

A Publication of the Vertical Flight Society

Summer/Fall 2024

VERTIFLITE CLIPS

Advancing Vertical Flight Since 1943



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“

I just wanted to write to express my thanks to the organizers of the HUMS and Airworthiness Technical Meeting. My colleague and I enjoyed the event very much and found the presentations and associated discussions highly informative.

We made some very useful contacts and intend to try and foster some collaborative activity for the future.

We have some ongoing programs of activity proposing to use regime recognition software for which the presentations provided some significant and positive inputs.”

Glenn K. Terry, CEng, MIMechE
Hampshire, United Kingdom



Vertical Flight Society

2700 Prosperity Ave, Suite 275, Fairfax VA 22031 USA

1-703-684-6777 Ext 107 • Fax: 1-703-739-9279

Membership@vtol.org • www.vtol.org

Advancing Vertical Flight

For more than 80 years, the Vertical Flight Society — founded in 1943 as the American Helicopter Society, Inc. — has been leading efforts to advance vertical flight.

VFS is the world's only international technical society for engineers, scientists and leaders working to advance vertical takeoff and landing (VTOL) technology. We bring together industry, academia and government to tackle the toughest challenges in vertical flight. Our members share a legacy of knowledge and accomplishment that has been driving innovation since the advent of the helicopter.

Every year, the Society organizes or co-sponsors several regional and international conferences that facilitate the advancement of the understanding and practice of VTOL aircraft technology, and publishes the proceedings. The Society publishes the premier vertical flight technology bi-monthly magazine, *Vertiflite*, as well as the world's only peer-reviewed vertical flight technical publication, *The Journal of the AHS*. VFS advocates on behalf of vertical flight to the public and to government bodies, awards \$120,000 in annual engineering scholarships, and sponsors annual student competitions. In addition, the Society presents two dozen annual awards to members of the vertical flight technical community for technical and practical accomplishments.

Vertiflite's editorial energies are devoted to informing our members of the advances being made in the industry and encouraging increasingly broader use of vertical flight aircraft. Typical issues are 80+ pages and cover the gamut of crewed/uncrewed, military/civil, piston/turbine/electric-powered aircraft, technology and developments. *Vertiflite* is written and managed by several leading award-winning VTOL journalists and experts. This edition of *Vertiflite CLIPS* includes sample 2024 articles on helicopters, advanced rotorcraft and electric VTOL / advanced air mobility (AAM).

We hope that you enjoy the sample articles in this issue of *Vertiflite CLIPS* and will join us in advancing vertical flight!



Angelo Collins
Executive Director
The Vertical Flight Society

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The Evolving VTOL Workforce

By Angelo Collins, Executive Director

The Vertical Flight Society leads advocacy efforts to advance vertical flight, bringing together members from industry, academia and government to tackle the toughest challenges. In this role, it is our responsibility to sound the alarm: the vertical takeoff and landing (VTOL) aircraft workforce is at a critical juncture.

What was once thought to be positive momentum, with the US Department of Defense (DoD) kicking off several multi-billion-dollar rotorcraft acquisition efforts, has soured: the Army's cancellation of its Future Attack Reconnaissance Aircraft (FARA) program places future research, development, test and evaluation (RDT&E) funding for vertical flight at risk. With funding still in play, now is the time to advocate internally for advancements in vertical flight technology. Now, more than ever, it's critical that we weather the storm and ensure the engineering workforce will be capable of leading cutting-edge rotorcraft developments in the future.

The “Electric VTOL Revolution” is faring better and still requires thousands of new engineers to continue gathering momentum. In 2020, VFS forecasted that 10,000 additional engineers were needed this decade to support planned military and civil rotorcraft developments, as well as the burgeoning electric VTOL/advanced air mobility (AAM) market. The cancellation of FARA provides the potential for some engineers to stay within vertical flight by moving to AAM, but this is clearly not enough.

So, what can be done to fix the shortage of engineers? First step, it's critical that we analyze the current landscape, which consists of significant volatility in the present workforce. In recent years, private investment in aviation has offered new and intriguing opportunities for both new graduates and tenured engineers alike. “Vertical flight” had generally seen most investment derived from the defense sector, but it is no longer the only game in town. These new opportunities are attracting some of the top talent from legacy rotorcraft manufacturers and defense contractors, what we at VFS call the Brain Drain 2.0.

In the 1970s, Congress limited appropriations for defense research at the Defense Advanced Research Projects Agency (DARPA) only to projects with direct military application, precipitating a significant departure of talent. These were dark days for the defense research sector, but the silver lining of this Brain Drain 1.0 was an apparent boost in the development of the fledgling personal computer industry. If the DoD and



defense sector wish to compete and ensure a healthy pipeline of engineers is available and interested in defense-sector employment, more needs to be done.

One critical action is to motivate students of all science, technology, engineering and mathematics (STEM) majors to get excited about vertical flight. The VFS Atlanta Chapter recently organized a Regional Mobility Panel for the local Georgia Tech students, and it was a great success. Many of the students in attendance were not studying aerospace engineering, and most were not aware of AAM. Events like these can improve the ability of rotorcraft and AAM companies to reach students from various STEM disciplines — including electrical, computer and mechanical engineering students — and can help to grow the workforce. Chapter president Carlota Bonnet is currently working on a template to replicable the event so that other chapters can run similar meetings for outreach with their local student chapters.

Another key enabler to ensure we grow the workforce is through the Vertical Lift Research Centers of Excellence (VLRCEs). Georgia Tech, University of Maryland and Penn State —

along with their dozen or so affiliate schools — lead the way in cutting-edge vertical lift research and education in the US. Funding these centers is one of the Vertical Flight Society's key areas of advocacy within Congress (see "VFS Raises VLRCOE Profile to Congress," *Vertiflite*, July/Aug 2023), with literature including a white paper for Congressional consideration, in cooperation with the Vertical Lift Consortium. We will set up meetings again this year with various congressional staffers and elected leaders to increase VLRCOE funding so that more students can be educated through these centers.

Educating the younger generation alone is not enough to grow the workforce; we also need to train the mid-career and even senior employees. Many trying to enter the growing AAM sector do not have relevant experience and are looking for opportunities to learn the skills required to do the job. VFS offers opportunities in the form of events, short courses, technical reference material and other resources to help these mid-career and senior staff begin the process of entering the AAM workforce. Those interested can become acquainted with the major players, the various roles and responsibilities, and where they may best fit in the community.

Lastly, to know the workforce, it's important that engineers also climb the management ladders at their respective companies. Many executives today do not have engineering backgrounds, which can be detrimental to the growth and future of a company whose backbone is its engineering excellence. Shortsighted priorities, such as quarterly profits, tightening margins and a stockholders-first mentality, coupled with a revolving door of executives who only serve a short term, will negatively impact the health and culture of a company. Prioritizing employee satisfaction, continued education, fulfillment and mentorship is critical if we want to see these companies survive or prosper in the coming years.

As the leading advocacy group for vertical flight technology — and the sector's global engineering professional society — it is important to highlight the workforce challenges we face. If you have ideas or recommendations, please do not hesitate to take action through your partners at the Vertical Flight Society. Our door is always open, and we welcome your passion and ambitions for the future of vertical flight. 

What do you think? Let me know at director@vtol.org.

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FAA Reauthorization Act of 2024 Becomes Law

On May 16, US President Joe Biden signed legislation to provide the Federal Aviation Administration (FAA) with its latest five-year mandate and to fund the agency for fiscal years 2024–2028, with more than \$105B for the FAA and \$738M for the National Transportation Safety Board (NTSB) during those years.

Both houses of Congress passed the FAA Reauthorization Act of 2024 after months of regulatory deadline extensions. The Senate had held up its bill (after the House of Representatives approved its version in May 2023) due to concerns from some members on specific issues, including whether to increase the retirement age of a commercial pilot from 65 to 67 years old (see “Washington Report,” *Vertiflite*, May/June 2024). The Senate prevailed in all its demands.

