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Missionized tire wear testing helping tire designers fail fast to move forward

By Jill Pickett
AEDC Public Affairs

WRIGHT-PATTERSON AIR FORCE BASE, Ohio – High costs and long lead times can be a deterrent to innovation. The team at the Landing Gear Test Facility, or LGTF, at Wright-Patterson Air Force Base is trying to lower those barriers for aircraft t ire manufacturers.

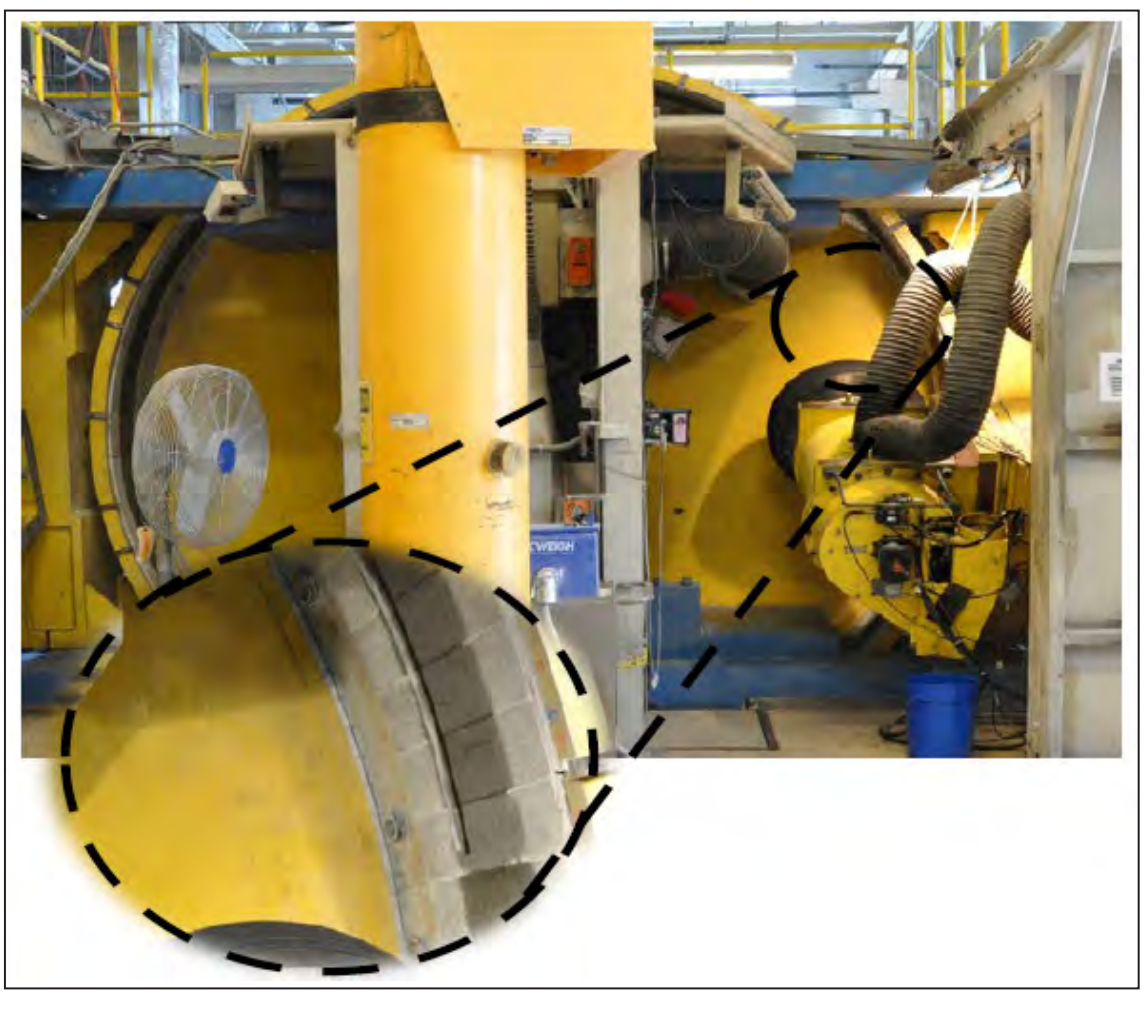
For roughly a decade, the LGTF team has been cloning runway surfaces by taking casts of runways and then creating concrete tiles used in an internal drum dynamometer for missionized tire wear testing, or MTWT. The team has built up an in-house library of tiles, but still not every runway a customer may be interested in is represented.

Conventional tire testing assesses structural integrity to ensure a tire can handle the loads, speeds, heat and braking experienced during landing and takeoff of an aircraft, but does not account for wear and tear. A tire may be able to survive all the forces, but only do so for one or two landings before needing to be replaced, which is significant in both cost and maintenance time. MTWT conducted by the LGTF team provides a means to assess how a tire wears over time and inform logistical planning and, ultimately, tire design.

In recent years, the LGTF team has been doing 3D runway surface scanning to create digital models of runway surfaces. The goal is to use these digital models to additively manufacture tiles for use in the dynamometer, but until then the data obtained from the models has provided another means to shorten the timeline to test and reduce cost.

The data obtained from the scans allow the LGTF team to truly treat the concrete tiles created through the molding process as a library. A scan of the "cloned" runways provides information such as height differences in the aggregate of the runway and number of aggregate points in a given area. Then, when a customer wants a runway not in the library, the team scans it and looks for a runway that

See **TIRE**, page 3



Concrete tiles are installed in the 168-inch internal drum dynamometer at the Landing Gear Test Facility at Wright-Patterson Air Force Base, Ohio, to simulate a specific runway in order to conduct Missionized Tire Wear Testing. The concrete tiles are created by taking molds of a runway then casting the tiles. The dynamometer operates at speeds up to 350 mph, with loads of up to 150,000 pounds, plus or minus 20 degrees of yaw, plus or minus 10 degrees of camber and can provide variable levels of brake torque. Operating Location-AC of the 704th Test Group, Arnold Engineering Development Complex operates the LGTF. ***(U.S. Air Force photo illustration)***

Addison Spicer, left, and Cameron Butcher, current and former members of the White Oak Rescue Team (WORT), respectively, conduct confined space training. The team was established in the late 1990s at Arnold Engineering Development Complex Hypervelocity Wind Tunnel 9 in White Oak, Md., to provide immediate lifesaving actions in the event of an emergency until county emergency responders arrive onsite. ***(U.S. Air Force photo)***

White Oak Rescue Team stands ready should emergencies arise

By Bradley Hicks
AEDC Public Affairs

WHITE OAK, Md. – Hope for the best but prepare for the worst.

Personnel at Arnold Engineering Development Complex Hypervelocity Wind Tunnel 9 have taken this proverb urging prudence to heart. For around the past quarter century, a group has been in place at the facility, ready to respond should disaster strike.

The White Oak Rescue Team, or WORT, was established in the late 1990s, not long after Tunnel 9 became an Air Force facility in 1997. The WORT is made up of trained and certified Tunnel 9 employees with both the Department of Defense and AEDC Test Operations and Sustainment contractor. Its purpose is to provide immediate lifesaving actions in the event of an emergency until county emergency responders arrive.

According to Dawnsherrae Bryant, AEDC White Oak Safety, Quality, Industrial Hygiene and Emergency Management coordinator and WORT manager, it would take a minimum of 10 minutes and potentially several hours for the nearest emergency response agency to arrive on scene should an emergency occur at Tunnel 9.

"The WORT members provide a sense of confidence to our workforce in knowing that we have this capability that if we ever are in peril, they will answer the call," said original WORT member William Betz.

The team was originally estab-

See **RESCUE**, page 3

NASA recognizes NFAC team for overcoming challenges, delivering quality results

By Bradley Hicks
AEDC Public Affairs

MOUNTAIN VIEW, Calif. – It has been said that nothing worth doing is ever easy.

And things weren't easy for the National Full-Scale Aerodynamics Facility test team assigned to the Aerodynamic and Acoustic Rotoprop Test, or AART. The group was tasked with completing the first-ever urban air mobility rotor acoustic test program at NFAC, which is managed and operated by Arnold Engineering Development Complex and located at the NASA Ames Research Center in Moffett Field, California.

