during flights is a

multifaceted task that begins long before they ever climb into the cockpit. Far from merely absorbing paragraphs from a textbook, true mastery of our environment demands a comprehensive approach. It begins with maintaining optimal health and extends to rigorous learning and training sessions on the ground and in the air.

Maintaining a healthy lifestyle is one of the most import and overlooked components of the mental fortitude that situational awareness and cognitive load abilities require. It encompasses consistent physical activity, adequate sleep, and proper nutrition. It's crucial to engage in regular exercise that suits your body and lifestyle, ensuring it's both enjoyable and sustainable. Proper nutrition, without delving into specifics, plays a foundational role in overall health, and mental acuity. Additionally, securing a regular sleep pattern and ensuring sufficient rest each night is paramount for cognitive function and physical rejuvenation. Mental and emotional well-being can be supported by fostering positive social connections and finding individualized strategies to manage stress.

Possessing comprehensive knowledge of your helicopter is also crucial for its safe operation. Should a system or component malfunction or fail, it's imperative for the pilot to fully grasp the nature of the problem and the necessary corrective actions. Many pilots mistakenly assume they can troubleshoot issues on the fly. However, numerous accidents have demonstrated that such an approach is not only risky but potentially disastrous. The vast majority of time when a pilot encounters an unfamiliar situation in the cockpit the immediate reaction is paralysis followed by a panicked response that in no way resembles the proper action. Truly understanding your aircraft requires dedication and time. Numerous resources are available to pilots, yet

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many remain underutilized. These include the aircraft's flight manual, the helicopter's systems manual, and a plethora of manufacturer's informational and technical documents.

Looking at the training aspect of situational awareness and cognitive load, we know that training is the act of learning a new skill or refreshing a previously learned ability, whether it be a full down autorotation or external load operations. A unprepared pilot will in all likelihood perform poorly in the event of a failure in the helicopter. With the stress of the event overloading his cognitive reasoning the pilots analytical thought process diminishes causing the pilot to enter a catatonic state or react unpredictably to the event. Whether the training event is a flight with an instructor or sitting in the helicopter visualizing various lights illuminating on the panel and imagining a planned reaction, training prepares the pilot for an emergency or failure within the airframe.

Mastering the art of handling robust cognitive loads and high-stress situations requires consistent practice and adaptation. In everyday life, from navigating unpleasant traffic to managing personal family issues, there exists a myriad of opportunities to hone these skills. In the heat of such moments, it's pivotal to pause, preventing hasty reactions that could exacerbate the situation. Prioritize the most critical issue, tackle it, and then methodically address the subsequent challenges. Integrating deep, controlled breathing techniques into the situation can instantly help modulate stress, promoting clarity even under immense pressure. By combining experiential practice with relaxation techniques, one can build resilience and enhance decision-making abilities under stress. **HO**

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NAVIGATING THE FUTURE

NNSA'S TRANSITION TO THE AW139 FROM THE BELL 412

COVER FEATURE

BY
NED DAWSON

The National Nuclear Security Administration (NNSA) has one unwavering counterterrorism / counterproliferation mission: to protect the public from radiological hazards, both anticipated and unforeseen. The Nuclear Emergency Support Team (NEST) is NNSA's multi-mission nuclear emergency response capability that leverages the Department of Energy's (DOE) world-class scientists and technical experts to contend with the Nation's most pressing radiological and nuclear challenges.

NEST is the umbrella designation that encompasses all DOE/NNSA radiological and nuclear emergency response functions, some of which date back more than 60 years. NEST's motto – "Scientifically Informed, Operationally Focused" – reflects the technical underpinning of its diverse operational missions.

A leader in this mission space, NEST's Aerial Measuring System (AMS) program stands as the gold standard in airborne radiological monitoring. The expert pilots and scientists of the AMS are uniquely prepared to respond to

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any nuclear emergency in the United States within hours, ensuring both preemptive and reactive coverage with an impressive blend of speed, detail, and precision.

After nearly a decade of fleet modernization, AMS now operates NNSA owned aircraft from two strategic bases—one near Washington, D.C., and another in Las Vegas. With three Extended Range King Air 350s and two state-of-the-art AW139 helicopters, AMS teams are equipped with sophisticated monitoring systems that enhance public safety efforts in dealing with diverse radiological scenarios. A third AMS location in South Carolina flies NEST equipment on non-AMS owned aircraft in partnership with DOE and another federal agency. Recently, HeliOps visited AMS's dedicated crews at Joint Base Andrews to see firsthand how their new AW139s are taking this vital national security program to new heights.

ROOTED IN HISTORY

While the AMS program traces its roots back to airborne measurement efforts during atomic and nuclear weapons testing during the 1950s, it wasn't until the very end of the 1990s that the AMS was officially created. Shortly after its formation by Congress in 2000, the AMS found itself responding to its first emergency in the early hours following the infamous 9/11 attacks when they were called upon to conduct radiological surveys over Ground Zero in New York City; a mission unlike any other. With the airspace tightly restricted and an atmosphere of intense security, the Bell 412 crew faced the task of surveying the remnants of the World Trade Center, searching for potential radiological material amidst the devastation.

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"It was surreal," Tim Rourke recalled. *"Flying over Ground Zero, we could still see smoke rising from the wreckage, and the sheer scale of the destruction was overwhelming. We were threading our way between buildings and trying to maintain precise flight lines in an environment that was anything but normal."*

After careful coordination with the Federal Aviation Administration (FAA) and law enforcement agencies to ensure the helicopter's safe passage, Tim Rourke who has been with the unit for many years, was the mission pilot on 9/11. He and his crew finally received clearance to thread their way through the restricted airspace from Joint Base Andrews to New York City. Navigating a complex route through tightly secured airspace, they eventually arrived to conduct radiological surveys over the rubble-strewn site where the Twin Towers once stood.

"It was surreal," Tim Rourke recalled. "Flying over Ground Zero, we could still see smoke rising from the wreckage, and the sheer scale of the destruction was

overwhelming. We were threading our way between buildings and trying to maintain precise flight lines in an environment that was anything but normal."

Rourke noted how, even a week later, smoke was still rising from the smoldering ruins, giving the air a distinct, acrid smell. Beyond Ground Zero, his team also conducted surveys over the Staten Island landfill known as Fresh Kills, where debris was already being transported for sorting and investigation. Their work, later shifted in focus to using nitrogen-cooled, multi-spectral cameras requiring meticulous timing at twilight, which provided critical data to firefighting and recovery teams, by helping to monitor and assess hotspots. "We kept going back, night after

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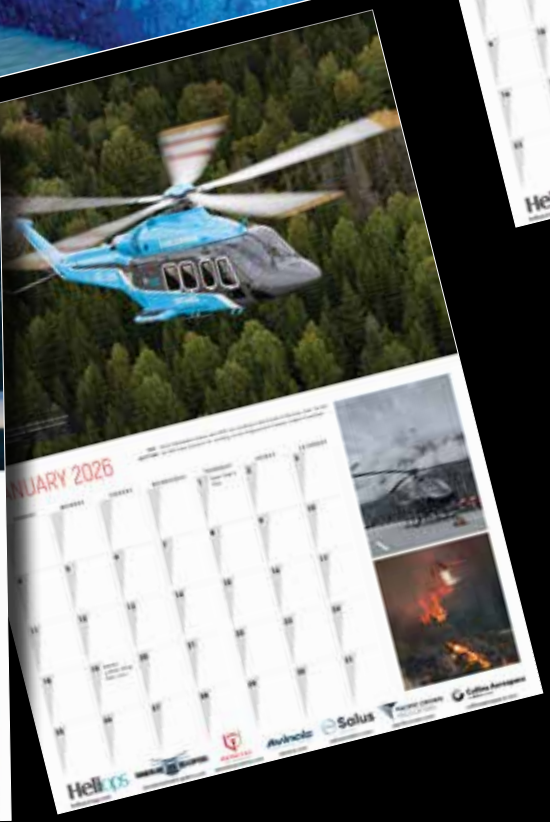

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night," Rourke reflected, "always with the same objective, to show the Incident Commanders what the subterranean fire was still doing."

In the years following 9/11, the AMS's distinctive grey Bell 412 helicopters became more frequently seen, maneuvering through the skyscrapers of America's most iconic cities to meticulously survey sites ahead of large-scale events like the Republican and Democratic National Conventions and Presidential Inauguration—events that might appeal to those with harmful intentions.

Though the AMS was formed to respond to incidents within the United States, following the catastrophic earthquake and tsunami that struck Japan in 2011, AMS crews were deployed internationally at the request of the

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Department of Defense to survey the unfolding Fukushima Daiichi incident. Using spare equipment and DOD partner aircraft, these AMS surveys revealed a crucial finding: contrary to predictive environmental models indicating that radioactive material would primarily disperse out to sea, radiological contamination was in fact, spreading inland as well. This unexpected discovery underscored the importance of real-time data collection amid critical events.

A few years later, after the Boston Marathon Bombing, AMS aircraft have become a regular presence at large public events deemed high-risk by the Department of Homeland Security's Special Event Assessment Rating (SEAR). Today, the AMS is commonly requested by government and commercial clients for events like marathons, Super Bowls, and New Year's celebrations. These AMS helicopters conduct detailed baseline radiation surveys before and even during events. This proactive measure not only detects unexpected radiation "hot spots" but also establishes

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a reference point to aid swift response if a radiological security threat arises.

Additionally, the AMS surveys sensitive sites, such as superfund remediation locations and the sites of current and even potential, nuclear reactors for energy production. The aircraft and crews also train for, and participate in, assisting in radiological asset recoveries, directing specialized units on the ground to the location of expected or unexpected materials of interest.

These low-altitude survey flights have often prompted

concerned citizens to call law enforcement or the FAA, unaware of the vital public safety mission carried out by the scientists and aviators onboard the distinctive-looking aircraft. In recent years, the NNSA's public relations stance has shifted, taking a more proactive approach to raise awareness and educate the public through press releases to the media, before survey flights. However, the AMS crews are still amazed and amused at some of the misconceptions that can be found on social media posts, especially when flying in new locations.

24/7 COAST-TO-COAST RESPONSE

Focused on public health and safety and rapid response, the AMS team operates as a uniquely specialized unit where pilots, scientists, and leadership seamlessly collaborate to deliver world-leading airborne radiological response capabilities. While AMS is frequently called upon for routine preventative or monitoring surveys, its core mission is emergency nuclear incident response. To maintain their emergency readiness, AMS is structured for continuous, around-the-clock operations, with dedicated crews on standby at each base, ensuring they can deploy within a four-hour window should any incident arise across the continental United States. This dual-base setup not only broadens geographical coverage but also shares the workload, allowing each location to function as a self-sustained unit equipped with skilled pilots, AMS

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scientists, and support staff to manage both routine surveys and emergency missions within their primary regions of responsibility.

AMS pilots have thousands of hours of experience—many with military backgrounds—and are dual-certified in both fixed-wing and rotary-wing aircraft. This expertise allows them to operate both the King Air and Bell 412 and Leonardo AW139 helicopters, providing flexibility in deploying the right assets for the mission. In a typical emergency response, a King Air is first on the scene to conduct preliminary measurements, followed by a helicopter team to create a detailed map of the incident area.