Safety certification and aviation infrastructure are among the many areas given funding and regulatory guidance through the five-year congressional mandate. This includes new funds for training and job incentives to grow the aviation workforce, including a priority to recruit and train air traffic controllers.

The FAA law also increased the priority of advanced air mobility (AAM) and emerging aircraft efforts for the agency, along with uncrewed aircraft systems (UAS) flight operations and development of hydrogen propulsion. This included a mandate for the agency to publish a final special federal aviation regulation (SFAR) to operate powered-lift aircraft within seven months. That could ease the path for electric vertical takeoff and landing (eVTOL) aircraft to enter commercial service; some parts of the FAA’s proposed SFAR were nearly universally panned when it was published last year (see “Industry Vets FAA’s Powered-Lift SFAR,” *Vertiflite*, Sept/Oct 2023 and www.vtol.org/sfar).

In its mandate, Congress directed the FAA to study the current and future electrical power demands at airports needed for electric aircraft and electric multimodal charging stations. The FAA will launch a five-year infrastructure pilot program for the acquisition, installation, and operation of electric charging equipment.

Electric aircraft companies praised the new law that calls for rules and guidance to certify those aircraft. The legislation’s prioritization of infrastructure development for eVTOL aircraft won support from Lilium CEO Klaus Roewe, who noted the law orders an updated environmental assessment process and new guidance for a vertiport design advisory circular (AC). “We are encouraged to see US lawmakers take concrete steps toward ensuring the creation of rules necessary for eVTOLs to operate in the US,” Roewe stated.



The agency is required by law to issue a notice of proposed rulemaking to allow for UAS flights beyond visual line of sight (BVLOS), potentially removing a key obstacle for the use of remotely piloted and autonomous aircraft in US airspace. This would provide more solid regulations for those technologies and help move beyond the stopgap measure used for years by the agency of granting exemptions to UAS developers.

Many aspiring eVTOL developers originally proposed autonomous passenger flights to minimize weight and improve profitability before delaying their plans due to a lack of movement on the regulatory hurdles. New BVLOS rules would be a step toward realizing those ambitions.

The FAA must also review whether to revise an existing rule to install crash-resistant fuel systems (CRFS) in newly built helicopters. That rule doesn’t require the installation of CRFS in helicopters built prior to April 2020; previously, older models could continue to use existing fuel tanks on new-build aircraft. The law states the review must determine “whether and to what extent crash-resistant fuel systems could have prevented fatalities in the accidents” and directs FAA to develop recommendations within 18 months.

The FAA is also ordered by Congress to “develop a viable path for the certification of the safe use of hydrogen in civil aviation, including hydrogen-powered aircraft.”

With that in mind, Congress gave the agency’s Aviation Rulemaking Advisory Committee a deadline of May 2027 to recommend rules for “the certification and installation of electric engines and propellers; hybrid-electric engines and propulsion systems; hydrogen fuel cells” and other “novel propulsion mechanisms.”

In addition, by the end of November, the FAA must create a new Advanced Aviation Technology and Innovation Steering

Committee to plan a comprehensive strategy and to resolve issues, enabling the deployment of new aviation technologies.

New FAA Safety Management System Rule

On April 22, the FAA announced that by the end of May 2027, operators of air tours (Part 91) and air ambulance operations, charters and commuter flights (Part 135) must implement a safety management system (SMS) program and submit a declaration of compliance. The SMS rule does not apply if a single pilot is the sole person responsible for the safe operation of the aircraft.

However, the SMS requirements extend to existing Part 21 type certificate and production certificate holders, which have six months to develop and submit an SMS implementation plan.

A statement of SMS compliance would also be required in the certification process of forthcoming eVTOL and other AAM aircraft.

The FAA stated that this rule “provides a means for a structured, repeatable, systematic approach to proactively

identify hazards and manage safety risk,” including by sharing hazard information with other aviation organizations.

EASA's Updated Innovative Air Mobility Hub

In May, the European Union Aviation Safety Agency (EASA) upgraded and expanded its online drone and air mobility hub for data resources and secure online forums for discussions between companies, regulators and academia, which it had originally launched in December 2023. Upgrades released by EASA on this Innovative Air Mobility (IAM) hub include a new section on privacy, featuring resources about how the drone industry could address the privacy concerns of citizens within European Union regulations.

Additions to the members area of the hub also include a critical area calculator for specific operations risk assessment (SORA) approvals and a pilot test for operational declarations. Members of the hub include European companies Airbus, Lilium and Volocopter. A third upgrade, related to noise and sustainability best practices and rules for drones and air mobility, is planned for later in 2024.



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Navy to Retire MQ-8C Fire Scout



In the US Navy's budget request for fiscal year 2025 (FY25), published in early March, the Navy detailed plans to retire the Northrop Grumman MQ-8C Fire Scout helicopter drone. The Navy intends to end the operational deployment of the MQ-8C in the fourth quarter of FY24 and retire the aircraft by the fourth quarter of FY26. Of the 38 MQ-8Cs delivered to the Navy, 10 are reported to be in operational service, with the Navy having placed the remainder in storage or stricken entirely. The MQ-8C, a modified Bell 407, flew for the first time in October 2013 and reached initial operational capability in July 2019. It made its operational fleet debut in 2021. The MQ-8C replaced the MQ-8B, a modified Schweizer 333, and is the successor to a program that dates to February 2000, when the Navy selected the Fire Scout to fill a requirement for an uncrewed aircraft system [UAS] able to fly from all air-capable ships and in support of the Marine Corps. A replacement could be fielded as part of the Navy's Future Vertical Lift Maritime Strike (FVL-MS) program.

Singapore's H225M and CH-47F Reach Full Capability

In a ceremony on April 11, Singapore's Ministry of Defence announced that its fleets of medium-lift Airbus H225M and heavy-lift Boeing CH-47F helicopters had reached full operational capability. The medium-lift H225M and heavy-lift CH-47F helicopters will replace the Republic of Singapore Air Force's (RSAF's) AS332M and CH-47D, respectively. Precisely when Singapore intends to retire the AS332Ms and the CH-47Ds, which it first acquired in 1985 and 1994, respectively, is unclear. Also uncertain is the exact number of new helicopters in service, though *FlightGlobal* estimates that the RSAF owns 16 CH-47Fs and 13 H225Ms.

Robinson Acquires Ascent AeroSystems

Robinson Helicopter acquired US drone manufacturer Ascent AeroSystems, Robinson announced on April 23. Ascent produces a line of small, cylindrical coaxial helicopter drones like the Ascent Spirit, which the US Defense Innovation Unit (DIU) has cleared



for use by government customers. "The laws of physics and aerodynamics favor coaxials, and with Robinson's fifty years of experience, there is now no better domestic source for reliable, mission-critical [UAS] platforms," said Ascent CEO Peter Fuchs in a statement. The acquisition will allow Ascent to produce its drones at Robinson's manufacturing facility in Torrance, California, though Ascent will retain its headquarters near Boston, Massachusetts, according to a Robinson press release.

Helo Lessors Place Orders with Airbus



On April 25, Airbus announced that the Shanghai-headquartered GDAT had placed an order for 20 Airbus H175s. GD Helicopter Finance (GDHF), a new helicopter lessor founded by GDAT owner Peter Jiang and based in Dublin, Ireland, will market the aircraft to customers in the energy, search and rescue, and the emergency and parapublic markets worldwide. GDAT previously placed an order for 50 H160s (see "Rotorcraft News," *Vertiflite*, July/Aug 2023). "GDHF is very pleased to announce the availability of 50 H160 and 20 Airbus H175 super medium helicopters to the worldwide market," said GDHF CEO Michael York in a statement.