Just as the team had gotten its bearings and the maiden test program got rolling, the global coronavirus outbreak escalated. At first, the pandemic prompted significant adjustments in the AART team's approach. Later, it brought the test to a complete standstill.

However, the AART team members overcame the challenges they faced and managed to complete the testing in under a year. Their efforts did not go unnoticed and earned them high praise from one of the agencies they worked closely alongside during the program.

Earlier this year, AART team members learned the group was named a recipient of a NASA Group Achievement Award. This certificate is awarded to any combination of gov-

See **NASA**, page 4

In This Issue....

HIGH MACH
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- *Excellence in all we do*

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- Sustainability. We plan and act for the long term benefit of our communities and our environment.

Members of the Tactical Data Link Enhancements Team, located at Hanscom Air Force Base, Massachusetts, pose in front of an F-15 Eagle at Holloman Air Force Base, N.M., in May. The team was conducting tests of their Heimdall tactical data link technology, which improves real-time information sharing and overall fighter performance in highly contested, near-peer environments. *(U.S. Air Force photo)*

586th FLTS helps showcase data link improvement

By Bradley Hicks
AEDC Public Affairs

HOLLOMAN AIR FORCE BASE, N.M. – The 586th Flight Test Squadron was involved last year in the testing and showcasing of the new Heimdall enhanced capability for legacy tactical data links.

The 586 FLTS is part of the 704th Test Group at Holloman Air Force Base, N.M. The 704 TG is a unit of AEDC, headquartered at Arnold Air Force Base, Tennessee.

Heimdall was developed to increase data sharing for legacy tactical data links, or TDLs, in contested environments and improve warfighter readiness.

The U.S., NATO and coalition forces TDLs are for transmitting and exchanging real-time data among allies for shared situational awareness. Like the 586 FLTS, personnel at Hanscom were involved in Heimdall testing.

Sponsored by the Air Force Life Cycle Management Center Aerial Networks Division, Tactical Datalinks and Gateways Branch, the Heimdall project is being developed in partnership with the Massachusetts Institute of Technology Lincoln Laboratory.

"Heimdall provides a critical capability to existing tactical data links that ensures continued operation in future fights," Michael McAuliffe, program manager, Tactical Datalinks and Gateways Branch, said. "What our system does is provide the Air Force with an advanced capability not only for the aircraft of the future but the aircraft of today. We have to keep these current platforms relevant for the modern fight, and that's our objective with Heimdall."

Linda McCabe with the Tactical Networks group of the MIT Lincoln Laboratory served as the lead technical planner for 586 FLTS tests and demonstrations of Heimdall that occurred in May 2021. The technology was demonstrated during the 2021 Northern Edge event, which McCabe said served a sort of "graduation exercise" for Heimdall.

"For us, the incredible advantage of going to an event like a Northern Edge is the sheer number of assets that are involved," she said.

Northern Edge is a U.S.-only military field training exercise event that occurs every other year at several facilities and in several areas in Alaska. The joint training exercise, conducted by the U.S. Indo-Pacific Command and led by Pacific Air Forces, emphasizes multi-domain and distributed operations, tactical to operational level requirements and innovative initiatives. The event provides the opportunity to train tier-three and tier-four tactical units in joint training, interoperability and readiness. It is also an experimentation venue for the testing of tactics, techniques and procedural innovations.

More than 13,000 personnel across all branches of the military participated in Northern Edge 2021, which took place over 12 days in May. Nearly 250 aircraft flew more than 3,300 hours, including more than 1,200 sorties.

There were more than 50 experiment initiatives at Northern Edge 2021. The 586 FLTS supported three of these initiatives with the payload it carried during the 2021 event.

"This is really an opportunity for our forces to exercise their full capability in a way that they can't in other places because of airspace size restrictions or frequency restrictions or all of the things that you just can't do when we have smaller, tighter test spaces close to populated areas," McCabe said. "You can do all of those things up in Alaska."

Prior to its demonstration at Northern Edge, Heimdall was tested over a two-and-a-half-week period in the spring of 2021 at White Sands Missile Range in New Mexico. Originally, those involved had planned to begin testing earlier at WSMR to allow six to eight months from the end of testing there to the start of Northern Edge. However, the ongoing COVID-19 pandemic compressed this timeline, and the Lincoln and 586 FLTS team went straight from testing at WSMR to demonstration at Northern Edge.

"We set up an exceptionally robust testing environment at WSMR, and we were thrilled that we were able to do that," McCabe said. "We partnered with a lot of different folks on the base there, and the support was fabulous. We were thrilled with the support we received from everybody, from the 586th to the 746th, plus the Army side of the house. Everybody was really, really great."

Through its partnership with the 586 FLTS, the Lincoln Laboratory team had access to the squadron's C-12J Huron at Northern Edge. The team was able to add not only Heimdall, but two additional payloads to the plane for demonstration. One of the other Lincoln technologies integrated on the C-12 was the Common Tactical Edge Network software prototype that enables mesh networking and mission-tailored data among tactical platforms.

Along with the C-12 from the 586 FLTS, the Lincoln team also had access during the testing at WSMR and demonstration at Northern Edge to an F-15C Eagle from the 40th Flight Test Squadron at Eglin Air Force Base, Florida. This allowed them to demonstrate the same technology carried on the C-12 in a smaller form factor.

"For us, the big difference is that F-15 can get in the fray and behave like it would normally and really give us that tactical context to ensure that what we built is actually working in that environment," McCabe said. "Because it has a much bigger space for payload, the C-12 gave us the benefit of actually having our operators sitting onboard. We were able to have a baseline capability so that we could do an apples-to-apples comparison of what warfighters have now versus what we're proposing, and then we could compare the data."

Another benefit of demonstrating the Heimdall system at Northern Edge was that it provided a more realistic environment compared to the more controlled setting at WSMR.

"From a Heimdall perspective, we were really excited to go to Northern Edge because of the size of the event," McCabe said. "When we were at WSMR, we were able to control everything, and it was a much more engineering-focused test. We actually had a much more robust threat at WSMR than we did at Northern Edge, but at Northern Edge you have the full-up tactical network, and that allowed us from a capacity perspective to really get some good data."

Editorial note: This article includes information from the article, "Hanscom team demos data sharing technology," posted to the Holloman AFB website on June 24, 2021.

Smoking Policy

1. The following revised Arnold AFB smoking policy is effective immediately and applies to all individuals on Arnold AFB.
2. Traditional Tobacco products (e.g. cigars and cigarettes):
   a. Smoking is permitted solely in Designated Tobacco Areas (DTAs) identified by designated signage. If no signage exists, smoking is not permitted in that area. It is the responsibility of all smokers to keep DTAs clean of cigarette butts.
   b. Tobacco use on the Arnold AFB Golf Course is permitted, but discouraged based on the health hazards of tobacco use and secondhand smoke. No smoking is permitted within 50 feet of golf course buildings except in the approved DTA.
   c. Smoking in government-owned/leased vehicles is strictly prohibited. Personnel are allowed to smoke in their personal vehicles at any time; however, at no time will personnel discard cigarette butts outside their vehicle.
   d. For government employees, the fact that a person smokes has no bearing on the number of breaks they may take. Breaks should be taken in accordance with the current supervisory and personnel policies that afford all employees the same break opportunities consistent with good work practices and accomplishment of the mission.
3. Smokeless Tobacco products (e.g. snuff and dip):
   Smokeless tobacco products are not to be restricted to DTAs. Smokeless tobacco use will be permitted in all workplace areas (inside and out) subject to reasonable safety and sanitary conditions. Specifically, containers of tobacco waste product, including sealed containers, must not be left unattended or disposed of in trash receptacles. Users of smokeless tobacco must flush tobacco waste down the toilet.
4. Electronic Cigarettes (also known as "e-cigs"):
   Pursuant to Air Force Instruction (AFI) 40-102, Tobacco Free Living, e-cigs are considered to be equivalent to tobacco products; however, e-cigs are not restricted to DTAs and are allowed to be used outdoors at a minimum distance of 25 feet from building entry/egress points. (This policy is dated July 27, 2016)

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Team AEDC,

I believe in free and open communications with our Team AEDC employees, and that's why we have the Action Line available. People can use the Action Line to clear up rumors, ask questions, suggest ideas on improvements, enter complaints or get other issues off their chests.