For more than two decades, the NNSA's AMS relied heavily on its Bell 412 helicopters—a robust and versatile platform that met the demands of radiation surveys for major public events, and emergency deployments. However, as operational needs evolved and technology advanced, the nearly 30-year-old Bell 412s began to

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show their age and limitations. This shift led NNSA to transition to the Leonardo AW139, a decision that brought a significant upgrade to AMS's aerial measurement capabilities.

TECHNICAL NECESSITY OF THE TRANSITION

Valued for its power, twin-engine redundancy, and straightforward, rugged design, the Bell 412 served as the backbone of the AMS helicopter fleet, but the limitations of the aging 412s became increasingly apparent. While capable, its steam-gauge cockpit and manual flight controls demanded constant pilot input, leading to an intense workload during complex missions. Further, the cabin's tight quarters and lack of air conditioning made long missions a taxing, visceral experience, not only for the pilots, but also for the scientists and technicians operating

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specialized equipment and at workstations in cramped, sometimes sweltering conditions.

"As reliable as it's been, the Bell 412 was reaching its limits," explained Rourke. "There's only so much we could upgrade before hitting a ceiling. For radiological surveys or emergency response in urban landscapes, we needed something that was more capable and better suited for our missions."

Beyond safety and reliability, the transition was further driven by a desire for greater stability, enhanced payload capacity for advanced detection systems, and improved precision—all without further burdening the crew. These factors led the team to assess several aircraft, ultimately finding the AW139 to provide the greatest value to the government, while also fitting the program's current and future mission requirements.

THE AW139'S TECHNICAL EDGE AND ENHANCED SAFETY

The AW139, a twin-engine, medium-sized helicopter, is engineered for versatility and reliability. Powered by dual Pratt & Whitney PT6C-67C engines, each providing 1,679 shaft horsepower, the AW139 offers an impressive combination of speed, power, and efficiency. The engines are equipped with Full Authority Digital Engine Control (FADEC), which continuously adjusts engine parameters based on flight conditions and pilot inputs, optimizing performance in real-time.

"The aircraft itself, especially the new avionics suite, is a major leap forward." Remarked, Mission Pilot, Dave Prasek. "It's like comparing a high-end Cadillac, to a basic Volkswagen." The AW139 features a fully digital glass cockpit, integrating four large multifunction displays that provide real-time data on flight parameters, navigation, and aircraft systems. Linked to dual integrated flight management systems (FMS), these displays enable pilots to access all critical information at a glance. Additionally, the AW139's four-axis autopilot offers precise control in all flight conditions, providing stability during long missions and improving safety during low-visibility operations.

The typical flight profile requires the helicopter to fly straight lines at an altitude of about 150 feet and the parallel lines are spaced about 100 to 300 feet apart. "Flying survey lines in the 412 felt like flying the final segment of an ILS approach for two hours straight." Explained, Mission Pilot, Steve Strawbridge. Both pilots are always highly involved and engaged in ensuring the mission is progressing safely.

"For us, the glass cockpit has been a game-changer," said NNSA's Chief Pilot, Alex Brid. "The flight management system greatly reduces our workload, and we're also

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finding that the AW139's autopilot is very reliable, and dependable where we need it."

The most difficult part about continuously flying in this low-level environment, according to Rourke is always being on the lookout for obstacles. Communication between the pilots and scientist crewmembers in the back is integral to mission success and safety, as is every edge to enhance situational awareness and reduce crew workload that the aircraft and avionics can provide.

INTEGRATION OF ADVANCED DETECTION SYSTEMS

The NNSA's core counterterrorism and counterproliferation mission is to monitor and respond to radiological threats with accuracy and efficiency. This means the ability to detect and measure radiation levels with a high degree of precision is paramount. The AW139 was selected not only for its flight capabilities but also for its compatibility with advanced radiological detection systems.

The Bell 412's radiation detector configuration was effective, but for missions like these, the more i nformation the sensors can detect, the better. A more sensitive, thus heavier, detection setup was desired. The AW139 carries a larger number of detectors, increasing instrument sensitivity by 50%. This additional sensitivity is crucial for detecting faint radiological signatures in l arge survey areas or complex urban environments. For instance, the onboard sensors can easily detect the precise levels of ground-level environmentally ambient radiation. This level of predominately naturally occurring radiation is hundreds of times below what is considered a concern to health, yet is easily detected even while flying 150 feet above the ground, Dr. Jacqueline Brandon, AMS

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Supervisor of the scientists and technicians in the RSL Joint Base Andrews office, elaborated on this capability: "The increased sensitivity and resolution in our detector arrays mean we can get a much clearer picture of radiological patterns. It's not just about finding radiation; it's about understanding its context and accurately identifying its source."

The AW139's radiological detection equipment is integrated with a real-time data analysis suite, allowing mission managers to visualize radiation levels in real time on digital maps during the flight. This immediate feedback loop enables rapid decision-making and more precise survey planning. Dr. Brandon added, "The AW139's enhanced sensitivity and increased capability give us a

The AW139's radiological detection equipment is integrated with a real-time data analysis suite, allowing mission managers to visualize radiation levels in real time on digital maps during the flight. This immediate feedback loop enables rapid decision-making and more precise survey planning.

much broader and clearer picture than we had with our previous aircraft."

PUTTING THE PIECES TOGETHER

Another key advantage of the AW139 is its increased payload capacity and modular design, which allow the NNSA to adapt the helicopter's equipment setup based on mission requirements. Leonardo's AW139 can accommodate up to 1,800 pounds more payload than the agency's Bell predecessor, and the spacious cabin can accommodate multiple sensor arrays along with their vibration-

dampening systems, specialized communications hardware, and mission workstations.

While the aircraft were being built, Dr. Brandon coordinated with Leonardo's engineers to ensure that the new AW139s suited all their needs and allowed the scientists to equip and operate their hundreds of thousands of dollars' worth of precision detection equipment. "Nearly everything we use is commercially available." Stated Dr. Brandon, "Figuring out where to place the sensors and workstations, for space and center of gravity concerns, as well as wiring everything for connectivity and power did require some extra attention."

Given the increased cabin space in the AW139, AMS and

Leonardo were able install all the sensor equipment from the 412 into the new aircraft. Even the large sensors that were iconically attached to the sides of the 412s were able to be installed inside the 139's spacious cabin. Interestingly, the primary reason for their external placement was due to fuel tanks being beneath the floor of the 412 which had a variable impact on the sensitivity of the equipment. Despite modularly installing hundreds of pounds of sensors and workstations into the cabin, there is still room to comfortably accommodate the crew of two pilots, one to two mission scientists, and an equipment technician.

Additionally, the aircraft is fitted with enhanced cellular and satellite data transmission capabilities to allow the high bandwidth of real-time voice communications with national and local government emergency services and data to be streamed to the cloud for detailed analysis on the ground by the scientists at the DOE national laboratories from anywhere in the world, to rapidly be presented to Incident Commanders to give them the latest and most precise radiological data and interpretations available.

OPERATIONAL PERFORMANCE AND REAL-WORLD BENEFITS

The AW139's performance characteristics offer clear advantages over the Bell 412. With a cruise speed of 150 knots and an operational range of 400 miles, the AW139 has more than an hour and a half longer endurance and flies further than the 412s. This allows them to reach survey areas faster and cover larger areas in each flight, reducing the need for refueling stops and increasing overall mission efficiency. This enhanced speed and range are crucial when missions involve urgent radiological responses or expansive areas to survey.

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The AW139's five-blade main rotor system delivers smoother flight characteristics and reduced vibration levels, directly translating to increased crew comfort and less wear on the aircraft. This improvement in comfort isn't just about making the ride smoother—it's about reducing crew fatigue over extended missions. Also contributing greatly to comfort and the reduction of crew fatigue, is the universally welcomed addition of air conditioning in their new aircraft.

"Pilot and crew fatigue was a significant concern with the Bell 412," Remarked Mission Pilot Bryan Fox. "Particularly on missions that require long periods of low-level flight to complete the surveys." The manual flight controls and limited automation meant that pilots had to remain fully engaged for the entire duration of the flight. The AW139 addresses this issue with its advanced autopilot system and automated flight controls, allowing pilots to focus on mission-critical tasks such as the exacting task of flying precise survey lines, rather than constantly hand-flying the aircraft from take-off to landing.

"The AW139's autopilot can handle most of the routine flying tasks," Brid explained. "It's not just about convenience—it's about keeping us fresh and alert during missions that can last for hours."

Additionally, the AW139's reduced noise profile is a key advantage. The helicopter's advanced rotor design and noise-dampening technologies lower its acoustic footprint, making it less intrusive during missions in populated areas or near sensitive sites. This reduction in noise not only helps maintain a lower profile but also minimizes disruptions to the communities in which the team is operating above.

"It's a win-win," Rourke added. "We can get in, do our job, and get out without causing a stir. That's critical when you're flying over sensitive sites or public events."

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TRAINING AND MAINTENANCE OVERHAUL

Transitioning to the AW139 required a comprehensive overhaul of training programs and maintenance protocols. Pilots underwent extensive retraining, which included classroom sessions, simulator hours, and in-flight mentorship with experienced AW139 instructors. The training focused on mastering the helicopter's digital

avionics, advanced flight controls, and automated systems.

"We didn't want our pilots to just switch aircraft; we wanted them to be masters of the AW139," Brid explained. "That's why we implemented a phased training program that combined simulator hours with real-world flights. It's not just about getting comfortable—it's about being competent in every situation we might face."

Taking a thorough approach to AW139 training, AMS

created an internal program that paired pilots with an experienced instructor for 12 real-flight hours before full certification. Each pilot retained their previous status from the 412—whether co-pilot or instructor—only after proving their readiness in live flights, not just in the simulators. "While this gradual, hands-on approach slowed us down initially," explains Brid, "it's set a strong foundation, ensuring every pilot is fully prepared to handle low-level, complex missions safely and effectively."

For maintenance crews, the transition involved significant changes as well. The AW139's more advanced systems required a deeper understanding of digital diagnostics and predictive maintenance protocols. Complimenting this, the helicopter's advanced health and usage monitoring system

(HUMS) continuously analyzes flight data and identifies potential issues before they escalate, allowing for more proactive maintenance scheduling.

FUTURE CAPABILITIES

The AMS team is already exploring additional upgrades to the AW139's capabilities, including the integration of heads-up displays (HUDs) for improved situational awareness, and enhanced flight features to further reduce pilot workload during routine operations.

The advanced capabilities of the aircraft and avionics also allow for easier expansion of the aircraft's mission

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equipment in the future should the NNSA choose to add additional imaging systems or electro-optical sensors to the aircraft. This would provide AMS with the ability to collect visible light, (Forward Looking InfraRed) FLIR or thermal video and still images of areas of interest during their operations and surveys. These future enhancements align with the agency's commitment to continuous improvement and readiness for emerging threats.

"This upgrade isn't just about us," Dr. Brandon emphasized. "It's about setting a new standard in radiological safety and being ready to support critical missions when called upon."

The transition from the Bell 412 to the AW139 represents a strategic leap forward for NEST's Aviation Team. It's not just about upgrading to a newer helicopter—it's about enhancing every aspect of their mission capabilities, from safety and stability to detection sensitivity and operational efficiency. The new helicopters bring a modernized, data-driven approach to radiological safety, allowing the team to respond more effectively and efficiently to emergencies and protect public health with greater precision and confidence.