Airbus announced on May 21 that LCI and Japan's Sumitomo Mitsui Finance and Leasing Company (SMFL) had placed an order for up to 21 helicopters. The contract includes firm orders for 14 helicopters and options for seven more; it is composed

of a mix of light twin H145s, medium twin H160s and super medium H175s (shown counterclockwise from top right). LCI and Sumitomo, which together operate a combined fleet of over 40 Airbus helicopters, are aiming to use the helicopters for a variety of missions, including emergency medical, search and rescue, and offshore energy. Delivery is expected to begin in 2028.

Leonardo Upgrades Transmission on AW101



On May 1, Leonardo revealed that the Italian Secretariat General of Defence had certified a series of upgrades to its AW101 medium-lift transport helicopter. The upgrades allowed the main gearbox torque to rise from 112% to 117%, providing an increase in available takeoff power from a total of 5,580 shp for all three engines on the AW101 to 5,830 shp, according to *FlightGlobal*. The changes represent the “most significant upgrade to the AW101 since the introduction of General Electric CT7 engines to the platform in the mid-2000s,” Leonardo said in a press release. The upgrades are already fielded with one customer and Leonardo is working with a second. The upgrades are a major aspect of the Norway Software Suite 9 (SS9), part of the AW101-612 Norway All Weather Search and Rescue Helicopter (NAWSARH) fleet program, according to Leonardo.

Bell Reveals New Flying Lab, ALFA



On May 7, in conjunction with the VFS Annual Forum, Bell revealed an aerial laboratory for developing and evaluating autonomous controls. Developed by Bell’s Advanced Programs team, the Aircraft Laboratory for Future Autonomy (ALFA) is based on the Bell 429 helicopter and uses a fly-by-wire control system. “Fly-by-wire flight, coupled with additional capability

that [is] being integrated into ALFA, provides a great foundation for Bell to expand on its autonomous capabilities,” said Bell’s Executive Vice President for Engineering Jason Hurst in a statement. The ALFA completed a test flight at Bell’s assembly center in Mirabel, Quebec; future tests and operations will take place at Bell’s Flight Research Center in Arlington, Texas.

Brazil’s Helisul Acquires Chile’s Ecocopter

On May 8, Brazil’s Helisul Aviação announced that it had acquired Chile’s Ecocopter. The acquisition brings Helisul’s fleet to 58 rotary- and fixed-wing aircraft, making it the largest helicopter operator in Latin America. The acquisition will “lead to expansion throughout the Latin American continent, initiating a multinational operation model unique in the sector,” said Helisul CEO Humberto Biesuz in a statement. The cost of the acquisition was \$36M, according to press reports.

NATO NGRC Draws Broad Interest

The NATO Support and Procurement Agency (NSPA) has received bids from six companies interested in building NATO’s Next Generation Rotorcraft Capability (NGRC), a medium-class multirole helicopter that could replace as many as 900 helicopters in service with NATO members beginning in the mid-2030s. According to a May 23 report in *FlightGlobal*, the interested parties include teams led by industry leaders — Airbus, Leonardo Helicopters and Bell, and Sikorsky/Lockheed Martin — as well as Lithuania’s Jetcopter; Canada’s Bornea Dynamics; and Deloitte, an international consultancy. The companies submitted bids in response to a request for proposals released by NSPA in February for the fifth of five concept studies, the Integrated Platform Concept, for the NGRC program (see “NGRC Enters Concept Stage,” *Vertiflite*, Sept/Oct 2023). The NSPA intends to select three of the bidders and award contracts for the year-long study in July. The NSPA awarded contracts for the first two industry-led studies in December (see “Rotorcraft News,” *Vertiflite*, May/June 2024).

Aurora, Bell Downselected for SPRINT



The US Defense Advanced Research Projects Agency (DARPA) selected Aurora Flight Sciences, a Boeing Company (concept shown above), and Bell Textron (see below), to participate in the



next phase of the S**PEED** and R**UNWAY** I**ND**ependent T**ECH**nologies (SPRINT) program. The two companies will participate in Phase 1B of the SPRINT program, which aims to design prototypes for a high-speed vertical takeoff and landing (HSVTOL) X-Plane. Aurora announced that DARPA had selected it to proceed in late April, awarding it a \$25M modification to its previously awarded contract for work on the program; Bell made the announcement in late May. DARPA's selection of the two companies marked the conclusion of Phase 1A of the program, which the agency launched on Nov. 1, 2023 (see "Four Companies Dash for DARPA's SPRINT," *Vertiflite*, Jan/Feb 2024). Phase 1A, a conceptual design phase, saw the participation of Northrop Grumman and Piasecki Aircraft, in addition to Bell and Aurora. In Phase 1B, Bell and Aurora will engage in preliminary design and risk reduction efforts. Eventually, DARPA will select one of the two companies to build a prototype of its design and begin test flights, which are expected in 2027.



Washington OKs Black Hawk Orders

In late May, the Defense Security Cooperation Agency (DSCA) announced that the US Department of State had approved a trio of possible foreign military sales of the Sikorsky UH-60M Black Hawk to Austria, Brazil and Sweden. In each case, the approved package is composed of 12 UH-60M Black Hawks and associated equipment. Combined, the potential order from all three countries could comprise as many as 36 helicopters, the estimated value of which could reach around \$3B. However, negotiations for the helicopters are ongoing and each will require US Congress approval. Sweden and Austria have an estimated active fleet of 15 and 12 S-70 Black Hawks, respectively, while the Brazilian Navy operates a handful of S-70B Seahawks, according to annual fleet data published by *FlightGlobal*. In November 2022, Sweden announced it would phase out of its fleet of 18 NHIndustries NH90s in favor of the Black Hawk (see "Rotorcraft News," *Vertiflite*, Jan/Feb 2023).

XTI Aircraft Partners with AVX Aircraft

On June 5, XTI Aircraft announced that it and AVX Aircraft Company will collaborate on the development, design and certification of the TriFan 600, XTI's "vertical lift crossover airplane" (VLCA). Both companies were originally founded by Dave Brody — AVX in 2005 and XTI in 2012. The TriFan 600 is a shaft-driven, lift-fan VTOL aircraft, though a hybrid-electric powerplant was pursued during 2017–2022.



"AVX will help refine our current design, which we expect will accelerate the TriFan 600 development program while significantly reducing expenses for certain engineering capabilities and services," said Scott Pomeroy, Chairman and CEO of XTI Aerospace, the parent company of XTI Aircraft.

On June 6, XTI revealed that Mesa Airlines had signed a conditional purchase order for up to 100 TriFan 600 aircraft. The potential value of the order could exceed \$1B based on a projected list price for the aircraft of \$10M, according to XTI.

New Super Pumas for the German Federal Police



Airbus announced on June 6 that the German Ministry of the Interior had ordered up to 44 H225 helicopters for its Federal Police. This record order for the H225 includes 38 firm orders with options for a further six helicopters. Deliveries are scheduled to start in 2029. The H225 Super Puma will replace the older AS332 Super Puma and H155 Dauphin helicopters that have been in service with the German Federal Police for more than 20 years. This order for the H225 will ensure a seamless transition for pilots and maintenance personnel. The contract also includes training and spare part packages.

The new mission and communication system provides improved situational awareness and smooth data transmission between police forces. It also has an improved main gearbox and an extended health and usage monitoring system (HUMS), which increases safety and helps to save costs. With a maximum takeoff weight of 24,600 lb (11,100 kg), the H225 offers a range of more than 450 nm (832 km) and an external payload of 10,470 lb (4,750 kg), essential for missions like disaster relief and firefighting.