The Action Line has been expanded to include an option for your ideas, comments, or suggestions on the AcqDemo personnel system. Simply call the normal x6000 commander's action line. You will then be prompted to select option 1 for the Commander's Action Line or Option 2 for the AcqDemo line. They can access the Action Line via the AEDC intranet home page and by calling 931-454-6000.

Although the Action Line is always available, the best and fastest way to get things resolved is by using your chain of command or by contacting the organization directly involved. I encourage everyone to go that route first, then if the situation isn't made right, give us a chance.

Col. Jeffrey Geraghty
AEDC Commander

TIRE *from page 1*

A tire undergoes Missionized Tire Wear Testing in the 168-inch internal drum dynamometer at the Landing Gear Test Facility at Wright-Patterson Air Force Base, Ohio, with concrete tiles installed to simulate a specific runway surface. The concrete tiles are created by taking molds of a runway then casting the tiles. The dynamometer operates at speeds up to 350 mph, with loads of up to 150,000 pounds, plus or minus 20 degrees of yaw, plus or minus 10 degrees of camber and can provide variable levels of brake torque. *(U.S. Air Force photo)*

has similar characteristics.

"What we've noticed is we can use the scanner and show what is comparable between the surfaces and what is not comparable," said Sami Labban, LGTF's Advanced Technology Development lead. "If there is a runway we haven't cloned yet, we can go out to the field, take a scan of it and look at the data sets to determine what concrete tiles we have in-house that best match it.

"Normally to manufacture concrete tiles is expensive and time consuming, but we've used this to show we can use similar surfaces to get an extremely close representative surface and use that for testing, which cuts down a lot on setup cost and time preparing for testing."

The team, recently, did exactly that for a customer test. The team went and scanned the desired runway and then was able to identify a tile that was 80-90% similar. The customer wanted to test at the LGTF as part of an effort to develop an innovative tire design.

To ensure the tile from the library was similar enough, the customer provided their baseline tire to see if the results were comparable to those seen in the field, which they were.

"Then the tire manufacturer gave us two 'out-of-the-box' tire design ideas that they didn't want to go through a full tire qualification to get it onto aircraft to try it out, because that costs millions of dollars," Labban said. "They said 'These are 'out-of-the-box' ideas that we aren't sure if they totally work and we kind of want to see if they work.' It's a lot cheaper to do here than try to get it qualified and put on aircraft.

"We're seeing there are a lot of benefits to doing it this way because we we're able to discover one prototype tire actually did significantly better than the baseline, and the other prototype tire did significantly worse. Then, we're able to start more quickly doing design iterations and design optimizations prior to going to the field, which saves the manufacturer money on getting a better design more quickly. And, it's better for the warfighter because you're getting a better product out to the field in less time as well."

In order to reduce cost and scheduling time in the instance a specific runway is not well-matched by anything in the tile library, a Small Business Innovation Research effort is underway to additively manufacture the tiles using a runway scan.

Additively manufactured tiles produced by Open Additive, LLC, such as those shown, for use in the 168-inch internal drum dynamometer at the Landing Gear Test Facility at Wright-Patterson Air Force Base, Ohio, are being developed and produced through a Small Business Innovative Research contract. A complete usable tile for use in the dynamometer is expected within the year. *(Courtesy photo)*

"Additive manufacturing cuts time and cost," Labban said. "We anticipate it will save roughly 20% cost on a test program and save six to eight months of set-up time."

The team expects to have a full tile produced by the Air Force SBIR contractor, Open Additive, LLC, using additive manufacturing for testing later this year.

Digitally modeling runways will also help efforts to field tires and aircraft faster by contributing to the digital twin, digital engineering efforts.

"The aggregate size, the roughness and the texture affects the friction between the tire and the runway," Labban said. "Stopping distances of an aircraft would be directly affected by that. These sort of calculations can start to be made and be pieced together to say, 'Hey, on certain runways we might not be getting the friction coefficients we want in order to land properly.'

"Gathering this data is really opening up a lot of doors to go and get a lot of detail on some of the physics that are necessary for a lot of these efforts."

RESCUE *from page 1*

lished to allow personnel to more safely work and enter the multiple confined spaces around the site. The location of Tunnel 9 within the Washington, D.C., metro area also played into the move toward an in-house solution. Tunnel 9 is located in White Oak, Maryland, on the Food and Drug Administration White Oak Campus. Unlike other AEDC units located on military installations, Tunnel 9 does not have its own fire department or medical clinic. Instead, those at Tunnel 9 relied heavily upon local county response. AEDC White Oak management determined a local quick response team was needed if an accidental release of nitrogen or accident was to occur.

Among the responsibilities of the WORT is confined space rescue. A confined space is defined as a space large enough for an employee to enter and perform assigned work but one that has restricted means for entry or exit, meaning there is usually only one way in and out. Confined spaces are not designed for continuous employee occupancy. Examples of confined spaces at Tunnel 9, which are most typically accessed by engineers, customers and technicians, include test cells, the heater pit and vacuum sphere.

"The combination of slow response time from emergency vehicles due to traffic and unscheduled permits required for confined space entry at Tunnel 9 warrants having a WORT," Bryant said. "Sometimes, when there is a need to perform inspections and repairs in the test cell and sphere, the WORT takes these opportunities to practice in these areas."

The WORT has the capability to extract a victim from a confined space environment that could become an oxygen-deficient area. Team members are also trained to administer first aid, including performing CPR and using an automated external defibrillator, until the arrival of professional medical response personnel.

All team members are notified prior to any confined space entry at Tunnel 9. Each of its members are contacted and asked if they are available to standby for an entry.

"We proceed with the confined space permit once we have a full team," Bryant said.

The WORT is currently comprised of nine members and includes engineers, engineer technicians, information technology personnel and the deputy director of Tunnel 9. The current members are Zenas Crisostomo, George Moraru, Addison Spicer, Mariusz Zarzecki, Nicholas Frederick and Jake Johnson. They are joined by Bryant and WORT co-leads Jason McDonald and Terry Mullin.

Mullin was part of the original WORT, and several other members of that inaugural team are still employed at Tunnel 9, though they no longer participate on the WORT. Those employees are William Betz, Chester DiBenedetto, Raymond Schlegel, Arnold Collier and AEDC White Oak Site Director Joe Coblish.

Membership on the WORT is voluntary, but those looking to join must first successfully complete training at Maryland Fire and Rescue Institute, or MFRI, in College Park, Maryland. Candidates are required to traverse a maze with no visibility. This helps assess whether an individual is claustrophobic.

"I have never witnessed this, but one of the original members Mr. Betz, believes a few volunteers in the past could not get past this portion of the training," Bryant said.

Those who complete the MFRI initial three-day training course become part of the WORT. This training includes learning how to rescue and secure people to spine boards, tying figure-eight rescue knots, using tripods for the recovery of bodies, using multi-gas detection meters and basic first aid. Bryant said along with the knowledge gained, the training also builds a sense of comradery among those who will be joining the WORT.

"We get to work together and learn each other's strengths," she said. "I also think that this helps in our everyday work environment."

To remain on the WORT, members are required to go to a one-day annual refresher training at MFRI. The team also looks to conduct at least one training session onsite at Tunnel 9 per year. Bryant and AEDC White Oak security specialist Taurean Gray have worked with the local fire department to incorporate the WORT in past fire drills and onsite emergency response training sessions. In addition, McDonald created an online program that prompts WORT members to perform monthly inspections of rescue equipment and gear.

Bryant admits finding time and opportunities for WORT members to train has been a struggle recently due to the intensity of the Tunnel 9 test schedule and the COVID-19 pandemic. Still, the team maintains the training at MFRI and team members are always at the ready to provide a quick response if called upon.