With the AW139s now fully integrated into the fleet, NEST's AMS is better equipped than ever to navigate the complexities of radiological monitoring and nuclear emergency response, wherever and whenever the call comes. The team's forward-looking approach and commitment to innovation ensure that they will continue to set the standard for radiological public health and safety and emergency preparedness for years to come. **HO**

Ned Dawson has had an interest in the helicopter world since his first ride in a 3 Sqn RNZAF Sioux in his early years. Since then he has gone on to become an accomplished air to air photographer shooting everything from R-22s to S-92s. Ned is also the group Publisher so he is more often than not out travelling the world from Afghanistan to Africa shooting this amazing industry.

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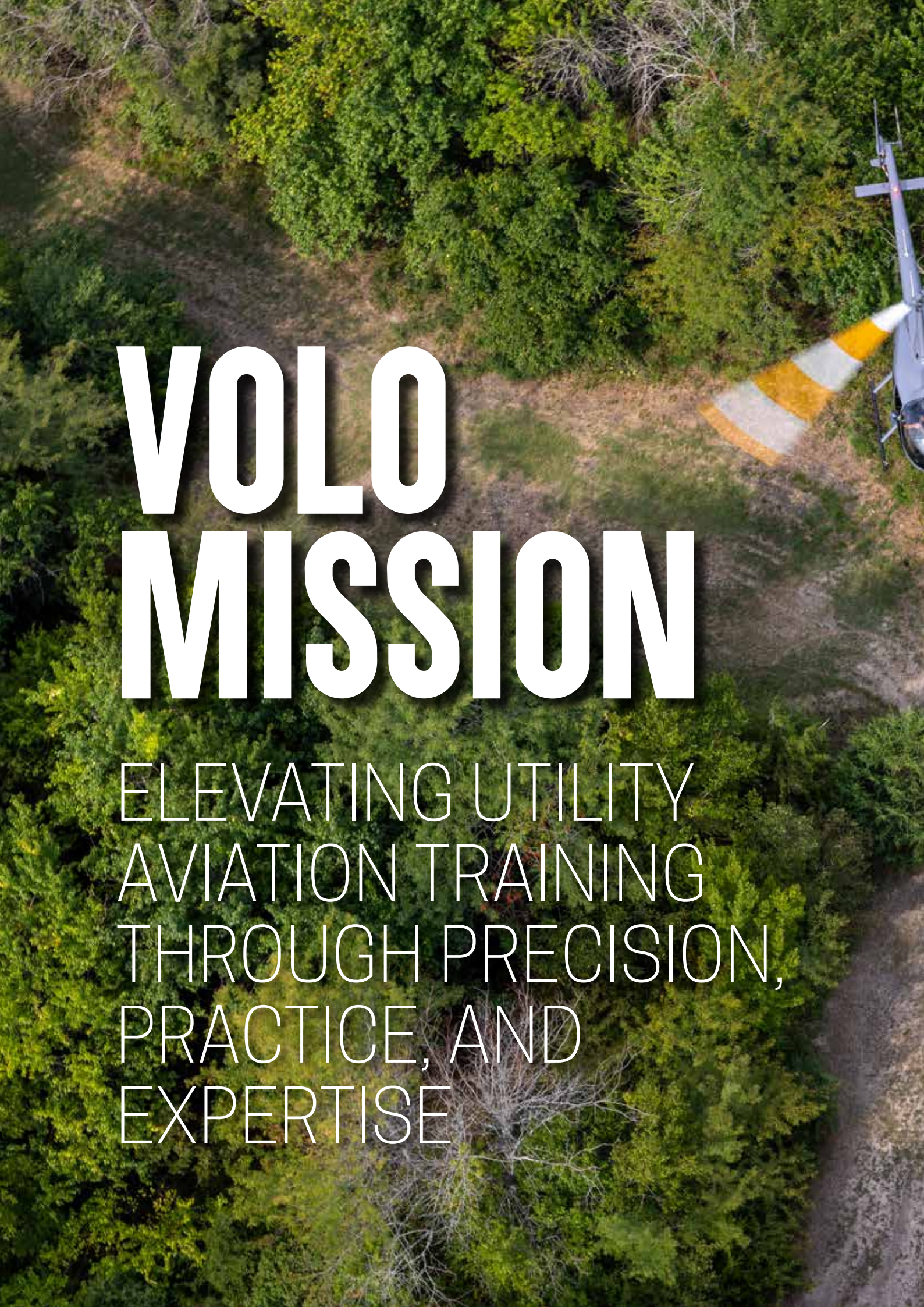

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BY
NED DAWSON

In the specialized world of utility helicopter operations, there's a growing gap in the number of pilots skilled in precision long-line and vertical reference flying. As older pilots retire, they leave behind a critical shortage of professionals ready to take on high-stakes missions like firefighting, heavy lifting, and precision placements.

The demand for utility pilots capable of handling these roles is soaring, but the traditional paths to gaining such expertise—logging or working in high-tempo operations—are less accessible than they used to be. This leaves a critical training gap in the aviation industry that few institutions are equipped to fill.

That's where Volo Mission steps in.

This Texas-based training organization has been redefining the standards for utility helicopter training for the past 10 years. Founded by Andre and Kim Hutchings, the training organization leverages decades of utility flying experience, and a deep understanding of the physiological and psychological considerations involved in aviation and learning. Culminating in an innovative training program to efficiently produce pilots capable of handling the demands of the utility industry.

HeliOps recently visited "The Ranch,"

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in Campbell, Texas to learn more about the unique training environment and opportunities that the company provides, and witness first-hand how this dedicated program doesn't just train pilots—it's shaping the future of utility aviation.

A CRITICAL GAP – THE GROWING NEED FOR UTILITY FLYING EXPERTISE

Utility helicopter operations require pilots to perform with pinpoint precision while carrying external loads, often in extreme or unpredictable environments. Small mistakes can lead to significant consequences, both in terms of safety and operational success.

Across the industry, the demand for well-trained utility pilots is continually growing. Large-scale wildfires, disaster relief, and infrastructure projects create a constant need for helicopter pilots capable of executing precision work in challenging environments.

Yet, the path to becoming a utility pilot isn't as straightforward as one might imagine.

Historically, many pilots gained their long-line skills through years of experience in logging, where high-frequency load placement helped hone precision over many hours of repetition. Over the years, these opportunities have decreased significantly, without these positions available to build foundational skills, many emerging pilots lack the depth of experience needed to transition into utility operations. As a result, many pilots and operators, find themselves searching for alternative paths to develop the foundations required by this uniquely demanding field.

Though many in the helicopter industry feel that younger pilots shouldn't need to pay for specialized training, often - you get what you pay for. Even if a pilot can get a utility job that offers to provide them with experience, frequently, the amount of time they spend in the right seat waiting for flight training opportunities to build

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> "Utility flying isn't just about moving a load; it's about doing so with precision, safety, and efficiency. Our goal is to instill those principles in every pilot we train."

their experience is far longer than they imagined. This is especially true when many of the aircraft utilized cost several thousands of dollars per hour to operate. So, "on the job training" often devolves into infrequent opportunities which can take years to add up to any degree of proficiency when dealing with such perishable skills.

This is where Volo Mission fills a critical gap in the industry. Their programs are designed to provide pilots with a structured, replicable way to learn vertical reference and precision long-line techniques. Instead of relying on years in the field, new pilots can gain meaningful experience in a couple of weeks, entering the utility pilot workforce with the confidence and skills needed to handle the job safely and effectively.

"Utility flying isn't just about moving a load; it's about doing so with precision, safety, and efficiency. Our goal is to instill those principles in every pilot we train." Remarks one of the company's Instructor Pilots, Greg Bettis, also Chief Pilot for Billings Flying Service on the CH-47.

The program bridges this gap by offering an accelerated, comprehensive curriculum dedicated to the utility mission. Pilots who complete the program find themselves equipped with the technical and mental skills to perform confidently in high-stakes vertical lift scenarios, making them valuable assets to employers. "We've had several students say, 'I was told that if I come and get training here, I would get hired.'" States, Kim.

The program's continued success is

rooted in it's holistic, ground up approach, and deliberate choices that have been made along the way to provide the student, and thus the industry, with the highest chances for safety and success.

A DELIBERATE CHOICE: SIZE MATTERS

A distinctive feature of this training program is its reliance on the Robinson R44 and, more recently, R66. While some might question the choice of these light aircraft for utility training, both models play a deliberate role in preparing pilots for the challenges of long-line operations.

The R44 is central to the curriculum due to its lightweight design and minimal power margins. This configuration forces pilots to focus on precise control inputs and efficient power management. As Andre explains: "The R44 makes you disciplined. It amplifies mistakes, which means pilots learn to be precise. Mastering long-line work in the R44 builds a foundation that transitions seamlessly to larger helicopters."

Kim Hutchings elaborates on the psychological benefits of starting in the R44: "The challenge of flying such a responsive machine builds mental toughness. Pilots develop confidence and adaptability, traits that are essential for real-world utility operations."

The R66 adds another dimension to the training. With more power and payload capacity than the R44, the R66 serves

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as a bridge to larger, turbine-powered helicopters commonly used in utility work. By introducing students to the differences in power management, control response, and external load dynamics, the R66 prepares them for the nuanced demands of operating more powerful and larger aircraft.

"The R66 is the perfect next step," Andre explains. "It has improved performance capabilities while still requiring the precision and finesse learned in the R44. This progression and experience ensures pilots can later handle a wide range of aircraft."

By strategically incorporating both the R44 and R66 into its curriculum, the students receive a comprehensive training foundation that prepares them for every stage of their utility flying careers. A foundation which is built using a ground-up approach.

BUILDING TECHNICAL MASTERY: A GROUND-UP APPROACH

Technical mastery isn't just a goal; it's the foundation of every aspect of the company's curriculum. Their training programs, ranging from introductory to advanced courses, are designed to take students through a step-by-step progression of skills, each building on the

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last. The result is training pilots who are not only technically proficient but capable of executing precise complex maneuvers in a variety of environments with confidence.

The curriculum starts long before students take to the skies. Ground training is a critical component, introducing pilots to load dynamics, rigging techniques, and safety protocols specific to utility operations, including emergency procedures. This ensures they have a solid theoretical base for this type of flying even before stepping into the cockpit. By developing a solid understanding of how loads behave in response to environmental factors like wind, turbulence and even gravity, pilots become knowledgeable applying that knowledge to their decisions.

Once airborne, initial flights focus on basic helicopter handling and hover precision. Students learn to maintain steady control under varying conditions, setting the stage for their external load operations. "You can't expect someone to master long-line flying if they haven't first nailed the basics," explains Andre. "It's about building confidence and muscle memory one step at a time." Then, the focus shifts to vertical reference flying—a technique requiring pilots to shift their

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gaze from the horizon to the load below. This fundamental skill is essential for long-line operations but is a significant adjustment for many aviators.

Greg Bettis recalls his own early challenges with vertical reference flying. "At first, it feels completely unnatural. You're asking your brain to let go of its reliance on the horizon and focus entirely on what's happening beneath the helicopter. It's a skill that demands patience and practice."

From there, the focus shifts to sling load work. This phase introduces students to managing external loads attached to a longline. Pilots practice picking up and placing loads with pinpoint accuracy, gradually increasing the complexity of the maneuvers. The culmination of this phase is longline training, where the line extends up to 200ft below the aircraft, requiring even greater spatial awareness.