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WOOLPERT

Future Tiltrotors Begin to Take Shape



Bell's uncrewed V-247 and naval V-280 tiltrotors on a deck with V-22 Ospreys. (Bell)

By VFS Staff

Over the past several years, the tiltrotor configuration has become a dominant design for high-speed rotorcraft. The Bell Boeing V-22 Osprey has accumulated some 750,000 flight hours from the more than 400 aircraft delivered. With the selection of the Bell V-280 Valor for the US Army's Future Long Range Assault Aircraft (FLRAA), tiltrotors will eventually be used by all US military service branches: the MV-22 for the Marine Corps, CV-22 for the Air Force, CMV-22 for the Navy and the V-280 for the Army. Likewise, the Leonardo AW609 is nearing certification and the world's first civil tiltrotor could enter into service next year.

Tiltrotors have appealing capabilities for both military and civil operations, and the configuration is currently being seriously studied by rotorcraft developers for future requirements. Here is a roundup of recent tiltrotor developments.

Bell: FVL-MS

FLRAA is part of the overarching Future Vertical Lift (FVL) initiative to replace the US military's legacy helicopters. The Navy calls its program to replace its MH-60R/S Seahawks

and MQ-8 Fire Scout uncrewed aircraft systems (UAS) FVL-Maritime Strike (FVL-MS).

At the Navy League's annual Sea-Air-Space expo in April, Bell Textron displayed how a naval derivative of the V-280 Valor could address the US Navy's future needs for rotorcraft capable of deploying from Navy aircraft carriers and Marine Corps assault ships. Bell also displayed a subscale model of its uncrewed V-247 Vigilant — originally developed for the Marines' cancelled MUX rotorcraft initiative — and updated for FVL-MS destroyer-based requirements. Both aircraft would leverage the technological advances of the V-280.

Leonardo: NGCTR

In July 2014, the European Union (EU) initiated the Clean Sky 2 Joint Undertaking to support technologies for "Fast Rotorcraft" (see "The Shape of Things to Come, Part 2," *Vertiflite*, Sept/Oct 2014). Over the ensuing years, teams led by Airbus and Leonardo have been developing and maturing technologies for flight demonstrators now taking shape under the EU's Clean Aviation Joint Undertaking. Airbus is completing assembly of its compound Racer, while Leonardo is modifying an AW609 with technologies applicable for a Next Generation Civil Tiltrotor (NGCTR).

At Heli-Expo in March (see "Heli-Expo Finale," pg. 34), Leonardo Helicopters Managing Director Gian Piero Cutillo noted

that the NGCTR testifies to the company's role and "commitment in Fast Rotorcraft technologies based on the tiltrotor architecture. It allows us to evaluate specific technological enablers and solutions, which can be key in the future generation of tiltrotors."

Structural changes being demonstrated include a new wing with no dihedral or sweep, non-tilting engines and a V-tail. "The technology demonstrator is being... assembled in Cascina Costa and is almost complete. The maiden flight is expected during this year, during the summer," Cutillo said.



Leonardo's AW609 being modified as the NGCTR Technology Demonstrator. (Leonardo)

Leonardo/Bell: NGRC

At Heli-Expo, Bell and Leonardo also signed a memorandum of understanding (MOU) to evaluate opportunities to cooperate in the tiltrotor technology domain. "As global leaders in designing, manufacturing, and supporting rotorcraft for commercial and military applications, Bell and Leonardo share a multidecade history of industrial cooperation on both traditional helicopters as well as tiltrotor technology collaboration," the press release read.

The cooperative effort will begin in earnest with NATO's Next Generation Rotorcraft Capability (NGRC) Concept Study #5, where Leonardo will take the lead on a tiltrotor architecture proposal, supported by Bell. NGRC is a NATO "High Visibility Project" that creates a multinational framework under which its participants can combine efforts to work on the design, development and delivery of a medium multirole vertical flight aircraft (see www.vtol.org/ngrc for more information).

In June 2022, six countries — France, Germany, Greece, Italy, the Netherlands and the UK — signed a memorandum of understanding committing to the Concept Stage; Canada joined in March this year, while Spain and the US have also been engaged. Under the NGRC program, NATO is seeking to develop a medium-class, multirole rotorcraft for initial service entry between 2035 and 2040 to replace more than 900 legacy helicopters of various types.

"This cooperative effort between Bell and Leonardo reflects our shared vision that next generation rotorcraft will be influenced by the speed, range and maneuverability only tiltrotor technology can deliver," said Lisa Atherton, President and CEO of Bell. "We are proud to deepen our relationship with Leonardo as we continue to explore emerging vertical lift programs in Europe and the United States."

Leonardo's Cutillo said, "We're thrilled to evaluate new joint efforts for the next generation of rotorcraft technologies,

based on our solid and shared view of the unique advantages of tiltrotors. Leonardo has always firmly endorsed tiltrotor technologies to meet evolving rotorcraft requirements, even more so as new needs emerge in the market."

United Aircraft Technology: UR6000

At the Singapore Airshow in mid-February, Chinese startup Shenzhen United Aircraft Technology Co. Ltd. highlighted a new design for crewed and uncrewed variants of a tiltrotor.

The company was originally established in 2012 as the Beijing AVIC Technology Co. Ltd, part of the state-owned Aviation Industry Corporation of China (AVIC) conglomerate. That same year, the group flew a 770-lb (350-kg) uncrewed coaxial helicopter dubbed the TD220. United Aircraft Technology was established as a separate entity in 2014; in 2020, the company completed the first uncrewed modification of a manned aircraft.

Based in Shenzhen, in Guangdong Province, the company received ¥2B (\$275M) in Series D financing last year to support its expanded product offerings, which includes four



Leonardo's Cutillo (left) and Bell's Atherton signed a tiltrotor cooperation agreement. (Bell)



The crewed variant of Shenzhen United Aircraft Technology's UR6000 tiltrotor. (UAT)

different uncrewed coaxial helicopters with gross weights of 600–1,550 lb (280–700 kg), as well as several small multirotor drones.

In addition to these UAS, the company also released images of a large tiltrotor. According to a report by *Aviation International News* (AIN), the 13,200-lb (6-t) “aviation-class” UAS would have a range of 1,864 miles (3,000 km). “We have achieved good results in the R&D of the tiltrotor UAV,” United Aircraft CEO Gangyin Tian said, according to AIN. “At present, the project has completed the detailed design phase and has entered full trial production,” he said.

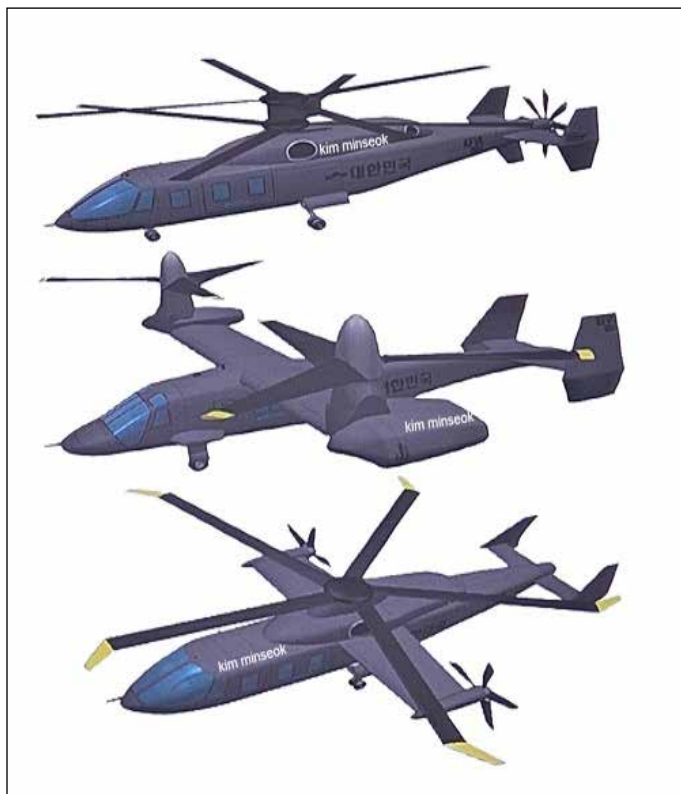
Aviation Week reported that the tiltrotor, called the UR6000, was an “autonomous tiltrotor intended to fly cargo missions in the near term and 7–10 passengers in the long term,” with the first prototype to be unveiled at the Zhuhai Airshow this November.