"Once the all-call alarm is sounded, our WORT can dress, assemble and be on the site of the incident usually within 2 minutes," Bryant said.

The past 25 years at White Oak have been filled with many technical accomplishments at Tunnel 9, with a few challenges mixed in for good measure. Despite these ups and downs and a revolving membership, Bryant said one constant for nearly the entirety of this time period has been the willingness of WORT members to respond whenever their help has been needed.

"Through it all, the WORT has never failed to answer the call," she said.

NASA *from page 1*

ernment or non-government individuals for an outstanding group accomplishment that has contributed substantially to NASA's mission. Criteria to be considered for the award includes the quality of results and agency or multi-center level of impact on programs or operations, effective management of cost and schedule, customer satisfaction and success in responding to unforeseen crises.

William Bartow, test director for the AART entry in the AEDC NFAC 40- by 80-foot wind tunnel, said NFAC personnel who were members of the AART team, upon receiving word of the award, reacted with excitement and appreciation for both fellow team members and all who contributed to the test.

"It was a challenging experience during uncertain times," Bartow said.

According to Dr. William Warmbrodt, NASA chief of the Aeromechanics Branch at NASA Ames who nominated the AART team for the award, the urban air mobility aircraft designs typically have aerodynamic configurations that result in complex aerodynamic and acoustic conditions, such as wing and propeller interaction. Multiple UAM aircraft designed and flown contain propellers or rotors that ingest aerodynamic turbulence from upstream bodies.

"In response, the Aerodynamic and Acoustic Rotoprop Test Program was implemented, a primary objective of which was to determine the aerodynamics and acoustics related to an auxiliary propulsor mounted behind an isolated wing in the National Full-Scale Aerodynamics Complex 40- by 80-foot wind tunnel," Warmbrodt wrote in his nomination.

The AART in the 40- by 80-foot wind tunnel was a follow-up to a 2018 test program overseen by the Army in its 7- by 10-foot wind tunnel, also located at NASA Ames. The 7- by 10-foot wind tunnel was staffed with Army personnel to support the initial efforts of the program, and NFAC personnel took the reins once it migrated to the 40- by 80-foot tunnel.

The 7- by 10-foot tunnel entry served to collect all of the model performance, including any Particle Image Velocimetry, or PIV, measurements of interest, while the anechoic treatment in the 40- by 80-foot tunnel would make it possible to collect the corresponding acoustic measurements for the conditions collected in the smaller tunnel.

The data set in the 40- by 80-foot tunnel was compiled using model mounted balances and acoustic measurements from strut-mounted microphones and wall-mounted microphone arrays.

"Since our focus was the corresponding acoustic measurements of the 7- by 10-foot [tunnel] entry, we had to tailor our focus experiment from the perspective of obtaining quality acoustic measurements," Bartow said. "This led to the design of three additional microphone struts that were fabricated for the entry along with an analysis for the customer on where the placement would be most effective."

The AART would set a standard, as the combined data set from entries in both tunnels would provide researchers with a comprehensive dataset to build future analysis tools to aid in the development of rotorcraft systems.

"The team was looking to build a comprehensive data set on the performance of a tail-mounted propeller under the influence of upstream aerodynamic wake generated from empennage control surfaces," Bartow said.

Working alongside the NFAC AART team onsite were test customer staff and civilian personnel from both the Army and NASA.

The test buildup process began in the fall of 2019 and continued through the early part of 2020. It was around that time the COVID-19 pandemic began to ramp up in the U.S., disrupting businesses and educational institutions nationwide. It was also when the challenges posed by the pandemic began for the AART team.

A rising number of COVID-19 cases across the country and fears of the spread of COVID-19 forced the test customer to depart NFAC and return to their base of operations on the East Coast. Although now on the other side of the country, the test customer was still able to provide valuable input to the AART team.

"While it's typical to have customer representation onsite to oversee the various phases of the entry, the pandemic introduced some challenges to the team when it forced all of the customer personnel to return home," Bartow said. "We were fortunate to have most of the installation effort completed but did have to perform some final model changes while relying on remote customer support."

By mid-March of 2020, the remainder of the execution phase was performed with the customer supporting the NFAC team remotely.

It quickly became apparent COVID-19 wasn't going away anytime soon. In the latter part of March 2020, California Gov. Gavin Newsome issued an order for residents to remain at home save only for essential travel, such as trips to the grocery store, convenience stores and banks. With this order implemented, NFAC personnel were forced to clear out, and the facility was vacant for several months. This officially put the AART program on hold.

When members of the AART team returned to the facility that summer, they didn't miss a beat.

"COVID stay-at-home orders eventually put a pause in the progress we were making and prevented us from resuming test execution efforts until several months later in July when the center partially reopened to essential personnel," Bartow said. "After about three months of being away from testing, our team was able to step back into operations efficiently and safely like no time had passed."

More than 20 NFAC personnel were assigned to the test throughout the different phases of the entry in addition to the NASA and Army civil servants who worked closely with the team while the AART occurred onsite. Bartow added the collaboration with personnel from the Army and NASA rotorcraft groups made it possible to complete the test while ensuring the NFAC team met all data quality requirements.

"NASA provided the personnel, expertise and the equipment to acquire the acoustic data and perform the acoustic analysis and data reduction, while the Army provided personnel to help in the execution of the entry," he said.

The test in the 40- by 80-foot wind tunnel, which originally began in October 2019, was completed in August 2020.

"Sometimes the excellence of our wind tunnel test organizations and test teams are challenged to prove their resilience and determination. The COVID-19 pandemic has done just that," Warmbrodt wrote. "And the NFAC AART Test Team was up to the challenge."

Members of the AART team were: Shawn Abadajos, Meliton Abenojar, Bartolome Aganon, Lex Alday, Geoffrey Ament, Russell Baker, William Bartow, Preston Bates, Kevin Boyce, Daniel Boyd, Nathan Burnside, Christopher Byron, Joseph Candaso, Louis Centolanza, Benny Cheung, Alvin Cruz, Steven Diamond, Michelle Dominguez, Scott Edwards, Michael Fleming, Brenda Fox, Todd Fuller, Nili Gold, Patrick Goulding, Paul Gracia, Effie Greene, Farid Haddad, Brian Hall, Christopher Hartley, Laquisha Highsmith, Kenneth Horn, William Horne, Levi Hubbard, Chakaria Hunter, Luisito Icari, Scott Jaffa, Jeffrey Johnson, Matthew Kwan, Jeffery Law, Mike Lonergan, William Lovvorn, Kyle Lukacovic, Kristen Mailhot, Matthew Nguyen, Thomas Norman, Christopher Nykamp, Austin Paige, Jose Rosario-Ferrer, Sandra Ruiz, Joseph Sacco, Cal Sargent, Emily Sayles, David Schatzman, Natasha Schatzman, Alex Sheikman, James Stephenson, Michael Strauss, Matthew Thomas, Brian Timmons, Calvin Tsurui, Johannes Van Aken, Thomas Wade, Brian Wallace, Adam Walsh, Scott Waltermire, Gina Willink, Jonathan Winegar and Nikolas Zawodny.

RPA Roadshow encourages automation with robot software

By Todd Cromar
75th Air Base Wing Public Affairs

HILL AIR FORCE BASE, Utah – The Air Force has adopted a Robotics Process Automation (RPA) software produced by UiPath, which is intended for use by Airman and Guardians to increase workflow efficiency by automating repetitive tasks.

Implementation of the software by the Air Force RPA Center of Excellence and UiPath software team is currently being accomplished with roadshow events hosted by individual bases and commands throughout the Air Force.

"We all have work that includes mundane and repetitive tasks, which kills our productivity while pulling away from the mission," said Matthew Roberts, program manager for the Air Force Robotics Process Automation Center of Excellence. "So, we are teaching and training individuals how to build robot digital assistants, to accomplish that portion of their work for them."