Kim highlights the psychological aspect of this phase. "Longline flying isn't just a physical skill—it's mental. You're managing the aircraft, the load, and the environment all at once. We teach pilots to remain aware and stay calm under pressure."

The advanced stages of training integrate all these elements into real-world scenarios. Student pilots work through exercises that simulate real-world scenarios, such as placing loads on

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confined pads, high-altitude operations, and complex configurations, managing firefighting buckets, or navigating turbulent air. These training exercises simulate the challenges they'll face in utility operations, ensuring that by the time they graduate, pilots can handle these challenges with confidence and precision.

THE COURSE STRUCTURE

Courses are tailored to the needs of individual students, with the full training program typically spanning two to three weeks and giving the students about 20 hours of experience in this type of flying. The length of the course allows ample time for repetition and refinement, which are critical for developing the muscle memory and decision-making skills essential to utility flying.

Each course is capped at just two students, a deliberate decision that ensures targeted training.

"We found that two students per course strikes the perfect balance," Andre shares. "It allows for enough one-on-one time while also giving students a chance to learn from observing their peers."

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Kim adds, "The smaller class size creates a more intimate learning environment. Students feel comfortable asking questions, and we can address individual challenges more effectively."

SKILL DEVELOPMENT IN FOCUS

Throughout the course, specific skills are emphasized to ensure comprehensive readiness:

- **Hover Precision:** Students learn to hover in tight spaces and under varying conditions, mastering the fine motor control needed for utility operations.
- **External Load Dynamics:** They practice handling sling loads of different weights and shapes, understanding how loads behave in flight and how to mitigate oscillations.
- **Long-Line Operations:** This skill requires managing extended lines, often over 100 feet, which demand heightened situational awareness and precise inputs.
- **Emergency Procedures:** Pilots train for unexpected scenarios, such as load failures or weather changes, ensuring they can respond decisively under pressure.
- **Environmental Awareness:** Instructors emphasize the importance of scanning the surroundings, communicating with ground crews, and maintaining safety margins in challenging conditions.

Bettis, sums up the program's philosophy: "We're not just teaching pilots to fly. We're teaching them to think, adapt, and excel in one of the most demanding sectors of aviation."

The progression of skills and the personalized approach make the program highly effective. By the time students graduate, they're not only competent but confident, equipped to take on the challenges of utility flying with precision and poise. This is a big factor for companies that regularly send their pilots there for advanced training. "When we started, nearly 80%-90% of our students were coming to our school on their own accord." Kim explained. "Now, 10 years later, that has flipped and 80%-90% of our students are coming from the operators in the industry."

SAFETY IS PARAMOUNT

Safety isn't just a checklist; it's a mindset that permeates every aspect of training. Vertical reference and long-line operations often take place in challenging environments, where a single miscalculation can have severe consequences.

Pilots undergo simulations that mimic real-world scenarios, such as adjusting for changing wind conditions or compensating for the shifting weight of a heavy load.

Announcing Online Training for The AS350B3e

EuroSafety, renowned for its thorough ground schools, now brings that same caliber to their new online educational offerings. The first public release is the Airbus B3e Dual Hydraulic Recurrent course, which is one of the most popular models taught. It includes the entire ground school presentation, videos, additional content, comprehensive quizzes and more. Each student completing the curriculum and passing the tests will earn a Ground School Certificate.

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The instructors emphasize situational awareness, guiding pilots to assess every variable in the field, from weather patterns to the behavior of the load. These skills are crucial when dealing with unexpected challenges; as Bettis notes, "You don't know what you're going to get each time you take off. It's different every time."

In addition to physical skills, the training builds mental resilience in its students. The training environment fosters a high level of focus, requiring pilots to stay calm and composed under pressure. This mental preparation is as essential as the technical training itself, equipping pilots to handle the intensity of utility operations with a clear head and steady hands.

THE PSYCHOLOGICAL EDGE: BUILDING RESILIENCE AND ADAPTABILITY

Utility flying is a career that demands more than just technical proficiency. Utility Pilots face high-pressure situations, unpredictable conditions, and the constant imperative to prioritize safety; all while executing precise and demanding maneuvers. These psychological challenges are woven into the fabric of the training curriculum. This innovative approach is championed by Kim, whose dual qualifications as a pilot and aviation psychologist, bridges the gap between technical training and mental preparedness.

Her personal experience adds depth to her training initiatives. As one of the few women in utility aviation, Kim brings a unique perspective, mentoring students and encouraging them to persevere through challenges. Her understanding of the psychological demands of utility flying has become an integral part of the training philosophy.

Through practical tools and strategies, she helps students manage stress, build confidence, and maintain focus during complex operations. This psychological resilience not only enhances their performance but also reinforces the culture of safety and excellence that is defined by the program's flight instructors.

INSTRUCTOR INSIGHTS: THE TEACHING PHILOSOPHY

One of the defining aspects of the training is its cadre of seasoned instructors. Before cofounding Volo Mission with his wife, Andre logged thousands of hours flying Columbia Helicopters' Chinooks and 107s on utility missions for over 27 years. Andre designed the technical side of the program to foster a challenging environment for pilots at every level. Teaching blends patience with precision, allowing students to make mistakes in a controlled setting and learn from those mistakes without jeopardizing safety.

The company's instructors break down complex maneuvers into manageable steps, building each pilot's confidence as they progress. Bettis said that that this approach ensures that students understand not just how to complete a task but why each step matters. "Andre doesn't just teach you the method; he teaches you the reasoning behind it."

THE PILOT'S JOURNEY: TRANSFORMING DOUBT INTO MASTERY

For many pilots, their time at in the program can be as transformative as it is challenging. Bettis says that even experienced aviators find themselves rethinking their skills and approach as they tackle the complexities of vertical reference flying. He recalls the initial difficulty he faced, when learning to become a utility pilot, joking that even though he had 8000 hours of flight time, after ten hours on the course, he was ready to "turn in his pilot's license and go work as a greeter at Walmart." Yet, under Andre's guidance, he persisted, eventually mastering the techniques and developing a completely renewed passion for aviation along the way.

This journey from struggle to success is a common theme, where pilots are

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encouraged to push through their initial frustration and keep refining their skills. The program builds a solid foundation, giving pilots the confidence to transition from training to real-world applications.

"Every flight is an opportunity to learn," Andre says. "Whether it's a success or a challenge, there's always something to take away. Our job is to instill that mindset in our students."

Graduates leave with more than just technical skills; they carry a mindset of excellence and continue on in their careers providing a lasting positive force in the industry.

Bettis emphasizing the long-term impact of the program, said, "Our goal is to produce pilots who don't just meet industry standards—they set new ones. When our graduates step into a cockpit, they're ready to handle whatever challenges come their way."

The company has also developed an initiative to bring more female pilots into utility flying with its annual "Ladies of Long Line" event.

LADIES OF LONG LINE: BUILDING A MORE INCLUSIVE UTILITY FLYING COMMUNITY

"Ladies of Long Line" is an event created by Kim, aimed at increasing the

presence of women in utility aviation. By offering mentorship and tailored training, the program supports and educates women, encouraging those that are interested to explore a rewarding future in utility flying.

Kim's position as one of the few women in utility aviation also provides her with a platform to mentor and inspire students. Through her mentorship, she encourages all students, regardless of background, to persevere, develop their skills, and find confidence in their abilities.

"I've faced my share of challenges in this industry," she shares. "But those experiences have taught me resilience, and I want to pass that on to the next generation of pilots." She adds; "We've seen incredible growth among the women we've trained. They often excel in areas like precision and situational awareness, bringing unique strengths to the industry."

The Ladies of Long Line event has inspired other organizations to partner in recognizing and fostering the contributions of women in aviation and invest in shaping a utility industry that is more inclusive and equitable to all pilots.

LOOKING AHEAD: THE FUTURE OF UTILITY TRAINING

As the utility aviation industry evolves, so too does Volo Mission. The program is continually exploring opportunities to expand its curriculum ahead of industry trends and fulfill the advanced training needs of operators. Ensuring its graduates are prepared not just for today's challenges but for the future of the industry as well.

Through its dedicated instructors, the company seeks to fill a critical industry need and redefine utility pilot training. **HO**

Jason Jorgensen has been a professional photographer for nearly 20 years. Happiest whilst in a helicopter with camera in-hand, this US Navy veteran has combined his love of aviation and photography with his keen writing ability. Jason can be reached at jason@heliopsmag.com

AUSTRALIA'S ENGINEER CRISIS

Aviation Companies confirming the crisis: Aurora Aviation, Bosca Helicopters
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Australia's aviation industry is in crisis due to a severe shortage of Licensed Aircraft Maintenance Engineers, posing a critical risk to sector integrity and safety.

Despite industry leaders meeting with CASA seven months ago to expedite the recognition of overseas licenses, no meaningful progress has been made. This inaction directly jeopardizes Australian aviation's safety and operational efficiency.

This challenge is not new - it's been ongoing for decades, with promises of easier licensing pathways, but little has changed. The demanding requirements have hindered the entry of new talent into the industry, resulting in a significant shortage of qualified LAMEs.

The time for decisive action is now! The government must move beyond discussions and immediately reform licensing procedures, enhance educational pathways, and recognize international qualifications, to protect safety and uphold Australia's global competitiveness.

The urgency for skilled engineers cannot be overstated. Industry leaders urgently call on CASA to implement reforms that will address the engineer shortage.