Korea Aerospace Industries: XUH

South Korean website BizHankook reported in late February that Korea Aerospace Industries (KAI) is advancing its work on high-speed rotorcraft concepts, including analogues of the Bell V-280 Valor tiltrotor, Sikorsky-Boeing SB<1> Defiant lift-offset rotor compound and Airbus Racer compound; KAI has agreements with Bell, Sikorsky and Airbus for information sharing.

KAI plans to invest \$5.9B (KRW 8T) in research and development (R&D) by 2040 to replace its existing Sikorsky UH-60 Black Hawk helicopters with advanced rotorcraft that can fly twice as fast and twice as far. The BizHankook website reported that the design was first unveiled on Feb. 22 at the “Vertical Takeoff and Landing System Sector Committee Winter Symposium,” held by the Korean Society of Aeronautics and Astronautics.

The company plans to develop its domestic tiltrotor technology in two stages. It will first develop a technology



KAI's advanced rotorcraft concepts, designed with support from Sikorsky, Bell and Airbus. (KAI via Kim Minseok)

demonstrator around 2,000 lb (1 t), followed by a 5,000-lb (2.5-t) technology demonstrator. If successful, KAI hopes that continued development (and eventual production) funding over the next 15 years would come from the Defense Acquisition Program Administration (DAPA) for the Republic of Korea Army.

Aviation Week also picked up the story and reported that the design was called the High-Speed eXperimental Utility Helicopter (XUH or HSXUH) project. Hanwha Aerospace is developing a 7,000-shp turboshaft engine for the effort. A decision to proceed could be made later this year. The Korean Ministry of Defense plans to complete a Required Operational Capability (ROC) study by November.

“KAI has compiled the technical specifications of the XUH based on joint research with the Korea Research Institute for Defense Technology Planning and Advancement (KRIT)” and the US Army’s FLRAA program, *Aviation Week* reported. “KAI expects to pursue technical cooperation or joint development with one of the three companies once the development plan is finalized.”

Tiltrotor Fever

Never before have there been so many development efforts for tiltrotor aircraft by so many developers. Time will tell which of these new concepts will succeed as demonstrators and which, if any, will bring additional tiltrotor designs to new military or civilian operators.

Air Force, Army to Develop Heavy VTOL Drones

By Dan Gettinger, Managing Editor

The US Air Force and Army awarded contracts to multiple firms to develop heavy-lift vertical takeoff and landing (VTOL) drones. As they eye future mobility and resupply needs, the Air Force and Army contracts aim to fill a critical gap in the capabilities of existing uncrewed aircraft systems (UAS).

These contracts follow the award by the US Marine Corps to SURVICE Engineering in April 2023 to manufacturer and deliver 21 TRV-150C Tactical Resupply Unmanned Aircraft Systems (TRUAS) drones (see “SURVICE for Service,” *Vertiflite*, Sept/Oct 2023); an additional 28 systems were approved in December. This was the US military’s first production order for a cargo UAS, with a potential of up to 180 TRV-150C systems, each of which can carry 150-lb (68-kg) of payload.

The Army’s Heavy Vertical Takeoff and Landing (HVTOL) program is seeking a VTOL uncrewed aircraft for resupply missions with a lift capability 10 times that of currently planned VTOL systems. According to the Phase II Small Business Innovation Research (SBIR) solicitation the Army issued on June 12, 2023, the program seeks an aircraft capable of lifting loads that weigh at least 800 lb (362 kg), with the goal being loads weighing 1,400 lb (635 kg). Additionally, the aircraft should be able to carry that load at least 100 miles (160 km).

In early October, the Army awarded contracts to Piasecki Aircraft Corp. (PiAC) and a team comprised of Kaman Air Vehicles and Near Earth Autonomy Inc. The Army is hoping to conduct an initial test of the aircraft in early-to-mid 2024, in which it will evaluate the aircraft’s ability to lift a 500-lb (225-kg) load. Following this, the Army intends to award a sequential Phase II award to demonstrate progress on the 800–1,400-lb load goal.

Kaman Air Vehicles, a division of Kaman Corporation, and Near Earth will develop a system derived from Kaman’s KARGO UAV. In an Oct. 4 press release, Kaman said that Near Earth will serve as the prime contractor of the project and provide the autonomy system. The two companies previously collaborated on developing the autonomous capabilities of Kaman’s KARGO (see “Cargo Carrier in a Can,” *Vertiflite*, Nov/Dec 2021). As of press time, Piasecki had not revealed what UAS it was developing for the Army project.

In November, Piasecki secured a second contract to develop a heavy-lift VTOL drone. AFWERX, the Air Force’s innovation unit, awarded Piasecki a multi-year, \$37M contract for work on the Aerial Reconfigurable Embedded System (ARES) UAS and hydrogen propulsion technologies. The contract, which AFWERX awarded under its Strategic Funding Increase (STRATFI) program, will support Piasecki’s efforts to integrate



a fly-by-wire flight control system for the ARES and conduct flight testing over the next year, PiAC told *Vertiflite*.

The ARES, a multi-mission tilt duct VTOL UAS, has its roots in the Defense Advanced Research Projects Agency’s (DARPA’s) Transformer (TX) program, which the agency launched in 2009 to develop a “flying Humvee” (see “The Shape of Things to Come, Part 2,” *Vertiflite*, Sept/Oct 2014). In 2012, DARPA selected a team comprised of Piasecki and Lockheed to develop an aircraft for the program, by then rechristened as ARES (see “Lift on Demand,” *Vertiflite*, Sept/Oct 2016).

Following DARPA’s cancellation of the ARES program in May 2019, Piasecki continued to work on the aircraft with its own funds and support from US Air Force SBIR projects. In 2022, PiAC was competitively selected under the STRATFI program, with funding from both the Air Force and Army.

In addition to continued work on ARES, the new STRATFI contract award will enable Piasecki to develop its hydrogen fuel cell propulsion technology. Piasecki is working with ZeroAvia on hydrogen fuel cell technology, which PiAC will apply to its forthcoming PA-890 compound helicopter and other VTOL aircraft. In May 2023, Piasecki re-opened the Heliplex facility in Pennsylvania as a center for the development of next-generation VTOL aircraft and associated technologies, such as hydrogen propulsion (“Piasecki Relaunches the Heliplex,” *Vertiflite*, July/Aug 2023).

The recipients of both the Army and Air Force contracts are companies with deep experience with uncrewed VTOL, setting up 2024 as a critical year for the development of next-generation UAS.

Joby and Volocopter Fly in New York City



Joby flying past Brooklyn Bridge Park during an additional flight on Nov. 14. (Joby photo by Torri Travis)

By Dan Gettinger, Managing Editor

On Monday, Nov. 13, Joby and Volocopter conducted demonstration flights of their electric vertical takeoff and landing (eVTOL) aircraft in New York City. The flights occurred at the Downtown Manhattan Heliport (JRB) and involved a Volocopter 2X and Joby's preproduction prototype, both of which were crewed. Beta Technologies, the Vermont-based eVTOL developer, also displayed its Charge Cube, an interoperable fast-charging system for electric aircraft.

