NFAC wind tunnel testing demonstrates successful integration of refueling, monitoring systems

By Bradley Hicks
AEDC Public Affairs

It turns out two systems developed to serve separate purposes were made for each other.

The pairing of an aerial refueling apparatus and instrumentation that could be used to boost its functionality was successfully tested recently in the Arnold Engineering Development Complex National Full-Scale Aerodynamics Complex in a full-scale demonstration that effectively combined two Small Business Innovation Research, or SBIR, projects in simulated flight.

This integrated system, tested this past summer in the 40- by 80-foot wind tunnel at the Arnold Engineering Development Complex National Full-Scale Aerodynamics Complex, located in the NASA Ames Research Center at Moffett Field in Mountain View, California, represents the marriage of two individual.

The integrated Actively Stabilized Refueling Drogue System and Optical Reference System was successfully tested at 4T, at Arnold Air Force Base. The integrated ASDRS and ORS was successfully tested at NFAC in 2019.

The first of the SBIR projects was successful. According to Jimmy Williams, an Air Force project manager for the test, the test was successful.

“Captive loads and aerodynamic store separation testing was conducted and provided important data to the Joint Program Office, Air Force Symbolic Projects Office and Navy Air Systems Command to better define the release envelope of a critical store from the F-35 Joint Strike Fighter,” he said.

In addition to fulfilling the test requirements ahead of the original test schedule, the independent drive system, or IDS, within the AEDC Propulsion Wind Tunnel Facility at Arnold AFB was returned to service in time for the test, providing a substantial cost savings over the Plenum Evacuation System, or PES, mode that would have otherwise been used to create test conditions at 4T.

The IDS mode is preferred when running Mach numbers below 1.3 to maximize efficiency and cost effectiveness, while the PES is primarily used for testing above Mach 1.3.

“Aerial refueling platform so that the aircraft receiving the refueling platform while the aircraft is in flight serves to stabilize the hose more safely and efficiently. The drogue, which resembles an open parachute, is attached to the aircraft receiving the refueling platform so that the aircraft receiving the refueling platform while the aircraft is in flight.”

See TEST, page 4

F-35 test completed ahead of schedule, under budget

By Deidre Moon
AEDC Public Affairs

Store separation testing on a 1/15th scale model of an F-35 Lightning II Joint Strike Fighter in the Arnold Engineering Development Complex 4-foot transonic wind tunnel, or 4T, at Arnold Air Force Base was completed weeks ahead of a scheduled facility maintenance outage, saving the test customer more than $1 million.

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See TEST, page 4
Smokeless Tobacco products (e.g. snuff and dip):

Smoking is permitted solely in Designated Tobacco Areas (DTAs) identified by designated signage. If no

The following revised Arnold AFB smoking policy is effective immediately and applies to all individuals on

• Culture. Our team is proud of our diver-
• Sustainability. We plan and act for the
environment. We are proud of what we do
through creativity, perseverance, technol-

The powerhouse team of TSS and NAS’s Asset Health Assess-
ance (AHA) group have built,
and NAS’s Asset Health Assess-

NASCIS. Our team uses an approach that relies
on data and condition data in an effort to

condition-based maintenance and reliability centered maintenance to reduce inspection frequency and only perform maintenance as needed. Similar to what automobile manufac-
turers have done with our oil changes, gone are the days when we change our oil every three months or 3,000 miles. Now our automo-
tives have sensors to monitor your engine temperature and driving habits to determine the frequency of an oil change. The cost avoided by reducing these oil changes adds up to big sav-

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Braden has a 3,980-acre reservoir.

I believe in free and open communications.

| Core Values | Integrity First | Sacrifice before Self | Excellence in All We Do |

Sustainment. According to the Oxford Dictionary, sustainment is the act of maintaining something of mili-
tary importance.

We’re in the AECM. We need surveys that will in-

a. personal vehicles at any time; however, at no time will personnel discard cigarette butts outside their vehicle. (This policy is dated July 27, 2016)

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The powerhouse team of TSS and NAS’s Asset Health Assess-

NAS delivers the best
and most cost effective
service before self

Three commercial enterprises
(See 6000 commander’s

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The CBM network is currently
to be proactive and perform main-
tenances at a time of our choosing.

in the Air

The powerhouse team of TSS and NAS’s Asset Health Assess-

by Col. Michael Brandt

is a huge thank you

the best and fastest way to get things resolved

The powerhouse team of TSS and NAS’s Asset Health Assess-

in the Air

the best and fastest way to get things resolved

in the Air

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| Vision | NAS delivers the best aerospace testing capabilities in the world | Vision | NAS delivers the best aerospace testing capabilities in the world |

Technologic maintenance (TSM) is centered maintenance to reduce inspection frequency and only perform maintenance as needed. Similar to what automobile manufac-
turers have done with our oil changes, gone are the days when we change our oil every three months or 3,000 miles. Now our automo-
tives have sensors to monitor your engine temperature and driving habits to determine the frequency of an oil change. The cost avoided by reducing these oil changes adds up to big sav-

Col. Michael Brandt

Individual Mobilization Augmentee for the Arnold Engi-

ternationals. I have heard it is

By Col. Jeffrey Geraghty

It’s a huge thank you

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(See 6000 commander’s

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An aircraft firefighting vehicle and truck sit, Jan. 31, in a bay expanded to accommodate two aircraft firefighting vehicles as part of a construction project at the Arnold Air Force Base Fire and Emergency Services building. The overhead doors for the building were also replaced as part of the project. (U.S. Air Force photo by Jill Pickett)
and to help facilitate the connection between the refueling hose and the receiving aircraft. The Actively Stabilized Drogue System, or ASDRS, was developed by Analytical Mechanics Associates, or AMA, the system is capable of counteracting small-scale disturbances on the aerial refueling drone in flight.