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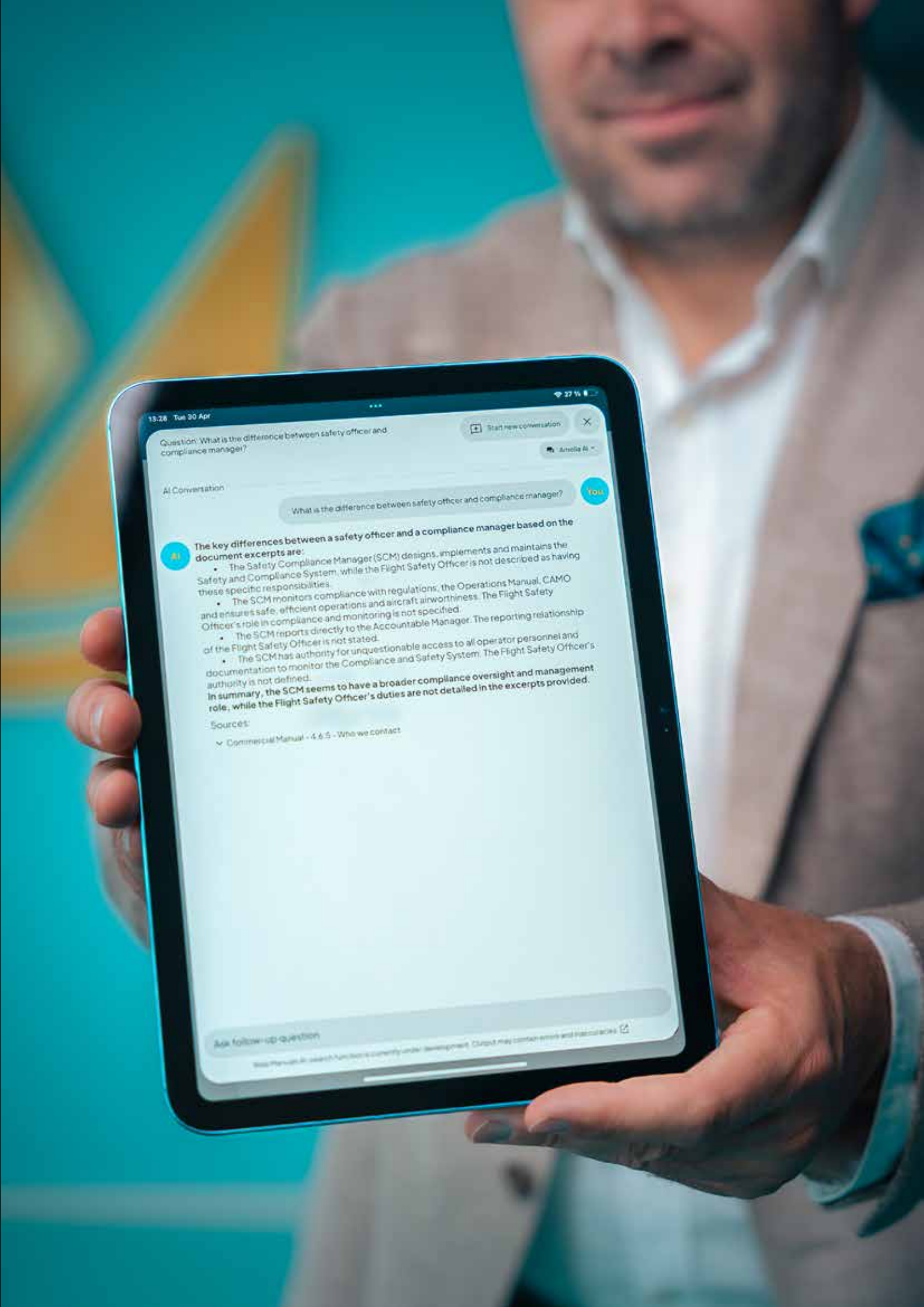
THE QUESTIONS TO ASK BEFORE BUYING INTO AVIATION AI

BY
DECLAN DALY

Artificial Intelligence (AI) is, apparently, either the answer to all our problems, our future replacements in all technological occupations or the next .com industry depending on who you ask. As described in Paul 'Foo' Kennard's article in the last edition of HeliOps (152) entitled *"Artificial? Perhaps. But Intelligent?"* it's a bit more nuanced than that.

For those of us working in the cockpit of the industry that is aviation, how do we sift through the products on sale? At the moment, there is an expanding portfolio of apps, programs and devices enabled to carry out their roles 'powered' by AI. Not all of them are up to scratch, and in the same way that makers of EVTOL vehicles are sometimes finding out the hard way, aviation regulation is a conservative nut to crack. This is justifiable when it comes to incorporating a new technology into the cockpit – many of those regs are written in blood, after all. To identify which products are going to be of benefit to our operation today, and which ones are maybe a few generations away from being used in the cockpit, we can ask a few questions and use one case study of how it has been done right.

Question one has to be, is it compliant? If the product has not been deemed acceptable for use in the cockpit by the relevant authorities, there is little point in proceeding. Is it reliable? Is it safe? Does it do something that improves efficiency and safety, or otherwise brings value to my flight? At the moment, AI products are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Question: What is the difference between safety officer and compliance manager?
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The key differences between a safety officer and a compliance manager based on the document excerpts are:
• The Safety Compliance Manager (SCM) designs, implements and maintains the Safety and Compliance System, while the Flight Safety Officer is not described as having these specific responsibilities.
• The SCM monitors compliance with regulations, the Operations Manual, CAMO and ensures safe, efficient operations and aircraft airworthiness. The Flight Safety Officer's role in compliance and monitoring is not specified.
• The SCM reports directly to the Accountable Manager. The reporting relationship of the Flight Safety Officer is not stated.
• The SCM has authority for unquestionable access to all operator personnel and documentation to monitor the Compliance and Safety System. The Flight Safety Officer's authority is not defined.
In summary, the SCM seems to have a broader compliance oversight and management role, while the Flight Safety Officer's duties are not detailed in the excerpts provided.
Sources:
Commercial Manual - 4.6.5 - Who we contact
Ask follow-up question

PHOTO BY GLEN WHITE

usually used in the less safety critical parts of aviation. Rostering, customer facing chatbots and dynamic ticket pricing are all areas where AI based products have simplified user experience to the point of providing oversight and approval rather than having to actually do the work. In the cockpit however, consequences of errors are more likely to manifest themselves kinetically. Lets' take a scenario to see how an existing product can actually help.

So, you're in poor visibility on the taxiway at a busy airport, waiting on your slot time for an IFR departure to arrive at a distant airport equipped with conventional navaids only. You're at Max All Up Weight with pax and cargo (the stuff that actually pays the bills) and you've enough fuel to meet the demands of alternates and weather, but if you delay too long on the

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ground, its back to the apron to top up again with all the commercial and crew duty period problems that entails. As you start to move off after the traffic in front of you, you get a caution light that your number one side FMS has failed. You need to know quickly if you can proceed to take off or not. What AI product can help you here?

Web Manuals Amelia AI was launched in April 2024. Richard Sandström, Chief Technical Officer of Web Manuals Publication describes it as follows:

We launched our first Web Manuals Amelia AI function in April 2024. The AI-search tool supports pilots and crew to efficiently source information from within their digitized operational and safety manuals, making it faster and more intuitive than ever.

Users can pose questions to Amelia and get descriptive answers, helping them quickly make safe and well-informed decisions while avoiding costly diversions and delays. The system seamlessly integrates natural language processing to speed up research work. For example, it can help pilots to understand the cause of aircraft faults, assisting them when making airworthiness decisions.

The first version uses English natural

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language sentences as input. That said, we're working on developing new versions which will expand the number of language options available. It will also be able to respond to voice demands as well as haptic input.

What this means for our scenario above, is that the pilot can type in plain language 'can I take off with one FMS?' and receive an answer derived from the customers own MEL. In this case, our crew can likely proceed on their way so long as they don't require an RNP approach at their filed alternate, and we have a little win for safety, scheduling and commercial efficiency all in one go. Safety as the pilot's head isn't dragged down for a long period to consult the MEL, scheduling as slot times at a busy airport may be hard to get and commercial efficiency as no one likes delays/unhappy customers/extra fuel burned for no revenue.

Nevertheless, due diligence requires we dig a bit deeper in order to fully understand new and upcoming products. There are potential pitfalls that need to be avoided in product design, or at least, which the operator needs to be aware of.

AIs, like pilots, need training before they are set loose upon the world. How

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this occurs is that the AI is fed vast amounts of data which is then analysed, allowing predictions to be made. These are then validated, or tweaked (sometimes with human interference, sometimes not) and the results are refined through successive rounds of training. Securing a fully trained product saves the operator from being exposed to the kinds of mistakes that anybody or anything in training makes in the early days regardless of their ultimate potential. As an example, see some of the purported results ascribed to ChatGPT's various maths tests... For our example:

Amelia is already a trained base model with natural language understanding. It generates responses in accordance with your documentation and will always give citations and sources from where it found the result.

In future, we plan to train new models that are specific for the aviation industry. However, it's unlikely that these models will be used for documentation search but rather used by our editors and administrators to empower and simplify their daily work.

So far so good, but one of the fears of a learning model is that it can pick up bad habits from its user i.e if I personally

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stop asking for important information, will it stop providing it? Adapting to user behaviour is fine in a creative AI, but if it reinforces blindspots in pilots, that's a different issue:

We decided not to develop a system that adapts to specific user behavior because of the associated risks. That said, we plan to evolve our product in future to offer users the option to manually promote certain results. This means that users will be able to report irritant results and further improve the AI system.

Controlling for user input in this way is a benefit, and also leads to the next area of concern – model decay. Model decay occurs when either reality changes from the data entered ie new regulations are released but not incorporated, or when our interpretation of data changes over time, but the previously labelled data is not updated. So for example, if approaches to a helipad using NVG were now considered as Performance Class 1, but no one told the AI, then it may give you bad information if you ask it 'can I fly HEMS to a helipad at night with a patient onboard?'. I asked Richard how Model Decay is controlled for on an ongoing basis:

We continuously upgrade the model when new updates are available. We also offer the option for users to share feedback if results are irrelevant, making sure to evolve Amelia to best suit customer requirements.

As regulations change and documents are updated, Amelia can use new manual revisions as a basis for its searches.

At this stage of enquiry we can be happy that our product is safe, but is it compliant? Specifically, we are asking questions in a 'spoken language' format and receiving a reply the same way, as opposed to the exact text that the national authorities have rubber stamped and approved – is this a problem?

Web Manuals stores hundreds of digital manuals related to aviation safety and compliance. Our Amelia function only responds to queries related to content already stored in an operator's existing documentation library.

It provides a summary of the text, along with a reference of exactly where the information came from. It does not provide answers without giving you three different sources or citations from within your own documents.

Amelia represents a good example of how to properly introduce an AI into the aviation environment – it is iterative in that future versions may be more capable but it is being based on a cautious foundation, and it is controlled in that it is designed to reject bad habits and remain up to date with each new integration of data. While it does leave room for development, sensibly, it has stayed clear of critical systems. Speculatively, I asked if future

versions may be used in a challenge and response manner to read out checklists:

While Amelia provides a summary of results from within your documents, human oversight is still important and we encourage users to read the actual text from the citations provided. But, as AI technology improves, developing Amelia to read out checklists, for example, is certainly something we would consider.

This seems to be an area of particular use in single pilot operations going forward. I would suggest that it is also a new area for CRM Trainers to explore in depth before introduction – much as there is a proper time to be reading checklists and a time to just look out the window and fly, there will be a time when your AI can help you and a time when excessive use will cause distraction. Identifying these strengths and weaknesses should certainly lead to exciting times in multiple training departments, and sim sessions, in the future.

'You might develop a very sophisticated algorithm that appears to work every time. But in the end, is it certifiable?" - The Flight to Safety-Critical AI, Will Hunt UC Berkely CLTC White Paper Series

Richard Sandström,
CTO Web Manuals

Amelia may be a product that has gone about things the right way, but more globally, there have been concerns about how to introduce AI into aviation in a manner that is as safe as any other part of the industry. The Centre for Long Term Cybersecurity (CLTC) at UC Berkely published a white paper focussing on some of the perceived risks associated with AI in general, and also the challenges to creating certifiable AI products to an aviation standard.

Reassuringly, they found that evidence of a race to the bottom was limited and that in fact there were signs that the opposite was the case:

'Industry experts report that representatives from firms, regulatory bodies, and academia have engaged in a highly collaborative AI

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- Primary safety advisor to the Accountable Manager and other Senior Management
- Reports to the Accountable Manager on all safety matters
- Makes regular visits across the organization's operations to build trust and contacts
- Deputizes for the Accountable Manager if they are unavailable

Sources:

(TN) OPERATIONS MANUAL PART A - 1.2.1 - Safety Accountabilities

Standard Operating Procedures - 1.2.1 - Safety Accountabilities

SMS Manual HL - 1.2.1 - Safety Accountabilities

of the SMS Accountability for the organisation's safety culture In the event that the Accountable Manager is unavailable, the Maintenance Manager will deputise. The Compliance Manager is the Senior Manager accountable for the day-to-day operation and development of the SMS. The Compliance Manager is the primary safety advisor to the Accountable Manager and the other Senior Management. The Compliance Manager is the primary safety advisor to the Accountable Manager and the other Senior Management. The Compliance Manager reports to the Accountable Manager on all safety matters. The Compliance Manager make regularly visits across the organizations' operations and is readily accessible to all in order to build trust and an effective network of contacts.