Both Joby and Archer Aviation — in collaboration with Delta Air Lines and United Airlines, respectively — intend to one day offer commercial eVTOL aircraft services to and from downtown Manhattan, with the latter hoping to use JRB as its destination. Located adjacent to Wall Street, JRB is one of two heliports in New York owned by the city (the other being the East 34th Street Heliport). The site opened in 1960 and today hosts tourism flights, as

well as corporate and charter flights (see “The Heliports of New York City,” *Vertiflite*, Nov/Dec 2021).

This was the world's first public demonstration of two different companies' eVTOL aircraft flying at

the same place. It was also the first time most of the spectators had seen — and more importantly, heard — eVTOL flights. Joby conducted a test flight on the day before, calling it “the first ever electric air taxi flight in the city and the first time Joby



Mayor Adams (center, in the cap) walks back with his staff and personnel from Volocopter and Joby after viewing the two eVTOL aircraft. (Michael Appleton/Mayoral Photography Office)

has flown in an urban setting.” Volocopter stated that the company had now “successfully and safely conducted flights in the heart of two of the busiest metropolitan hubs of the world, NYC and Singapore.”

Joby shipped its aircraft to the HHI Heliport in Kearny, New Jersey, for reassembly (see “Serving the Big Apple: The Kearny Heliport,” *Vertiflite*, July/Aug 2021), conducted test flights and then moved the aircraft by barge across the Hudson River to JRB. Joby noted that it had “flown more than 30,000 miles with its full-scale prototype eVTOL aircraft” since 2017, while Volocopter stated that it had made “over 2,000 successful public and private test flights” of its various multicopter models since 2011.

At the event, New York City Mayor Eric Adams announced plans to electrify the Downtown Manhattan Heliport and transform the site into a destination for maritime freight and micro-distribution. The city issued a request for proposals for an operator willing to support aerial operations at JRB and provide the infrastructure required to permit eVTOL aircraft operations, as well as last-mile delivery and maritime freight delivery. As of press time, the submission deadline is Jan. 12, 2024.

“Our vision for the Downtown Manhattan Heliport will create the world’s first heliport with infrastructure for electric-powered aircraft and put this public asset to work for New Yorkers as a hub for sustainable transportation and local deliveries,” the mayor said in a statement.

The project to refashion the heliport is in line with New York’s sustainability and economic revitalization objectives, the mayor’s office said in a press release. One such goal, identified



Joby comes in for a landing after Volocopter’s flight. (Michael Appleton/Mayoral Photography Office)



The Volocopter 2X and Joby S4 air taxis at the Downtown Manhattan Heliport. (Volocopter photo)

in the mayor’s “PlaNYC: Getting Sustainability Done” strategy, is to shift some freight from diesel-powered trucks to New York’s waterways by activating harbor landings at points around the city. In doing so, the city hopes to reduce emissions from roadways and support the rapid movement of goods around the city.

“Reactivating our waterways for freight mobility and electrifying our transportation systems are key initiatives laid out in PlaNYC that will help us cut transportation emissions in half by 2030,” said New York City Chief Climate Officer Rohit T. Aggarwala.



Here's our roundup of news on battery-electric, hybrid-electric and hydrogen-electric vertical takeoff and landing (eVTOL) aircraft from our Electric VTOL Newsletter. Nearly 1,000 eVTOL aircraft have been catalogued to date in the VFS World eVTOL Aircraft Directory (www.eVTOL.news/aircraft), with new aircraft added after every unveiling. Check it out for more information on each of the advanced air mobility (AAM) aircraft described here or to subscribe to our newsletter.

AIR and Nidec Partner on eVTOL Motor



On Feb. 21, Pardes Hana, Israel-based AIR VEV Ltd announced that it had partnered with Nidec Motor Corporation to develop the motor for the AIR ONE, the company's production model of its two-seat eVTOL aircraft. The two companies will collaborate on developing an electric motor customized to meet the 100-mile (160-km) flight range of the AIR ONE. AIR intends to incorporate the enhanced-efficiency motor into the AIR ONE's ongoing flight testing and, eventually, into its production. Nidec Motor Corporation is a US-based subsidiary of Japan's Nidec Corporation, which specializes in electric motors and has partnered with other eVTOL developers, like Eve Air Mobility (see "eVTOL Leaders Continue to Accelerate Progress," *Vertiflite*, Jan/Feb 2024).

Air Force to Evaluate Pivotal BlackFly



Pivotal announced on Feb. 22 that it delivered four BlackFly eVTOL aircraft and two flight simulators for evaluation by the US Air Force. Pivotal delivered the aircraft to Modern Technology Solutions Inc. (MTSI), a Virginia-based company that

is working with the Air Force's AFWERX technology incubator on its Agility Prime initiative. Pivotal will deliver a total of eight BlackFly aircraft to MTSI and AFWERX, which is seeking to evaluate the aircraft's performance and its military potential for use as a remotely piloted aircraft. Pivotal will also provide the Air Force with pilot training and support services during the evaluation period, an eight-month program occurring at the New Braunfels National Airport, Texas, and the National Advanced Air Mobility Center of Excellence at Springfield-Beckley Municipal Airport, Ohio.

CycloTech Secures Investment



On Feb. 28, CycloTech announced that it had raised €20M (\$21.7M) to fund its work on a novel propulsion system for aviation. The investment from Breeze Invest and Konos Holdings will go towards further development of the CycloRotor, the Austrian company's electrically driven propulsion system that features 360-degree thrust vector control, and the eventual certification of the system by the European Union Aviation Safety Agency (EASA). It marks CycloTech's progress towards meeting its target of raising €53M (\$57M) by the year's end, the company said in a press release. "We are convinced that CycloTech's unique technology will revolutionize how we move from A to B in the long term," said Breeze Invest Managing Director Maximilian Schönfeldt in a statement.

SkyDrive Launches Production



In a ceremony on March 6, SkyDrive launched production of its SD-05 SkyDrive eVTOL aircraft at a Suzuki Motor Corporation manufacturing plant in Iwata-city, Shizuoka, SkyDrive said on March 7. The facility can produce 100 aircraft per year. It is the culmination of a multiyear partnership between SkyDrive

and Suzuki, which invested in the eVTOL developer in 2022; the two companies agreed in June 2023 to jointly produce SkyDrive's eVTOL aircraft at a Suzuki-owned plant. In September 2023, SkyDrive launched its manufacturing subsidiary, Sky Works Inc., to manage production. Meanwhile, on March 14, SkyDrive announced that Bravo Air, a US-based private air charter based in Augusta, Georgia, intends to purchase up to five SD-05 SkyDrive eVTOL aircraft.

Airbus Unveils CityAirbus Prototype



On March 8, Airbus unveiled its CityAirbus NextGen prototype eVTOL aircraft. The CityAirbus NextGen features a 40-ft (12-m) wingspan and is expected to have a capacity of one pilot and three passengers. At the same time, Airbus formally inaugurated the company's new test center in Donauwörth, Germany, where it plans on evaluating the systems for its eVTOL aircraft. The Donauwörth test center — located at the Airbus Helicopters Deutschland plant — launched initial operations in December 2023 and will serve as the locus of test activities ahead of the company's planned maiden flight of the CityAirbus later in the year. Airbus unveiled the CityAirbus NextGen in September 2021 (see "Airbus Reveals NextGen eVTOL concept," *Vertiflite*, Nov/Dec 2021); it is the successor to the first-generation CityAirbus demonstrator, which Airbus revealed in 2019.

TCab Raises \$20M Towards Series A



Shanghai-based TCab Tech announced on March 25 that it had raised an additional \$20M in its Series A financing. The investment came from a strategic investment fund that plans to in-

troduce the air-taxi application in the Middle East. TCab's E20 tilt-propeller eVTOL aircraft has five seats (a pilot plus four passengers) and six propellers — two lift-only propellers and four that tilt for lift and cruise — powered by Safran ENGINE-US electric motors. The E20 targets a cruising speed of 140 kt (260 km/h) and a maximum design range of 108 nm (200 km), though it is most efficient for commuting 15–80 nm (30–150 km). TCab completed initial testing of its full-scale aircraft in October, after conducting hover and transition flights at Dongyang Hengdian General Airport in Zhejiang Province (see "Electric VTOL News," *Vertiflite*, Jan/Feb 2024).