Recently, a roadshow training seminar was locally organized by Tech. Sgt. Robert Santamaria, flight chief in the 75th Comptrollers Squadron, and held April 13-14 at Weber Basin Water Conservation District.

"When I found out about the RPA roadshows, I thought Hill AFB needs this because we have a lot of computer-based workers that could use these kinds of automations," said Santamaria. "Hopefully this will kick start RPA awareness here and help fuel further steps forward, maybe with the establishment of our own local center of excellence."

The software tool can be easily learned by anyone, requiring no programmer or coder background, and can be applied to almost any occupation or field of industry.

The roadshow seminar consisted of a day and half of training, followed by a couple hours of trainee self-built automation demonstrations.

At the conclusion of the seminar, Roberts said, "I doubt anyone attending this class has ever played with RPA before, and yet 80% of our 30 participants are building almost fully functioning automations."

"The real intent of this roadshow is to have trained individuals leave here with the software and license in order to keep building automations," said Roberts. "All we ask in return is that these trainees keep us aware of their unique automation builds, so we can then share them or pass along to others in similar work fields."

The RPA technology software is readily available on AFNET, for any official user to download and install from their respective software center. The software program that sits on your desktop, licenses are valid for a year, and then must be renewed

"We are currently at 2,000 users with a finite number of licenses issued out, but would like grow that number to 10,000 users by this time next year," said Roberts. "The more time and energy not spent on these repetitive tasks, translates into more time that people can spend on mission critical analysis and accomplishment."

Students during an RPA roadshow training seminar April 14 at the Weber Basin Water Conservation District. The software produced by UiPath is intended increase workflow efficiency by automating repetitive tasks. *(U.S. Air Force photo by Todd Cromar)*

Around Arnold

Don't let slips, trips and falls sneak up on you

By Rick Fleming
AEDC Safety

The National Safety Council, or NSC, tells us that the second leading cause of unintentional injury-related death is falls; number one is motor vehicles. In 2021, 42,114 people died in falls at home and work, according to the Centers for Disease Control and Prevention, or CDC.

For working adults, depending on the industry, falls can be the leading cause of death. It only takes, literally, a half of a second to go from standing on your feet to impacting the ground.

In 2019, 880 workers died in falls and 244,000 workers were injured badly enough to require days off from work. A worker doesn't have to fall from a high level to suffer fatal injuries; 146 workers were killed in falls on the same level in 2019, according to *Injury Facts*, an online resource of the NSC.

Construction workers are most at risk for fatal falls from height – more than seven times the rate of other industries – but falls can happen anywhere, even at a "desk job."

The Occupational Safety and Health Administration maintains general industry regulations on walking and working surfaces that guard against hazards, including clutter, protruding objects and wet conditions. These hazards can harm everyone in a facility, regardless of title or job responsibilities.

There are three physical factors involved in slips, trips and falls: friction, momentum and gravity. Each one plays a role. Friction is the resistance between objects. Momentum is affected by the speed and mass of an object. Gravity is the force exerted on an object by the Earth.

Slips, Trips and Falls

- **Slips** are a loss of balance caused by too little friction between your feet and the surface you walk or work on. Slips can be caused by wet surfaces, spills or weather hazards like ice or snow. Slips are more likely to occur when you hurry or run, wear the wrong kind of shoes or don't pay attention to where you're walking.
- **Trips** occur whenever your foot hits an object and you are moving with enough momentum to be thrown off balance. Trips are more likely to happen when you are in a hurry and don't pay attention to where you're going.
- **Falls** occur whenever you move too far off your center of balance. Falls account for more workplace fatalities than any other reason.

CDC Tips to Prevent Falls

- Take short steps on slippery surfaces to keep your center of balance under you.
- Clean up or report spills right away. Even minor spills can be very dangerous.
- Be extra cautious on smooth surfaces, such as newly waxed floors. Be careful walking on rugs.
- Make sure you can see where you are walking. Don't carry loads that you cannot see over.
- Keep walking and working areas well lit, especially at night.
- Keep the work place clean and tidy. Store materials and supplies in the appropriate areas.
- Arrange furniture and equipment so that it doesn't interfere with walkways or pedestrian traffic in your area.
- Maintain walking areas, and alert appropriate authorities regarding potential hazards.
- Don't jump off landings or loading docks. Use the stairs.
- Repair or replace stairs or handrails that are loose or broken.
- Wear shoes with appropriate non-slip soles.

Falls are 100% preventable. For any task, it's important to plan ahead, assess the risk and use the right equipment. First, determine if working from a height is absolutely necessary or if there is another way to do the task safely. If working from a height is necessary, then adhere to the following guidelines:

- Determine what safety equipment is needed.
- Make sure you are properly trained on how to use the equipment.
- Scan for potential hazards before starting the job.
- Make sure you have level ground to set up the equipment.
- Use the correct tool for the job, and use it as intended.
- Never use old or damaged equipment; check thoroughly before use.

At Home

The rules and preparation are the same for preventing falls when away from work. Good habits do not change just because you are home. If you take on home improvement or other weekend projects, it's important to know your limitations and don't exceed them. Risky projects, like installing siding, gutters or roofs, are best left to professionals. Saving money isn't worth risking a debilitating or fatal fall. At home or at work, many of the same rules should apply.

We tend to think we're always safe on flat ground, but the thousands of injuries each year tell us otherwise.

Falls are the number one cause of death for older adults; fall-proof your home with these tips:

- Keep floors clear of clutter.
- Keep drawers closed.
- Keep electrical and phone cords out of traffic areas.
- Install handrails on stairways and use them.
- Wear sensible footwear.
- Never stand on chairs, tables or any surface with wheels.
- Properly arrange furniture to create open pathways.
- Maintain good lighting indoors and out.

More than 8 million people were treated in emergency rooms for fall-related injuries in 2019. A fall can end in death or disability in a split second, but with a few simple precautions, you'll be sure to stay safe at home and at work.

Take care of each other.

The Air Force Materiel Command will host a Cross-Cultural Mentoring Panel in conjunction with Asian American and Pacific Islander Heritage Month, May 24, at 2 p.m. ET. The virtual event is open to all AFMC uniformed and civilian Airmen. ***(U.S. Air Force graphic)***

AAPI mentoring panel set for May 24

By Marisa Alia-Novobilski
Air Force Materiel Command

WRIGHT-PATTERSON AIR FORCE BASE, Ohio – The Air Force Materiel Command will host a Cross-Cultural Mentoring Panel in conjunction with Asian American and Pacific Islander Heritage Month, May 24, at 2 p.m. ET. The virtual event is open to all AFMC uniformed and civilian Airmen.

The Asian American and Pacific Islander Major Command Barrier Analysis Working Group lead, Amanda Gentry, who is also director, Air Force Research Laboratory Sensors Director-ate, will kick-off the event, which will feature representatives from across the Air Force and industry.

Panel members include:

- Edwin Oshiba, Acting Secretary of the Air Force for Energy, Installations, and Environment
- Maj. Gen. (Ret.) Sharon Dunbar, Vice President of Cross-Company Business Initiatives, General Dynamics Mission Systems
- Dr. Yoon Hamrick, Director of Staff, Ogden Air Logistics Complex, Hill Air Force Base
- 1st. Lt. Sofia Smith, Medical Laboratory Scientist, United States School of Aerospace Medicine, Air Force Research Laboratory
- Staff Sgt. Kevin Blevins, Technician, USAFSAM

Maj. Charlton E. Freeman, commander, 72nd Comptroller Squadron, Tinker AFB, will serve as moderator at the event.

This is the third of eight mentoring events scheduled to occur during special observance months throughout 2022. The events are hosted by the AFMC Major Command Barrier Analysis Working Group champions and will focus on issues related to the groups celebrated during the special observance period.

The link for the ZoomGov event will be sent to all AFMC personnel via internal communication channels.

Personnel can submit questions for the panelists prior to the event by emailing ***AFMC.A1DC.Training-NeedsAssessments@us.af.mil***.

Additional information on AFMC Mentoring and upcoming events is available at ***https://www.afmc.af.mil/careers/AFMC-Mentoring/***.