OPEN DOCUMENT

Ask follow-up question

Web Manuals AI-search function is currently under development. Output may contain errors and inaccuracies

standard-setting process, focused on meeting rather than relaxing aviation's high and rising safety standards.' - The Flight to Safety - Critical AI

In the area of safety critical systems (your run of the mill customer service chatbot may be different), the serious consequences of failure to produce reliable results has been recognised by all parties. However, there are still remaining factors inherent to AIs writ large that make certification difficult.

Firstly, AI as a concept is relatively new and aviation regulations precede the existence of AI products, so there is scant information available on which standard, if any, they are required to meet in most countries. As a result, the testing of the safety case of each individual application is in many cases being delegated to the firms producing them. While they are at the moment pursuing a safety conscious approach to development, independent oversight will be an essential part of this sector of the industry going forward, one need only look at the 737 Max to see what happens when firms and regulators become too complacent in that regard.

The other difficulty highlighted in the

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report is described as the opacity of the technology – it is not easy for regulators to probe and test the logic of the algorithms that are employed in complex AIs, especially where a sign off is required on a machine that will keep learning through exposure to new data and usage. Consequently, the opinion of the experts interviewed in the white paper was that AI that interacts directly with safety critical systems in the aviation industry is more or less non-existent at this time, and that we are potentially decades away from anything we would recognise as a revolutionary change.

For now, it seems that products like Amelia, which assist the pilot with non-critical functions are much more likely to become a feature of our jobs than any more advanced system is to replace us entirely. The deliberate and cautious approach being taken by firms and regulators alike should serve to provide confidence in the products that have already made it through the system. **HO**

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EUROPEAN ROTORS 2024

SHOWCASING THE FUTURE OF VERTICAL FLIGHT

BY
ALAN NORRIS

BY
JIMMY VAN DRUNEN
AND LIAM HUBERS

The European Rotors exhibition, held from November 4th to 6th, 2024, at the Amsterdam RAI Exhibition Centre, showcased the continued strength and international appeal of the rotorcraft industry attracting over 4,600 participants from around the globe. Now in its fourth edition, the event built on the success of the previous year's show in Madrid, Spain, further establishing itself as the premier European exhibition for rotorcraft professionals. This annual event showcased the latest innovations, regulatory advancements and best practices in the vertical flight sector.

507

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Amsterdam proved to be an excellent choice for hosting European Rotors, thanks to its strategic location and exceptional accessibility. The city is reachable within a two-hour flight from most major European cities, facilitated by Schiphol Airport, the Netherlands' main international gateway and the fourth largest in Europe. Schiphol connects over 100 airlines and

serves routes to more than 98 countries. Additionally, Amsterdam boasts an efficient train, tram and metro transport network, ensuring seamless mobility for both exhibitors and attendees. Although, when walking between their hotel and the venue, a visitor must be vigilant for the seemingly endless streams of bicycles and mopeds that are such a feature of the Dutch capital!

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European Rotors has grown to attract international participation, with attendees and exhibitors from Asia, North America and beyond, making it more than just a European centric event. The exhibition enjoyed robust support from large and small players in the rotorcraft industry, demonstrating its importance as a comprehensive business to business gathering. Sponsored by the European Helicopter Association (EHA) and the European Union Aviation Safety Agency (EASA), in collaboration with Vertical Aviation International (VAI), the event reflects the strong cooperative effort among the industry's key stakeholders.

As Europe's largest rotorcraft event, European Rotors offered something for everyone connected to the vertical flight industry. The three-day event featured a variety of educational workshops and Training Sessions that offered

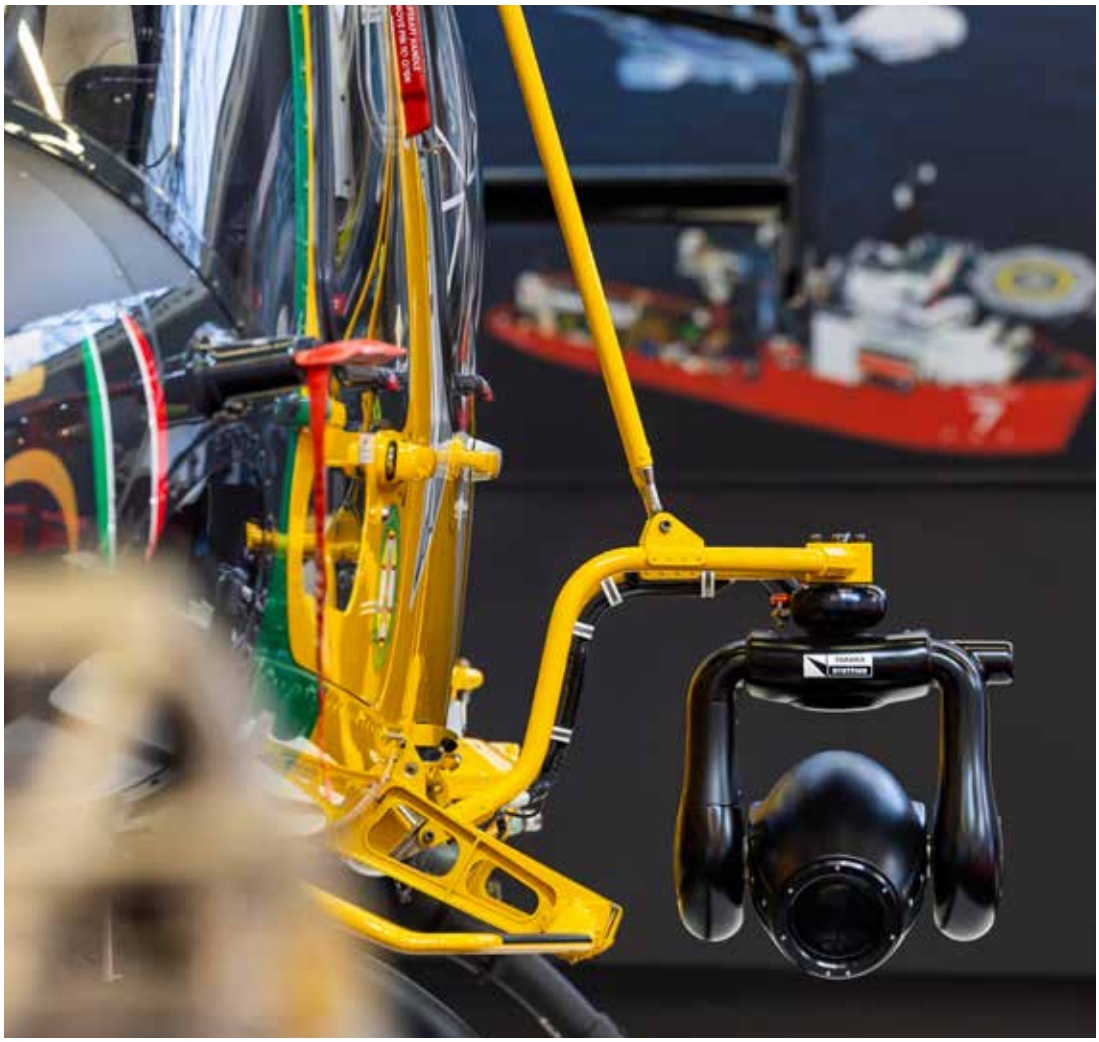

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Image courtesy of Ned Dawson

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insights into the best practices for maintaining aircraft safety and efficiency, while training sessions focused on emerging technologies in rotorcraft operations. EASA also held a detailed briefing on the best practices for escaping vortex ring state.

One of the standout events of the show was the Rotorcraft and VTOL Safety Symposium, presented by EASA. This symposium provided a platform for discussing the latest safety developments within the rotorcraft sector. Attendees, including industry authorities, operators, pilots and safety investigators, engaged in active discussions on safety improvements, emphasizing the industry's continuous focus on safe operations and innovation.

The exhibition spanned three halls, featuring 234 exhibitors and eighteen helicopters on display showcasing their latest products and services, an increase over the

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number from previous years. Attendees had the opportunity to engage with cutting-edge technology such as flight simulators, unmanned aircraft systems and training devices. Notable helicopter OEMs at the exhibition included Airbus, Robinson, Leonardo, Enstrom and Bell, who all used the exhibition to showcase their latest models, cutting-edge technology and engineering.

European Rotors 2024 also served as a venue for significant business announcements:

- Airbus Helicopters signed a contract for ten H125's with Østnes Helicopters, the official distributor for Airbus Helicopters in the Nordic region.

- Leonardo secured Long-Term Support and Training Agreements with Bristow for its AW139 and AW189

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models. This collaboration ensures enhanced maintenance and operational efficiency extending into the next decade. Notably, a new AW139 full flight simulator will be introduced in Aberdeen, Scotland, starting in 2026. Furthermore, Bristow announced the addition of four new AW189s to its offshore energy services fleet by 2026.
Offshore Helicopter Services UK ordered two AW139s, to enhance their 24/7 emergency response in support of the North Sea's energy sector, with both aircraft to be based in Aberdeen.

- Bell announced that Rheinland Air Service GmbH is now its authorized dealership for the Bell 505 in the

Netherlands, expanding Bell's footprint in the region and reinforcing its commitment to localized support and service.

- Ryan Aerospace demonstrated the HELIMOD Mark III device for long lining and vertical reference, a modular and reconfigurable helicopter simulator system. They have recently partnered with Intersim simulation to provide a newly developed sling load module which enhances the realism of long lining and vertical reference techniques, including the ability to use a Bambi Bucket.

Leonardo also exhibited its new Virtual Extended Reality (VxR) simulator for the first time in Europe.