XTI Completes Nasdaq Listing



On March 12, XTI Aerospace Inc. was officially created, formed through completion of the merger between XTI Aircraft Company and Inpixon. The company began trading on the Nasdaq the next day with the ticker symbol XTIA. XTI Aerospace is focused on the development and commercialization of the TriFan 600, a fixed-wing, "vertical lift crossover airplane" (VLCA), and offers real-time location systems (RTLS) technology to manufacturing and other industrial facilities. The planned merger was announced in July 2023.

Scott Pomeroy has been appointed chairman and CEO of XTI Aerospace. Michael Hinderberger continues as CEO of XTI Aircraft Company, a subsidiary of XTI Aerospace, while Soumya Das will serve as CEO of the RTLS business unit of XTI Aerospace. David Brody was the founder and past chairman of XTI Aircraft Company (as well as AVX Aircraft Company).

XTI Aircraft was founded in 2012. The TriFan 600 was originally conceived as a shaft-driven VTOL aircraft and led by former Sikorsky president Jeff Pino until a tragic accident in 2016. Former AgustaWestland North America CEO Bob Labelle then took over the company and shifted it to a hybrid-electric VTOL design. Due to the low energy density of electric propulsion, the design was switched back to shaft-driven ducted propellers when Hinderberger was appointed as CEO in 2022. In addition to the two ducted fans, a third fan in the rear fuselage balances the lift. XTI has received more than 700 conditional preorders to date, with the potential to generate over \$7B in gross revenue upon delivery.



Michael Fallon

Assistant Program Executive Officer
Naval Air Systems Command (NAVAIR)

At NAVAIR headquarters in Patuxent River, Maryland, Michael Fallon doubles as assistant program executive officer (PEO) overseeing vertical lift science and technology (S&T) for air, anti-submarine warfare and special mission programs, and as the vertical lift portfolio manager for NAVAIR's Chief Technology Office (CTO). He explained, "I support the program offices [PMAs] — H-53, Presidential, V-22, H-1 and H-60, and also the new PEO(A) Advanced Development Team where Future Vertical Lift [FVL] resides right now for both the Marines and the Navy. Sometimes, I help out with the other program offices like Fire Scout. Anything vertical lift, if they have something special, they can come to me."

The APEO(A) for S&T continued, "The program offices have more near-team problems, obviously, because they're in the business of acquiring and developing aircraft. In the CTO role, I also help manage Navy S&T programs like small business innovative research (SBIR), and Office of Naval Research (ONR) programs. I coordinate with Office of the Secretary of Defense [OSD] joint capability technology demonstrations [JCTDs], rapid defense experimentation reserve programs and things like that." Fallon added, "I also have an external role, interacting across the Navy, the Marine Corps, all the other services, DARPA, NASA, academia and industry to represent naval aviation and ensure a balanced S&T vertical lift portfolio. I'm trying to find out what they're doing, and they're trying to find out how we can fit in with each other's programs."

NAVAIR S&T investments are driven by Navy and Marine Corps needs. Fallon said, "We try to put those things into four interest areas. We've got enabling technologies, which includes artificial intelligence, space-weight-and-power [SWAP] reduction and things like that. We've got technology to improve warfighter performance — that's where you'd see degraded visual environment [DVE] aids and things like live-virtual-constructive [LVC] training technologies. We also have technologies to improve readiness and sustainment — repair, corrosion, manufacturing, prognostics through artificial intelligence or machine learning. And we work on things to improve warfighting capability — things to improve range and speed, mission planning and, of course, survivability."

Fallon cited, "We have had tiltrotor S&T going on since the beginning of the V-22. We have a program that's ready to wrap-up called DIVE — Dynamic Interface Virtual Environment — which is trying to get CFD [computational fluid dynamics] and



simulation to develop flight envelopes and perhaps also be used for training fleet pilots to keep their qualifications. There's a big V-22 component in that, and we're trying to improve CFD codes for V-22."

NAVAIR collaborates ONR, the US Navy Test Pilot School, the US Naval Academy, and university-based Vertical Lift Research Centers of Excellence (VLRCEs) on vertical lift and tiltrotor research. "We're doing flight tests and CFD and some wind tunnel tests showing that there's a performance degradation for sloped surfaces. That directly relates to ship decks, showing if you hover over a sloped surface, you'll lose some power.

The Test Pilot School will provide pilots to the VLRCEs — a lot of them have their own simulators. We'll get better results that way with trained test pilots."

Into the Fleet

Mike Fallon grew up in Cairo, New York, near the Catskill Mountains and scored high in math and science in a high school class of just 70 students. He recalled, "I did have an early interest in engineering. My dad had worked on a dairy farm and taught me how to fix machinery and my cars."

Teachers Edward and Carol Fallon would ultimately run their own farm in New York's Finger Lakes district, but their son was drawn to flight. The NAVAIR APEO(A) for S&T recalled, "My first real interest in aviation and the military happened when I saw the Blue Angels at a local airshow. As a recruiting tool, those guys are great — I'm a case in point. That got me interested in seeking out an ROTC [Reserve Officer Training Corps] scholarship. My parents were very supportive and even made a deal with me that if I got a full scholarship, they'd pay for room and board. I applied to both the Navy and the Air Force for an ROTC scholarship, and as fate had it, I got the Navy ROTC scholarship at Rensselaer Polytechnic Institute [RPI]."

Mike Fallon entered RPI focused on electrical engineering. "When I was in high school, personal computers were just coming out, and I had a Radio Shack TRS-80. I spent a lot of time programming in BASIC and saved my programs on cassette decks. My summer before my senior year in high school, I was accepted into a summer program at RPI and took a course in programming microcomputers. When I got to RPI, I was very interested in electrical engineering and concentrated on image processing and control systems, especially control systems for aircraft."

Upon graduation in 1987, Fallon reported to the Navy. "I got selected for aviation and went down to Pensacola and then into primary training. At the end of that, you choose rotorcraft or

fixed-wing, and luckily, I did get rotorcraft.” Fallon explained, “When we were going through school as midshipmen in ROTC, they gave you training in the different communities — the submarine community, the surface community, the Marines and aviation. When I did the aviation week, I got a ride in an H-3 [the Sikorsky Sea King helicopter]. That just blew me away, that you could sit in the air, 10 or 50 ft above the ground, and not move. Then they picked us up out of the water with the H-3. Just seeing the cool things that it could do, that’s what made me want rotorcraft.”

Fallon was designated a naval aviator in 1988. “You put in your ‘dream sheet’ for the aircraft you wanted. I put in for the H-60 because it was the newest aircraft at the time, but I got the H-46. That was probably one of the best things that happened to me.” The “nugget” pilot joined helicopter combat support squadron HC-6 at Norfolk, Virginia, and immediately deployed to Puerto Rico for Hurricane Hugo relief. “It was great flying. We brought emergency supplies to villages. After that, I did anti-drug support down in the Caribbean and Panama, and a little while after that, Desert Storm happened.”

Wartime helicopter operations were eye-opening. “We were just flying so much because the H-46 was doing VERTEP [vertical replenishment] bringing bombs and food and mail to everyone. One of the biggest challenges back then was we didn’t have any night vision goggles. We had a couple of aircraft lost at night. From a safety standpoint, it was disappointing to lose so many aviators to mishaps. They weren’t wartime related. I think it was just the pace of operations.”