Kendall, Brown, Raymond tell Congress $194 billion budget request balances risks, quickens transformation

By Secretary of the Air Force Public Affairs

WASHINGTON (AFNS) – Invoking Gen. Douglas MacArthur's observation that militaries fail when they are slow and "too late" to change, Secretary of the Air Force Frank Kendall urged Congress April 27 to embrace a $194 billion budget request specifically tailored to "transform" and modernize the Air and Space Forces to meet growing challenges from China.

"We're comfortable with the balance we have struck in this budget submission, but we also want to ensure that the Committee understands that hard choices do lie ahead, at any conceivable budget level," Kendall told the House Armed Services Committee in the first of a series of hearings to examine the Department's priorities, plans and budget request for the next fiscal year.

"Change is hard, but losing is unacceptable," Kendall told lawmakers in a three-hour session that also featured Air Force Chief of Staff Gen. CQ Brown, Jr., and Chief of Space Operations Gen. John "Jay" Raymond.

"What my colleagues and I are trying to do, and what we need your help with, is to ensure that American Air and Space Forces are never 'too late' in meeting our pacing challenge, which is China," Kendall said. "We are also concerned about the now obvious and acute threat of Russian aggression."

Anticipating questions that emerged during questions from lawmakers spanning two hours, Kendall portrayed the budget request as sufficient to provide "the capabilities we need today," while simultaneously putting both services on a path to develop future needs and capabilities.

"There should be no doubt that great power acts of aggression do occur, and equally no doubt of how devastating they can be for the victims of that aggression," he said in a direct reference to Russia's invasion of Ukraine.

All three senior leaders delivered familiar recommendations and perspectives – the need to modernize the forces; make the hardware and operations in space more "resilient," modern and robust; continuing to refine "multi-domain" operations and communications; upgrading the nuclear deterrent; and ensuring that bases are protected, and personnel and equipment can be delivered to wherever they are needed without delay.

All of those elements – and others – are essential parts of "Integrated Deterrence," the overarching philosophy developed by Defense Secretary Lloyd Austin for protecting the nation's security and interests.

The roles played by the Air and Space Forces in that effort are embodied in the Department's official "posture statement," a document that explains how they fit into the nation's larger national security strategy for the 2023 fiscal year.

"The Air Force we are building is critical to integrated deterrence, campaigning, and building enduring advantages," Brown told the Committee, citing three major components in the updated National Defense Strategy.

Brown, like Kendall and Raymond, was blunt about both the promise of what might be and the risk if that vision is not realized.

"A world class Air Force requires world class Airmen who are organized, trained, and equipped to remain the world's most respected Air Force," he told the Committee, which is the primary source of setting defense policy that later becomes law.

"But, if we do not continue to transform, this may no longer be the case. … We must modernize to counter strategic competitors. (China) remains our pacing challenge and Russia remains an acute threat so we must balance between the demands of today and requirements for tomorrow," Brown said.

Raymond offered a similar assessment for space and the Space Force, telling the committee: "We find ourselves at a hinge of history, where the rules-based order established after World War II, is under an acute threat from Russia. In the meantime, we continue to face a pacing challenge in the Indo-Pacific from China."

Space he said is a new and indisputable "warfighting domain" which is why the United States and its allies are focusing heavily on space and adapting to the new conditions.

"We cannot allow potential adversaries to gain an unchallenged ability to conduct space-enabled attacks," Raymond said, who is the senior military leader of a service born on Dec. 20, 2019. "Our joint forces will remain at risk until we can complete the transformation to a resilient architecture and protect the joint force from space-enabled attacks. This is critical to supporting all aspects of the National Defense Strategy."

But space today is different and more dangerous, no longer the "benign" environment that many of the satellites operated today were designed for. That is an untenable condition, Raymond said, because "space power provides a series of foundational capabilities upon which our joint forces depend.

The Space Force's $24.5 billion budget request includes higher levels of spending on "weapon system sustainment, a more resilient Global Positioning System, and next generation satellite communications," Raymond said. The biggest chunk of the budget – $15.8 billion – is devoted to research, development, test and evaluation.

This will allow the U.S. military presence in space to modernize and "begin the pivot to a more resilient and mission capable missile warning and missile tracking force design," Raymond said.

Lawmakers generally accepted the funding and priorities in space and directed most of their questions to Kendall and Brown about more traditional topics such as plans for modernizing the Air Force's fleet and plans for divesting older aircraft. They also wanted to know how the Air Force will drive down the cost of operating and maintaining F-35 fighters, details about the transition to the new 'Sentinel' intercontinental ballistic missile weapon system, the continuing development of the new B-21 long-range bomber and more prosaic topics such as basing and cyber security, among other diverse topics.

As in past years, lawmakers had multiple questions – mostly directed to Brown this time – about how decisions were made to retire aircraft and if those decisions created vulnerability or operational gaps.

Brown acknowledged that transitions are difficult but said he was comfortable with the Air Force's direction and the mix of aircraft the budget proposal supports.

Secretary of the Air Force Frank Kendall testifies before the House Armed Services Committee on the Department of the Air Force's fiscal year 2023 budget request in Washington, D.C., April 27. *(U.S. Air Force photo by Eric Dietrich)*

Air Force Chief of Staff Gen. CQ Brown Jr. testifies before the House Armed Services Committee on the Department of the Air Force's fiscal year 2023 budget request in Washington, D.C., April 27. *(U.S. Air Force photo by Eric Dietrich)*

Chief of Space Operations Gen. John W. "Jay" Raymond testifies before the House Armed Services Committee on the Department of the Air Force's fiscal year 2023 budget request in Washington, D.C., April 27. *(U.S. Air Force photo by Eric Dietrich)*

"When I talk about balancing risk over time, there's a balance between the operational risk we will see today as we make that transition versus the risk we'll have in the future if we don't start to modernize," Brown said in response to a question suggesting the Air Force was retiring too many planes.

"We do have to make some tough choices. I don't just look at the numbers. I look at the overall capabilities and capacity; not just the airplanes but what goes with the airplanes. … It's a complete package. There is some risk there but I'd rather take a little bit of risk now than a lot of risk later in a future conflict," he said.

In dollar terms, the proposed Air and Space Forces budget for the next fiscal year that was submitted to Congress in March provides $169.5 billion for the Air Force and $24.5 billion for the Space Force. If approved as written, it would boost funding by $1.1 billion to modernize the nation's aging, ground-based nuclear deterrent ($3.6 billion compared to $2.5 billion in the 2022 proposal). It adds $320 million in additional funding for continued development and nuclear certification of the B-21 long-range bomber ($3.25 billion from $2.87 billion). It increases the budget for hypersonic weapons by $138 million ($577 million from $438 million).

The proposed budget calls on the Space Force to spend an additional $1 billion on "resilient missile warning/missile tracking to address hypersonic and maneuverable RVs (re-entry vehicles)."

In a portion of the request known as 'procurement funds,' the fiscal 2023 proposal provides funding to purchase 33 F-35A Lightning II fighters, 15 KC-46A Pegasus tankers, 24 F-15EX Eagle II fighters, among other hardware procurements. It provides funding to the Space Force for three National Security Space launches, three additional launches by the Space Development Agency and two launches that will put into orbit crucial GPS III satellites to enhance the resiliency of the positioning, navigation and timing constellation accessed by billions of users daily.

More broadly, the request calls for spending $7.9 billion (an increase of $300 million) to boost flying hours to 1.1 million, a level officials said is the "maximum executable level." It increases spending for "weapons system sustainment" to $16.6 billion from $15.4 billion and carries funding to increase pay for civilians and active-duty personnel by 4.6%. It also has $77 million for the Air Force to address climate change requirements. The budget also proposes funding for 501,800 Total Force Airmen and 8,600 Guardians.