The 2024 European Rotors exhibition in Amsterdam proved a resounding success, drawing a diverse array

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Prefect Julien Marion, Director General of Civil Security and Crisis Management - Ministry of the Interior

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of exhibitors and attendees from across the globe. The event's comprehensive line up of workshops, conferences and industry-focused discussions reinforced its reputation as Europe's leading rotorcraft trade show. With significant industry partnerships, contract signings and educational opportunities, European Rotors continues to set the standard for collaboration in the rotorcraft sector bringing together manufacturers, suppliers, operators and stakeholders from around the world. Much of the vertical flight industry thrives on personal relationships,

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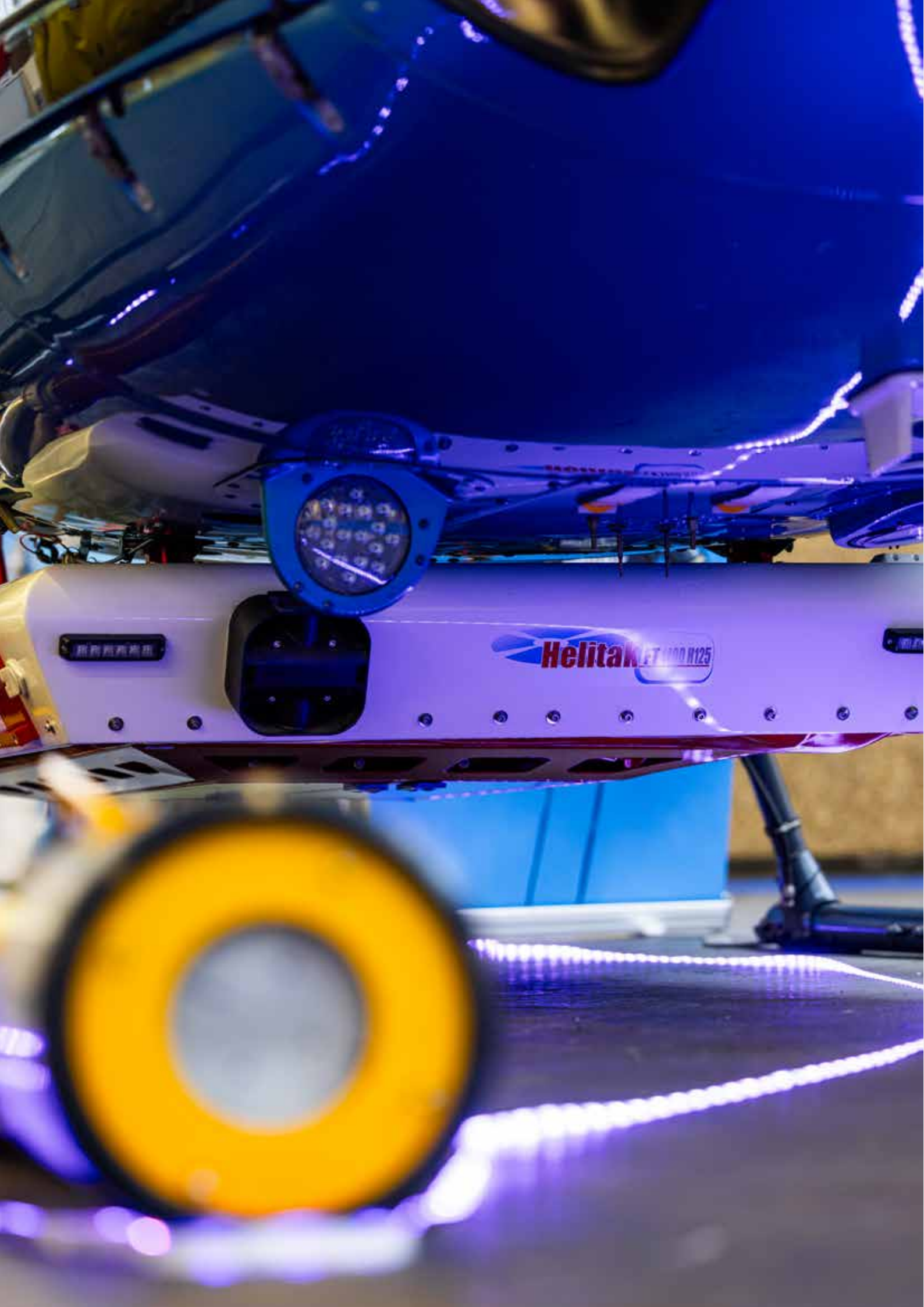
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often developed on the show floor, with many attendees commenting positively on the opportunity to network face to face.

Since its launch event in 2021 in Köln, Germany, European Rotors has established its place as a key annual fixture in the rotorcraft calendar. Köln, the site of the first two shows, and Madrid, paved the way for this year's exhibition in Amsterdam. The exhibition returns again to Köln for its 2025 edition, scheduled for November 18th–20th, with registration opening in mid-2025. **HO**

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BATTERIES & EVTOL

BY
MARK OGDEN

A fundamental case for, and enabler, for a shift eVTOL has been the increased capability of batteries as a power source. The publicity given to electric vehicle fires in recent times indicates that there may be a significant certification question associated with this technology. The question is could this impact the eVTOL industry? **Mark Ogden** delves a little into the issue to provide some thoughts and observations.

THE TECHNOLOGY

One of the technologies that made electric vehicles (EVs) viable was that associated with batteries, namely the move to Lithium Ion. Lithium is extremely reactive in its elemental form. That's why lithium-ion batteries don't use elemental lithium. Instead, lithium-ion batteries typically contain a lithium-metal oxide, such as lithium-cobalt oxide ($LiCoO_2$). Lithium-ion batteries have the highest charge density of any comparable system, providing significant energy without being very heavy. Lithium is the most 'electropositive' element in its ability to donate electrons to produce positive ions i.e., it can easily produce a lot of energy. Lithium is also the lightest of all metals, meaning that these batteries weigh much less than other

types of batteries that use metals like lead or nickel.

The four essential components inside a Lithium battery include the cathode, the anode, a separator, and the electrolytes: much the same as any other type of battery. Using these four relatively simple components, Lithium-based batteries can hold and discharge an incredible amount of energy. The difference in lithium batteries from, say the old lead acid type, is the chemical composition of the components. And even Lithium-Ion batteries come in different guises, but we will get to that later.

The chemistry of a lithium-ion battery, like older technology batteries, requires different materials on the positive and negative sides of the battery. The positively charged cathode is fundamentally aluminium foil coated in a lithium compound, such as lithium iron phosphate ($LiFePO_4$). The negatively charged anode is similar but constructed of different materials; typically, copper foil coated in graphite.

All a battery is, is a form of storage. It must be 'charged'. Electricity is all about electrons, and their movement is the key to the crucial changes that occur when you charge a battery. The very first charge of a lithium-ion battery is usually done by the manufacturer because of the lithium in the electrolyte. When the battery is being charged, a chemical reaction takes place involving the $LiFePO_4$ on the cathode. The compound is split into electrons, positively charged lithium ions, and iron phosphate. The electrons flow to the anode through the charger. The positively charged lithium ions move through the electrolyte to combine

with the graphite on the anode. Eventually, all the lithium ions and electrons have completed their movement, resulting in a fully charged lithium-ion battery.

Compared to old-design lead acid batteries, Lithium batteries are completely sealed, so there is little opportunity for users to encounter the electrolyte solution except in cases of serious battery damage. Whereas the old batteries used lead which made them heavy, Lithium-based batteries are much lighter. Lead-acid batteries also suffered from 'sulfation' where sulfate crystals could form on the battery electrodes, which increased the battery's impedance. Sulfation does not occur in Lithium batteries because the necessary chemical ingredients are not present.

Essentially, Lithium-based batteries are superior to the old technology batteries because they are lighter, require less maintenance, can be fully discharged with damage and work better in more extreme environmental conditions.

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THE DARK SIDE

Although Lithium-ion batteries address many of the issues associated with old technology batteries, they do introduce new considerations and limitations. We need to break out the facts from the ideology that has built around these power-packs.

The global market for lithium batteries reached nearly 250 GWh in 2020 and is predicted to increase ten times more by 2030. In Australia's case, only 10% of its lithium-ion battery waste was recycled in 2021, compared with 99% of lead acid battery waste. Lithium-ion battery waste is growing by 20 per cent per year and could exceed 136,000 tonnes by 2036. Australia's CSIRO (Commonwealth Science Industry Research Organisation) reports that lithium-ion batteries are a source of many valuable materials and if recycled, 95% of battery components could potentially be recovered for alternative use or may even be turned into new batteries. According to the CSIRO, there is very little capacity in Australia for processing these batteries and large volumes are stored in warehouses and scrap yards, creating a serious fire risk and potential for environmental contamination.

The EV battery recycling industry in the USA is in its infancy. The International Council on Clean Transportation (ICCT) says that most of the lithium-ion battery materials going into recycling plants do not presently come from end-of-life EV batteries but rather from scrap material created during lithium-ion battery production. Most EV batteries produced to date are still on the road but 37 million EVs could be on US on the roads between 2023 and 2032 (now debatable given the slowed uptake of EVs in the USA and the election of a Republican Federal Government which would likely drop all subsidies),

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recycling end-of-life EV batteries will be essential.

Lithium-ion batteries can quickly wear out regardless of how often they are used. A typical lithium-ion battery will last about 2-3 years before it needs replacing. EV lithium-based batteries can last ten years without significant degradation. The production and the eventual disposal of these batteries can have a significant negative impact on the environment. The eventual disposal of potentially millions of batteries has not been fully resolved.

Lithium is extremely reactive. Some electronics, such as laptops or cell phones, have burst into flames because of their batteries. According to a paper produced by Australia's New South Wales Fire and Rescue authority (one of the largest in the world covering some 7,200 sq kms and attending 20,000 fire or explosion incidents), about 1 in every 100 fires attended in the state involves a lithium-iron battery or battery device. Interestingly, of the just seven EV fire incidents attended in 2022 and 2023, four involved hybrid cars.

Lithium-ion batteries include a separator to prevent the electrodes from touching each other. If the separator is damaged, the electrodes can touch, causing a significant build-up of heat eventually leading to a thermal runaway. This is a phenomenon in which the cell enters an uncontrollable, self-heating state. Thermal runaway occurs when a cell's temperature rises uncontrollably at a rate greater than 20° centigrade per minute and a maximum temperature reaching over 300°C with gas

and/or electrolyte venting, smoke or fire or a combination of all.

If this build-up of heat produces a spark, the highly flammable electrolyte can catch on fire and once there are flames in one cell, they can quickly spread to others. A build-up of heat can also cause the pressure to rise very quickly leading to an explosion. Also, even if a lithium-ion battery fire appears to have been doused, it can reignite. Indeed, while a lithium-ion battery fire may be cooled with water, lithium metal batteries explode on contact with water.

EV fires though have received a lot of attention in the press and in social media. The industry is busy countering claims that the technology is dangerous. Of some 40 million EVs claimed to be on the roads of the world, (evfiresafe.com), there has been less than 520 verified EV fires. Of those verified fires, a significant majority resulted in 'ignition' with directional flames rather than a vapor cloud explosion or violent deflagration. The data noted that most of the events had an unknown reason for the fire. It seems the general scientific consensus is that fires in battery EVs are not more dangerous than fires in internal combustion vehicles, nor are they more frequent. In general, there are fewer fires from EVs compared with fires from conventional vehicles when driven over the same distance.