**NFAC** provided a truly unique capability to test this emerging technology, said Chris Hartley, NFAC test engineer. Driven by onboard devices, NFAC conclusively showed the disturbances on motion under turbulent flight conditions.

The ASDRS consists of a pair of aluminum structures that can rotate and are mounted onto the exiting hose end of the refueling coupling. These structures, which are designed to improve aerodynamics, were developed over the last 10 years through SBIR contracts with AMA. This test entry was the first application where closed-loop control and position monitoring control were demonstrated in a full-length hose and drogue setup. The first phase of the ASDRS was awarded, or ARS, this was an instrumentation package developed for better motion control of refueling system performance. Within this package is the Optical Reference System, or ORS, which was developed by Coherent Technical Services, Inc., or CTSi. The ORS provides time and position monitoring control and proves for stability and control. The other SBIR project, which was demonstrated in conjunction with the ASDRS, supports future readiness and reliability of the AER refueling platform.

ASDRS was selected to the award of a second phase in 2012 and on testing over the last six years through the DOD contracts with AMA. This test entry was the first application where closed-loop control and position monitoring were demonstrated in an air vehicle. The ORS is designed to be housed in the fuel tank plane system. Infrared light emitters on board the drogue can enable position tracking. The system proves effective at giving real-time feedback in the wind tunnel environment in all light conditions and altitudes under test.

Sponsored by the Office of Naval Research, the first phase of the instrumentation package of which the ORS is a part was awarded funding in 2015 to cover a range of vehicle testing. The project was subsequently picked up by Naval Air Systems Command, also known as NAVAIR.

**NFAC** is an instrument for the purpose of 2008 to research an in- novative, controllable, refueling system. This research led to the award of a second phase in 2012 and on testing over the last six years through the DOD contracts with AMA. This test entry was the first application where closed-loop control and position monitoring were demonstrated in an air vehicle. The ORS is designed to be housed in the fuel tank plane system. Infrared light emitters on board the drogue can enable position tracking. The system proves effective at giving real-time feedback in the wind tunnel environment in all light conditions and altitudes under test.

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Safety during winter storms

By AEC Safety

Winter storms can manifest themselves very differently, depending on where you are. Below are tips to help you be ready:

- Listen to the television or radio for updates. Watch for alerts.
- Test all smoke alarms at least once a month.
- Install carbon monoxide detectors in your home, at least one on every floor and by each sleeping area.
- Plan two ways out of your home in case of an emergency.
- Establish a meeting place outside of the home and practice evacuating.
- Make sure your house number can be seen from the street. If you need help, emergency workers will be able to find you.
- Be ready in case the power goes out. Have flashlights and fresh batteries on hand. Never use open flames, such as candles, in your home.
- Generators should be used outside of the home, under dry conditions, and down doors and doors. Do not use generators inside your home or garage, even if the door is open.
- Be ready if the heat stops working. Use extra layers of clothing and blankets to stay warm. If you use an emergency heat source, keep anything that can burn at least 1 foot away.
- Turn portable heaters off when you go to bed.
- Stay away from any downed lines and report them to authorities.
- Remember to slow down when approaching any downed lines or wires. Extra caution is required.
- Keep vehicle safety lights on and carry a winter emergency kit.
- Remember to check on neighbors or others who may need help.

Important reminder: there are more home fires in winter than in any other season. Half of all home heating fires happen in December, January, and February. So, stay safe and be prepared.

As you stay cozy and warm, take steps to be safe.

Winter is not the time to try something new. If you’re not sure how to use a generator, contact your local electric company or a local expert.

For more information, visit www.ready.gov/energy.

AEC Safety

By Dan Hawkins

AETC partners with multiple MAJCOMs to create virtual aircraft maintenance hangars

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AETC partners with multiple MAJCOMs to create virtual aircraft maintenance hangars

A Boeing CH-47 Chinook lands at Arnold Air Force Base, Tenn., as part of a training exercise Dec. 20, 2019, for members of Arnold Fire and Emergency Services, as they test the FES team’s ability to respond to any aircraft and vehicle problems of three different U.S. Air Force helicopters in the event the team is called to an emergency situation involving such aircraft. (U.S. Air Force photo by Deidre Moon)

Arnold Air Force Base Fire and Emergency Services personnel list themselves as a member of a U.S. Army unit based at Fort Campbell, Kentucky, which describes the equipment inside the helicopter as part of a training exercise Dec. 20, 2019 at Arnold Air Force Base. The training is meant to familiarize the FES personnel with the working parts of different military helicopters should they ever be called to assist in an emergency involving such aircraft. (U.S. Air Force photo by Deidre Moon)
By Airman 1st Class Joseph Reeder
100th Air Refueling Wing Public Affairs

RAF MILDENHALL, United Kingdom (AFNS) – A 100th Maintenance Squadron Airman has designed a device that decreases the time it takes to repair leaks within aircraft fuel tanks.