The aviator-engineer subsequently earned an advanced degree in Monterey, California. “When I went to the Naval Post-Graduate School, mid-career, I got my EE [Electrical Engineering] Masters [degree] and had a really good time furthering my control systems knowledge. I started studying artificial intelligence and neural networks there. I had a really good thesis advisor, Hal Titus, who was an expert in missile and aircraft systems.”

Fallon subsequently served as safety officer on the amphibious assault ship USS Saipan and concluded his military career in 1998 as the H-46/V-22 mishap analyst in the Naval Safety Center at Norfolk, Virginia. “At that point, I made the decision to leave the Navy. I needed to do something related to aviation, and I looked for a job here at NAVAIR hoping I could use some of my degree and my abilities to fix the things that caused those mishaps.”

NAVAIR Knowledge

Fallon joined NAVAIR as rotorcraft team lead in the flight dynamics branch. “When I first started out, I worked basically all the helo programs seen in the Navy and Marine Corps in the late 1990s — the H-60 Common Cockpit, H-1 Upgrades, V-22, CH-53K, Fire Scout, unmanned K-MAX and Presidential. The main job was doing airworthiness for handling qualities.

Handling qualities is a special discipline because you have to interact with the aerodynamics folks, the flight control people, the performance and engine people. You interact with the crew systems people, the ship suitability people, the structures group.”

Fallon noted, “I worked with the Army on the new ADS-33 handling qualities design standard. I got to go to NASA Ames Research Center and work with Chris Blanken and do some flight testing. We helped develop the standard at NAVAIR and helped make it better. We actually used it on the CH-53K, I believe the first program to use ADS-33 from the ground up.”

Fallon graduated from Naval Test Pilot School at Pax River in 2000. “They let me fly a lot of the test points, and also expected me to do engineering-level analysis on the data and report. It was really cool because it drove home the theories I had learned to that point as far as control systems, stability and things like that. You write discrepancies against the aircraft system and put yourself in the seat of the fleet pilot, not the test pilot with the ‘golden arm,’ so the engineers can fix those things for the fleet pilot.”

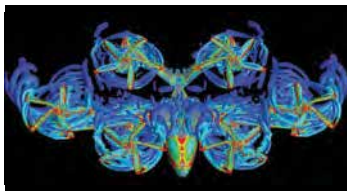
NAVAIR science and technology today leverages program office and Naval Air Warfare Center (NAWC) engineers. Fallon observed, “Other services sometimes have a dedicated body or group that does S&T. A lot of our guys who are doing S&T are also doing airworthiness and flight clearances.” Investigations also leverage partnerships outside the Navy. “We recently re-energized the OSD Community of Interest (COI) for vertical lift. We did that just a couple of months ago with the Army [at Redstone Arsenal] in Alabama. We also have a number of project arrangements with various countries.”

NAVAIR’s vertical lift portfolio manager noted, “One of the things we’re just starting in is eVTOL [electric Vertical Takeoff and Landing] and hybrid-VTOL technologies. We’re working with the Marine Corps Warfighting Lab folks because they may have some applications with the VTOL Family of Systems. We’ve been working with Air Force Agility Prime and NASA. For us, eVTOL opens up the design space and perhaps reduces your sustainment and maintenance functions. On the other side, it may have some limitations for us — batteries that are not approved for a ship and where do we put the hydrogen. Naval Research Laboratory has a lot of pretty good programs in hydrogen fuel cells. It’s starting for all of us, and we’re all very interested in it.”

Mike Fallon joined the American Helicopter Society (AHS), today’s Vertical Flight Society (VFS), in 1999. He is currently NAVAIR Liaison to the VFS Board of Directors. “VFS is a unique organization. You get the most out of the interaction with the people in industry, academia, the other services. A lot of times, that’s where I’ll meet the person who has something that would help benefit one of my programs.”



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Director, Industry & Strategy
Community Air Mobility Initiative (CAMI)

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- | | |
|--|--|
| Sept. 10–12, 2024
Marseille,
France | 50th European Rotorcraft Forum (ERF)
The European Rotorcraft Forum is one of the premier events in the rotorcraft community's calendar bringing together manufacturers, research centers, academia, operators and regulatory agencies to discuss advances in research, development, design, manufacturing, testing and operation of rotorcraft. This special 50th Anniversary ERF takes place at Le Palais du Pharo, an old palace built by Napoleon III during the second half of the 19th century. |
| Sept. 3–5, 2024
Las Vegas,
Nevada, USA | FLYING HY 2024
This in-person event by HYSKY Society (in conjunction with Commercial UAV Expo) will bring together key hydrogen aviation players from around the world to discuss topics spanning technology, infrastructure, regulatory policies, investment opportunities and more. |
| Sept. 17–18, 2024
Washington, DC,
USA | 8th Workshop on AAM Infrastructure
This annual event, held this year in support of the Federal Aviation Administration (FAA) headquarters, features an introduction to AAM infrastructure followed a deeper dive into specific challenges. |
| Oct. 8–10, 2024
Augsburg,
Germany | AIRTEC 2024
AIRTEC is the international B2B trade fair and dialogue platform for aerospace and future mobility at the high-tech region of Bavaria. Exhibitors, keynotes, conference topics, B2B meetings and workshops will focus on core areas: modern mobility concepts, components and systems, materials and production, design and structures, research and development, legal framework and certification, and information and communication. |
| Nov. 7–8, 2024
Melbourne,
Australia | 10th Asian/Australian Rotorcraft Forum (ARF)
The 10th Asian Australian Rotorcraft Forum is being organized by the Vertical Flight Society's Australia Chapter, with the support of educational members Melbourne University and Sydney University. ARF invites technical paper abstracts on the full gamut of vertical lift technical disciplines, including AAM/eVTOL. |
| Dec. 4–5, 2024
Hampton Roads,
Virginia, USA | HELMOT XX: Helicopter Military Operations Technology Meeting
This 20th biennial HELMOT meeting consists of a day-and-a-half of unclassified, unrestricted presentations by the military, government and industry. HELMOT XX will combine interest in crewed and uncrewed rotorcraft/VTOL research and development enabling increased warfighter capability. |
| Dec. 4–6, 2024
Singapore | 2nd International Conference on Advanced Air Mobility Systems (ICAAMS)
The forum will address all subdisciplines of AAM systems from design and development to operations, product support, regulations and airspace management. Submit an abstract! |
| Jan. 22–23, 2025
Huntsville,
Alabama, USA | Handling Qualities Technical Meeting
The event focuses on meeting the needs of the vertical flight aircraft handling qualities, flight controls and vehicle design communities. Papers are invited on handling qualities standards and flight test technique development, in addition to updates to ADS-33E-PRF / MIL-DTL32703 for new military and civil platform configurations — including helicopters, advanced rotorcraft, drones and electric vertical takeoff and landing (VTOL) aircraft. Submit an abstract! |
| Feb. 4–6, 2025
Phoenix,
Arizona, USA | Transformative Vertical Flight 2025
TVF2025 comprises three events: the 11th Biennial Autonomous VTOL Technical Meeting, the 12th Annual Electric VTOL Symposium and the Short Course on Electric VTOL. Submit an abstract! |
| April 2–3, 2025
Long Beach,
California, USA | 4th Annual H2-Aero Symposium
VFS has been a thought leader in hydrogen electric aviation since 2020. The Society's fourth annual symposium will feature leaders from industry, government and non-profits to share their insights on the progress and remaining barriers to realizing aircraft powered by hydrogen fuel cells. |
| May 20–22, 2025
Virginia Beach,
Virginia, USA | 81st Annual Forum & Technology Display
The world's leading international technical event on vertical flight technology. The three days of technical sessions will include hundreds of technical papers on every discipline from acoustics to unmanned systems, as well as dozens of invited presentations by leaders in industry and government. Submit an abstract! |

Find out more at www.vtol.org/events