United States Air Force Lt. Gen. Richard M. Clark, U.S. Air Force Academy superintendent, speaks during the T-7A Red Hawk rollout ceremony April 28 at the St. Louis, Missouri Boeing facility. The T-7A will eventually replace the T-38C Talon to train Air Force pilots to fly 4th and 5th generation aircraft. ***(U.S. Air Force photo by Tech. Sgt. Matthew B. Fredericks)***

First Red Hawk rolls out

By Daryl Mayer
AFLCMC Public Affairs

ST. LOUIS, MISSOURI (AFLCMC) – The first T-7A Red Hawk training aircraft rolled off the production line at the Boeing Defense, Space & Security building at Lambert International Airport.

This is the first of 351 aircraft to be delivered to the Air Force under terms of a $9.2 billion contract awarded to Boeing in September 2018.

"Today we honor the heroes of our past, while also looking toward our future as an Air Force on an incredible pace of change, innovation and progress," said Lt. Gen. Richard Clark, Superintendent of the United States Air Force Academy.

The production aircraft sport the iconic "Red Tail" symbol of the famed Tuskegee Airmen of World War II. The Red Hawk name is derived from the Curtiss P-40 Warhawk, one of the aircraft flown by the 99th Fighter Squadron, the U.S. Army Air Forces' first African American fighter squadron.

Attending the ceremony was retired Lt. Col. George Hardy, a Tuskegee Airman, along with Yvonne and Ron McGee, children of the late Brig. Gen. Charles McGee.

"With this roll out, we honor our storied history and the heroes who wrote the chapters," Clark said, "and we usher in an exciting new era of aviation and a new generation of heroes who will write the next chapters."

The aircraft, along with simulators and associated ground equipment, will replace Air Education and Training Command's aging fleet of T-38C Talons.

"Quality has always been and remains the top priority for Air Education and Training Command," Lt. Gen. Brad Webb, commander of AETC, said. "The T-7A aircraft and accompanying ground systems will help us meet the Air Force's mission and prepare aircrew to fight future threats. Getting the T-7A into the hands of our instructors, students and maintainers is important to our initiatives in transforming pilot training to ensure the highest caliber of pilots are ready for future conflict."

The Red Hawk, a joint effort between Boeing and Saab, is the first Air Force aircraft to use digital design tools to allow it to move from computer screen to first flight in 36 months.

"The T-7 was designed through model-based systems engineering and 3D tools," said Col. Kirt Cassell, T-7 Program Manager. "This enabled quicker assembly and improved quality to deliver a safe and effective training system for Air Education and Training Command."

Going forward, the aircraft will perform a series of ground checks and taxi tests before making its first flights in the coming weeks. Later this year, it will fly to Edwards AFB in California to begin flight tests.

"The T-38 is a true workhorse training Air Force fighter and bomber pilots for Air Education and Training Command, but the T-7 Red Hawk is a game changer, providing advanced mission systems, a glass touchscreen cockpit, stadium seating, and embedded training capability," Cassell said.

Arnold AFB Milestones

Doug Garrard, TOS
40 years

Ronald Reagan, TOS
40 years

Howard Frederick, TOS
35 years

Steve Macon, FSS
35 years

Douglas Ratliff, TOS
35 years

40 YEARS
Tony Acklen, TOS
Doug Garrard, TOS
Donna Kennedy, TOS
Randall Quinn, AF
Ronald Reagan, TOS
Joe Warren, AF

35 YEARS
Howard Frederick, TOS
Steve Macon, FSS
Douglas Ratliff, TOS
Karen Zarecor, TMAS

30 YEARS
William Binkley, TOS
Jason Blackwell, TOS
Ronnie Glasgow, TOS
Jason Kelley, TOS

25 YEARS
Kenneth Tatum, TOS
Elden Yoder, TOS

20 YEARS
Dustin Crider, TOS
Kristopher Hughes, AF
James Perryman, TOS
John Richardson, TOS

15 YEARS
Nathan Colvin, TOS
Cindy Dixon, TOS
Monica Fleenor, TOS
Michael Hogwood, TOS
Michael Key, TOS
Omra Schultz, TOS

10 YEARS
Laquisha Highsmith, AF
Jason McDonald, TOS

5 YEARS
Andrew Bowen, TOS
Sheila Downs, TOS
Trevan Guess, TOS
Shahn Hunter, TOS
Jake Johnson, TOS
Tina Johnson, TOS
Adam McKamey, FSS
Terry Porter, TOS
Jerry Rice, TOS
Ronald Rich, TOS
Casey Tigner, FSS
Michael Whitehead, TOS
Jonathan Winegar, TOS

INBOUND MILITARY
Maj. Justin Ong, AF

RETIREMENTS
Kathleen Comer, TOS
Terry Hill, TOS
Betty Rutherford, TOS
Thomas Wade, TOS

NEW HIRES
James Atkins, AF
Adal Camacho Melendez, TOS
Michael Drake, TMAS
Michael Eovine, TMAS
Valerie Fuston, TOS
Justin Harris, TOS
Bethany Hill, AF
Melissa Hill, TOS
Jesse Hougnon, AF
Carie Kilgore, TOS
James May, TMAS
Jennifer McKay, TOS

Karen Zarecor, TMAS
35 years

Wayne Monteith, TOS
Mack Morton III, TOS
Aime Oakes, TOS
Michael Oakley, TOS
Nicole Purvis, TOS
Mark Quint, TOS
Curtis Roberts, TOS
Henry Ruston, TOS
Toni Sebastian, TOS
Christopher Turner, TOS
Grant Walker, TOS
Robert Witherspoon, TOS

PROMOTIONS
Zachery Erickson, AF, promoted to first lieutenant

Margaret Libby, AF, promoted to first lieutenant

Jeremey Thomas, AF, promoted to colonel

Mark Vlassakis, AF, promoted to captain

Erickson promoted to first lieutenant

From right, Lt. Col. Dayvid Prahl, chief, Space Test Branch, Test Division, Arnold Engineering Development Complex, administers the oath of office to newly-promoted 1st Lt. Zachery Erickson during a ceremony April 15, at Arnold Air Force Base. ***(U.S. Air Force photo by Jill Pickett)***

Alabama JROTC cadets visit Arnold Air Force Base

Cadets from the Air Force Junior ROTC and Space Force Junior ROTC programs at Huntsville High School in Huntsville, Alabama, pause for a photo during their visit at Arnold Air Force Base, headquarters of Arnold Engineering Development Complex, April 13. Pictured with the cadets are, at left, Col. Carl Ise, Individual Mobilization Augmentee to the AEDC commander, and, at right, 1st Lt. Michael Hareld, a U.S. Space Force Guardian and program manager for the AEDC Hypersonic Systems Test Branch. ***(Courtesy photo)***

New Air Force priority topics unveiled for industry partners

By Patrick Foose
Air Force Strategic Development Planning and Experimentation Office

WRIGHT-PATTERSON AIR FORCE BASE, Ohio (AFRL) – Five new Department of the Air Force, or DAF, capability priorities are in the 2022 Topical Call for Solutions and Concepts announced to industry partners at the DAF Future Force Capability Development Strategy Interchange Meeting, or SIM, Phase I from March 14-16.

Leaders shared DAF's future force strategies, efforts, challenges, and investments geared towards securing strategic advantage for Airmen and Guardians. The industry partners also received insights into the DAF's interests in a wide array of technology areas and concepts.

The five topics in the 2022 Topical Call for Solutions and Concepts are:

- **Cognitive electronic warfare, or EW**: Algorithms, architecture and adaptation to enable real-time interdiction of unknown signals.
- **Compact and containerized platforms**: Approaches to compress, ship, field-assemble or aerially deploy air platforms.
- **Lean, agile ground operations**: Field preparation, support equipment and processes for austere combat power.
- **Networking the fight**: Multi-domain, multi-level, multi-partner connectivity through nodes/network/apps.
- **Responsive launch for multi-domain effects**: On-demand, precision placement of smaller payloads into specific orbital positions.

Cognitive electronic warfare

"We need advances in EW systems to sense and prosecute modern threats, and Artificial Intelligence/Machine Learning advancements alone will not close this capability gap," said Dr. Reid Melville, chief of innovation for the Air Force Research Laboratory's Strategic Development Planning and Experimentation and Transformational Capabilities Office.