According to an article in maritime magazine (maritimemagazines.com), there are fundamental differences in fighting a battery - compared to a petroleum fuel fed – fire. A petroleum fed fire needs oxygen to continue burning and materials such as water or foam can be effective in 'smothering' such a fire. Foam or water is not as effective on a battery fire (thermal runaway) although their early use could be effective in keeping it cooler. So, the conclusion is that while EV fires are different, they are not necessarily worse. An EV fire may take longer to completely extinguish, but, chances are that it is easier to manage in the early stages. Interestingly, other sources note that an EV battery fire can burn at up to 2,7000C (4,9000F) – nearly twice that of a diesel/petrol fire. An

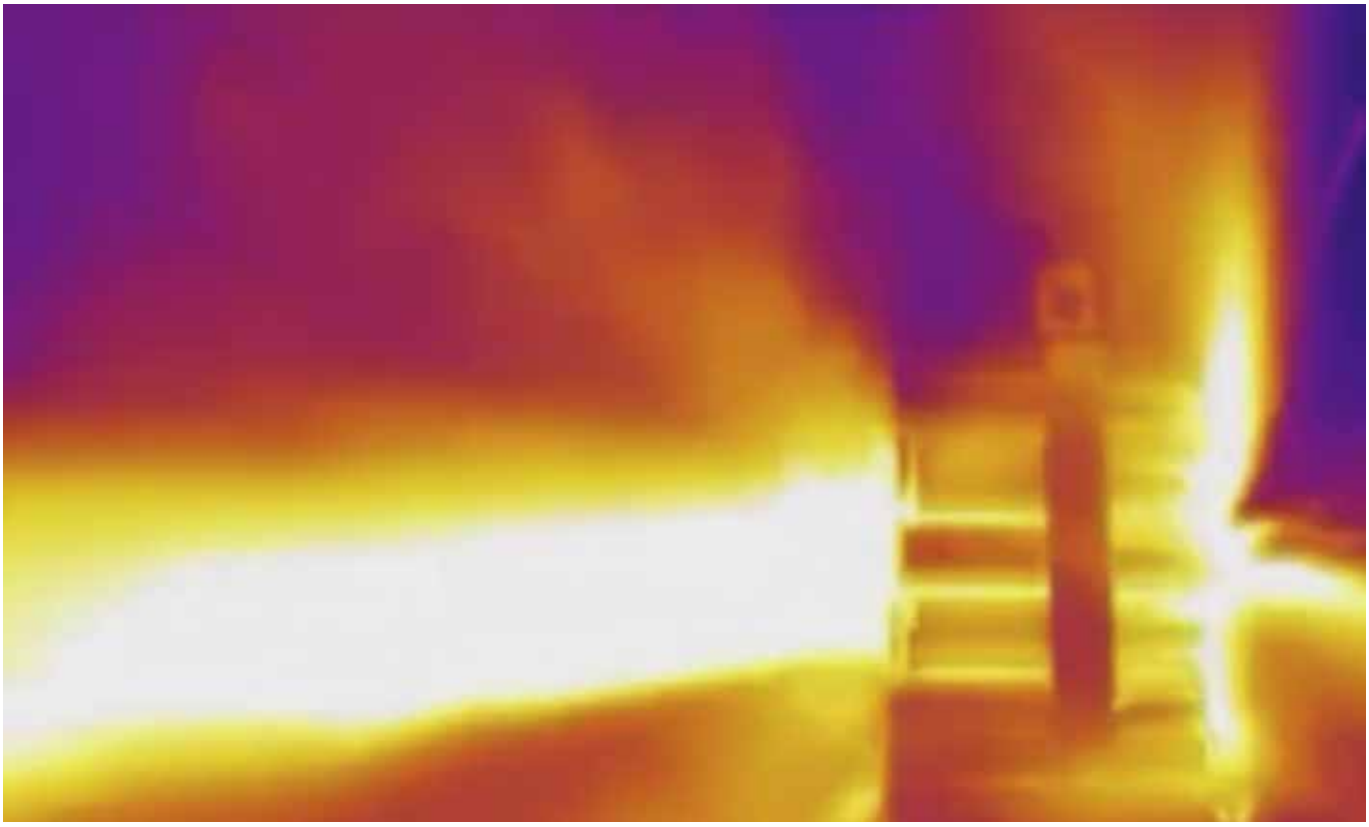
interesting note made by Fire and Rescue authorities is that an electric vehicle that has been involved in a collision, a fire, or has been submerged, must be treated with caution because damaged EV batteries may ignite hours, days, or even weeks after the initial incident.

AVIATION IMPACT

An advantage for EVs that are being driven is that if there is a fire, generally it can be recognised early, the vehicle stopped and the occupants escape. Sure, it's an inconvenience and if a fire gets hold, then there are heat and toxic smoke implications but as long as the vehicle is in the open, the consequence of the fire isn't so high (note: this lower risk does not include those battery fires caused by or the result of an impact or damage where the occupants may be unable to quickly escape).

In an aircraft though, a battery thermal runaway or fire can have significant consequence – from toxic fumes to heat and flames. The issue here is that such issues may not be able to be resolved quickly e.g., traditional fire extinguishing systems would be ineffective given their short duration operation. While the likelihood of a Lithium-Ion battery pack fire may be less than a traditional aircraft, the consequence could be far worse.

So, what are the certifying authorities saying the in the proposed certification standard? Battery powered eVTOLs (not hybrid) represent a challenge to battery technology. It could be expected that their duty cycles will need high discharge currents at the beginning and end of the flight for takeoffs and landings and a



relatively moderate power draw in transit. Power demands will also change depending on environmental conditions – not a lot different from rotorcraft where the high density-altitude affects lift performance. There would also be current draws for air conditioning – again, the hotter it is, the greater the demand. So, eVTOL batteries will need to be able to work efficiently and reliably to high and low temperatures, available for high current draws during takeoff and landing, power all ancillary devices including flight instruments, radios, and air conditioning, provide suitable reserves, and be resistant to thermal runaway in normal operating conditions as well as in a crash.

Yet when it comes to regulatory certification for these aircraft, it is still 'work in progress'. It would be expected that relevant parts of the current rotorcraft regulations would apply or would be adapted to the technology – after all, the regulatory authorities would put themselves in a difficult position if they were to accept a higher level of risk than that accepted that accepted for equivalently sized regular aircraft.

If Federal Aviation Administration (FAA) airworthiness standards for rotorcraft Parts 27 and 29 are considered, certification standards exist that include (among other things) fire protection of structure, controls, and other parts and Flammable fluid fire protection. The FAA issued Advisory Circular (AC) 21.17 "Type Certification – Powered Lift" to start addressing eVTOL certification requirements. As the noted in the AC, its purpose was to provide guidance for the type, production, and airworthiness certification of powered-lift. "Fire and High Energy Protection" probably represents the

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equivalent of the FAR 27/29 requirements. PL.2430 "Energy systems" specifically addresses the source of energy for powered lift. Interestingly, no specific mention of fire is made although it does note that the system has to be designed to (among other things):

- Provide a means to safely remove or isolate the energy stored in the system from the aircraft; and
- Be designed to retain energy under all likely operating conditions and to minimize hazards to occupants and first responders following an emergency landing or otherwise survivable impact (crash landing).

Each energy system must:

- Withstand the loads under likely operating conditions without failure; and
- Be isolated from personnel compartments and protected from likely hazards.

When queried about fire protection/suppression specifically, an FAA spokesman said, "We anticipate a lot of diversity among powered-lift designs. Accordingly, the FAA does not have blanket airworthiness requirements for all aircraft in the powered-lift category. We develop them on a case-by-case basis to address the unique characteristics of each aircraft model. That said, the airworthiness criteria for each unique aircraft model will address factors such as battery pack fire suppression/containment."

EASA issued SC-VTOL-02 "Special Condition for small category VTOL-capable aircraft. Here, it is more prescriptive.

"The aircraft must be designed to minimise the risk of fire propagation by:

- providing adequate fire or smoke awareness and extinguishing means when practical;
- application of self-extinguishing, flame-resistant, or fireproof materials that are adequate to the application, location and certification level; or
- specifying and designing designated fire zones that meet the specifications of SC VTOL.2330."

Also, "A fire or other release of stored energy in a designated fire zone must not preclude continued safe flight and landing for Category Enhanced, or a controlled emergency landing for Category Basic."

Several companies were asked about their implementation of battery powered systems with specific questions regarding fire suppression or containment. Many designs have the battery packs in the roof or in the subfloor area of the passenger compartment.

Many did not respond but Switzerland-based UAS Systems (developing the eZELOS Twin Hybrid Taxi) provided a good overview of their implementation. Hans-

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Christian Stuber, Founder & President of UAS Systems said that the eZELOS features two independent generators that produce electricity to power the electric motors (dual motors housed in a single casing) via the batteries. "A key advantage is that, in a worst-case scenario, the batteries can support autorotation through the electric motors, ensuring added safety and control during emergencies."

He also noted that, in general, they did not believe batteries were ready for eVTOL and that hybrid was the better option presently. On fire suppression, he said, "a fire suppression system for lithium batteries in an eVTOL makes little sense, as the added weight would be substantial, and its effectiveness is questionable; lithium fires are difficult to extinguish and tend to reignite. It's therefore more practical to use LiFePO4 batteries, which are inherently much less prone to fires or explosions, thereby increasing safety." Lithium iron phosphate (LiFePO4) batteries represent a low cost, long cycle life and higher safety than other combinations found in Lithium-based batteries. The problem is that compared to those batteries incorporating nickel cobalt aluminium, LiFePO4 batteries hold about half to three quarters the specific energy.

Australia-based AMSL Aero is developing Vertiia, which AMSL claims, is the world's first eVTOL designed to be powered by hydrogen. "Vertiia is designed with two 'power pods' which longitudinally adjoin a box wing structure. Each wing pod will store the bulk of the aircraft energy, which includes battery and hydrogen tanks. We use battery and hydrogen fuel cells to provide high power for take-off and landing, and the fuel cell provides range extension and the ability to recharge batteries in flight. This enables long range, 1000km, and rapid turnaround as the batteries don't require recharge on the ground, and the hydrogen is a liquid fuel that can be refilled quickly on the ground. These batteries and hydrogen fuel cells provide the electrical power to the 8 electric motors," explained Dominic White, a spokesman for AMSL Aero.

So here, the AMSL product's design principle places the batteries away from the passenger compartment and places the batteries in a crash worthy compartment – separate and away from the passengers.

"We use commercially available battery cells, the sort you would find in cordless drills and electric cars. We package them in a pack designed and assembled by us with components made by specialist manufacturers. In doing so AMSL Aero have an acute appreciation and internal expertise for setting and understanding final design standards at a detailed level. The final battery design will evolve during the test and development program. Battery technology continues to improve both in terms of energy density and power density. The design of hybrid electric aircraft batteries is new for the industry, and we see significant value in closely managing this aspect of design."

"The design will be required to meet national aviation regulatory requirements for crashworthiness, which are expected to include drop tests, explained Dominic. "The location of the batteries provides notable protection for passengers in the event of an overheating battery in flight, or in the event of a crash landing and an in the extremely rare event of a fire occurs. In this later case the aircraft has been specifically designed to enable rapid egress on a traffic line that does not approach the battery location."

STATE OF PLAY

The regulators have, in general, kept the battery fire question enveloped in general fire attenuation standards although the Europeans compared to the Americans, have been more specific. Given the consequences of EV fires and the high heat and toxic fumes generated by Lithium-based batteries when in thermal runaway and on fire, designers will need to keep exploring some innovative concepts to address how these fires and fumes could be contained and kept away from crew and passengers; noting that suppression seems problematic and impractical. AMSL Aero's approach in its Vertiia design appears quite different from those where the battery bay is almost integral to the passenger compartment being under the floor or in the roof.

Given the cycles and current battery technology, the hybrid approach appears to be more flexible and capable in providing the needed range and least risk when it comes to any potential fire or toxic fume issues associated with lithium-iron batteries in an eVTOL aircraft. **HO**

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When fellow citizens are in trouble, people come to the aid of their neighbors, friends and even total strangers. This human drive to help others was recently on full display, yet again, in the Southeastern United States following the devastation of **Hurricane Helene.**

Tom Dorl reports on the efforts of private owners and commercial helicopter operators who, alongside the military, answered the call for help.

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