The solution space for this challenge includes bridging the technology gap between legacy EW systems to Cognitive EW systems, using open standards across both the hardware platform and the EW software and adaptive managers to optimize the EW system.

Compact containerized platforms

Melville said the demand for compact containerized platforms involves the need to generate a significant mass of combat power from forward, austere operating sites and to generate a significant mass of combat power from remote, air-launched operations.

The solution space for this challenge includes employing small-footprint Autonomous Collaborative Platforms, or ACP, from forward areas; ACPs that are readily shippable, containerized and ready for field assembly and maintenance; and expanding the volume of air-launched effects from more compact or palletized munitions.

The concepts and solutions request is for methods to best pack, containerize and ship ACPs with reduced weight/volume footprint, techniques for simplified forward-assembly and in-situ production of replacement parts, and technology to enable more compact or compressed air-launched SUAS and munitions.

Lean, agile ground operation

Lean, agile ground operation involves the requirement for agile airfield areas that can be established rapidly in forward areas.

"Forward air operations need low-logistics ground support equipment that flows rapidly," Melville said.

The solution space for this challenge includes capability for forming, preparing or exploiting ramp and runway surfaces for air operations; Aerospace Ground Equipment (AGE) with radically lower volume/mass/operator footprint; and other low-footprint solutions that support needed functions for air operations.

The concepts and solutions request is for methods for rapid creation or refurbishment of large surfaces with needed durability; technology for light, multi-functional equipment with minimal operator requirements; and other technology that enables lean and agile logistics for austere air operations.

Networking the fight

"Networking the Fight addresses the ability to communicate opportunistically -- not just about the ability to talk to each other, but instead the ability to take action on not just kill-chains but rather kill-webs," Melville said. "Command and control of the network is not trivial."

Solutions being sought include government flexible software with interoperable hardware to CONNECT-SECURE-SHARE information across heterogeneous nodes and networks.

The concepts and solutions request is for flexible, agile, hardware and software applications and algorithms to CONNECT-SECURE-SHARE information.

Responsive launch for multi-domain effects

Melville said potential competitors' advanced anti-access/area denial, or A2AD, capabilities restrict U.S. and allied freedom of operation. Solutions being sought include multi-domain effects that cross the air and space domain.

The concepts and solutions request is for responsive space launch of payloads placed into orbits below 400 km on tactically relevant timescales.

The SIM Phase I virtual event attracted nearly 250 participants who represented more than 100 organizations.

The attendees will be allowed to securely share their ideas and receive feedback from interested government stakeholders in one-on-one settings at Phase II of the SIM, April 26-28 at Joint Base Andrews, Maryland.

AFRL technology makes new weapon for sinking ships a reality

By Whitney Wetsig
Air Force Research Laboratory Public Affairs

The Air Force Research Laboratory partnered with the 780th Test Squadron of the 96th Test Wing and the 85th Test and Evaluation Squadron of the 53rd Wing to equip the F-15E Strike Eagle at Eglin Air Force Base, Fla., with modified 2,000-pound GBU-31 Joint Direct Attack Munitions as part of the second test in the QUICKSINK Joint Capability Technology Demonstration. Eglin's Integrated Test Team demonstrated QUICKSINK, a new low-cost, air-delivered capability for defeating maritime threats April 28 successfully destroying a full-scale surface vessel in the Gulf of Mexico. ***(U.S. Air Force photo by 1st Lt Lindsey Heflin)***

EGLIN AIR FORCE BASE, Fla. (AFRL) – The Air Force Research Laboratory and Eglin's Integrated Test Team demonstrated a new low-cost, air-delivered capability for defeating maritime threats April 28, 2022, that successfully destroyed a full-scale surface vessel in the Gulf of Mexico.

An F-15E Strike Eagle released one modified GBU-31 Joint Direct Attack Munition, or JDAM, as part of this test, the second experiment in the QUICKSINK Joint Capability Technology Demonstration, or JCTD, funded by the Office of the Under Secretary of Defense for Research and Engineering. The test succeeded through a collaborative effort with AFRL, the 780th Test Squadron of the 96th Test Wing, and the 85th Test and Evaluation Squadron of the 53rd Wing.

"QUICKSINK is an answer to an urgent need to neutralize maritime threats to freedom around the world," said Col. Tony Meeks, director of AFRL's Munitions Directorate. "The men and women of this directorate consistently find ways to solve our nation's greatest challenges."

AFRL scientists and engineers are developing a weapon open systems architecture, or WOSA, seeker to enable precise placement of the weapon. The implementation of WOSA also lowers costs by providing modularity via the ability to plug-and-play different manufacturers' seeker components, which can lead to reduced weapon system costs and enhanced performance.

The QUICKSINK program, a partnership with the U.S. Navy, aims to provide options to neutralize surface maritime threats while demonstrating the inherent flexibility of the joint force. This JCTD uses a JDAM to rapidly deliver an immediate effect on stationary or moving maritime targets at minimal costs.

"QUICKSINK is unique in that it can provide new capabilities to existing and future DOD weapons systems, giving combatant commanders and our national leaders new ways to defend against maritime threats," said Kirk Herzog, AFRL program manager.

While torpedoes predominantly sink enemy ships via submarines, new methods explored through QUICKSINK may achieve anti-ship lethality with air-launched weapons, including modified 2,000-pound JDAM precision-guided bombs.

"Heavy-weight torpedoes are effective [at sinking large ships] but are expensive and employed by a small portion of naval assets," said Maj. Andrew Swanson, 85th TES division chief of Advanced Programs. "With QUICKSINK, we have demonstrated a low-cost and more agile solution that has the potential to be employed by the majority of Air Force combat aircraft, providing combatant commanders and warfighters with more options."

This latest experiment allowed researchers to assess the scientific and technology challenges associated with the QUICKSINK concept for operational use.

"A Navy submarine has the ability to launch and destroy a ship with a single torpedo at any time, but the QUICKSINK JCTD aims to develop a low-cost method of achieving torpedo-like kills from the air at a much higher rate and over a much larger area," said Herzog.

As it was released over the Gulf of Mexico, where Eglin operates the 120,000 square mile Eglin Gulf Test and Training Range, stakeholders watched the QUICKSINK demonstration online thanks to multiple camera feeds from aerial platforms.

"The QUICKSINK mission was successful thanks to the hours of planning and preparation provided by the entire test team," said Capt. J. Tucker Tipton, Air-to-Surface Test Flight commander, 780th TS. "This was another example of how the 780th Test Squadron supports weapons developmental test customers and helps deliver unique capabilities to the warfighter."

OUSD(R&E) awarded this JCTD to AFRL's Munitions Directorate in fiscal year 2021 as part of its ongoing Maritime Weapon Program.

"The development of this technology is critical to maintaining U.S. technological superiority and addressing defined national security challenges," said Gerry Tighe, OUSD(R&E) oversight executive for the JCTD. "This successful demonstration represents an important milestone."

AFRL is the QUICKSINK program technical lead while the operations manager is U.S. Indo-Pacific Command. Air Force program executive officer for weapons serves as the transition manager.

AFMC Connect May focus: Considerate

By Estella Holmes
Air Force Materiel Command

WRIGHT-PATTERSON AIR FORCE BASE, Ohio – The AFMC Connect focus for May is Considerate.

Consideration is being respectful of the people you interact with daily. Words or deeds can show intentional and deliberate thoughts of consideration and the desire to be considerate.

Consideration in the workplace can lead to increased morale and productivity.

Leaders can encourage teams to connect:

- Active listening
- Recognizing impactful moments
- Publically acknowledging strengths
- Providing encouragement

Discussion Points might include:

- What does being considerate mean in the work or home environment?
- What are some examples of considerate acts within the workplace?
- How does it feel when members are considerate towards one another?

Continual practices of consideration can strengthen the team, organization and command.

More information on how to be considerate and the power of the deliberate act of showing consideration, can be found on the AFMC website. The AFMC Connect Implementation Guide is also available as a resource.

Consideration in the workplace can lead to increased morale and productivity. ***(U.S. Air Force graphic)***