Staff Sgt. Patrick Leach, 100th Maintenance Squadron aircraft fuels systems craftsman, uses the Pressurized Leak Detection Cup Feb. 14, at RAF Mildenhall, United Kingdom. The device, designed, has reduced leak detection time by approximately 75 percent and can potentially save the base more than 1 million dollars annually. (U.S. Air Force photo by Airman 1st Class Joseph Reeder)

“I’m excited to be working on this innovation,” said Leach. “We’re able to hit aircrews with equipment that decreases the time it takes to repair leaks within aircraft fuel tanks.”

“My innovation is a 3D printed cup which we can pressurize when pressed up against the inside of the tank. We can then easily identify if there is a leak with a local computer in a matter of minutes.”

Leach’s innovation also has the potential for any career field in which it could be useful for any career field. He recommends workplaces such as health care and teaching to take advantage of this tool. They can use it to improve workplace efficiency and reduce overall costs.

“The cup reduces the time it takes to detect leaks by 75 percent, improving the wing’s ability to perform quickly allowing mission-ready aircraft capable of providing aerial refueling.”

“The cup can be used in leak repair and fixes maintenance personnel can perform on their own or with others’ tasks,” Leach said.

“Upon receiving the device, our aircraft fuels systems Airman, Leach’s innovation has also the potential to affect other crew fields.

“it was primarily designed for fuel repair but could be useful for any career field that deals with liquid containers such as vehicle maintenance or culinary services.”

Leach believes workplace innovation can be replicated by other Airman. He recommends individuals look for opportunities to innovate in the areas of their job they find most frustrating.

“There is always a better way to do something,” Leach said. “If you don’t think that you’re doing your job right and make your life easier.”

Staff Sgt. Patrick Leach, 100th Maintenance Squadron aircraft fuels systems craftsman, uses the Pressurized Leak Detection Cup Feb. 14, at RAF Mildenhall, United Kingdom. The device, designed, has reduced leak detection time by approximately 75 percent and can potentially save the base more than 1 million dollars annually. (U.S. Air Force photo by Airman 1st Class Joseph Reeder)
By Airman 1st Class Emily Farmer, Edwards Air Force Base, Calif.

Highly lawmaker building a multidisciplinary team, Edwards Air Force Base continues to diversify its research and development efforts. With a new wave of innovation, the base is tackling new challenges, including a new technology developed under the Tipping Point Program.

At Edwards, the Tipping Point Program has been a successful way for the Air Force to encourage innovation and foster new technology development. The program provides funding to small companies to develop new technology that can be tested and validated at the base.

One of the companies currently working with Edwards is Broadsword, which has developed a liquid methane engine. The engine is a trailblazer for future rocket engine technologies and has the potential to significantly reduce the cost and environmental impact of space launches.

The Broadsword 25K engine is designed for the Air Force’s Rocket Propulsion Division. The engine is capable of producing up to 25,000 lbf of thrust and is being used to test new technologies that could one day be used in future space launches.

The engine is being tested at Edwards Air Force Base, and the results of the tests will be used to improve the design and reliability of the engine. The engine is expected to be ready for flight testing later this year.

In addition to the Broadsword engine, Edwards is also working on other new technologies, including an avian radar system and a bird strike hazard mitigation system. The avian radar system is being used to track bird trends in the area, while the bird strike hazard mitigation system is being developed to reduce the risk of bird strikes to military aircraft.

The Air Force Research Laboratory (AFRL) at Edwards Air Force Base is working with a variety of partners to develop new technologies that can be tested and validated at the base. The Tipping Point Program is one of the ways the base is encouraging innovation and fostering new technology development.

The next set of Tipping Point Program contracts are expected to be announced in the coming months, and AFRL looks forward to working with new and existing partners to develop new technologies that can be tested and validated at Edwards Air Force Base.
Five robotics teams sponsored by the Arnold Air Force Base Science, Technology, Engineering and Mathematics program attended the regional Tennessee FIRST® Tech Challenge, or FTC, competition in February at Middle Tennessee State University in Murfreesboro. The Tennessee Robotics Club from Murfreesboro was one of the Arnold STEM-sponsored teams to walk away with several accolades. As the Inspire Award-winning team, TRC will be joining other robotics teams from across the globe at the FIRST Houston World Championship in April. The team also received the top spot in the Winning Alliance category, second place in the Arm, Inc. Control Award category and third place in the competition overall.

Small Town Robotics from Shelbyville took several honors home as well, receiving first place in the Think award, third place in the Design Award and third place in the Amy Johnson category. Team SHARP from Spring Hill took first place in the Inspire Award category and second place in the Winning Alliance category. The other Arnold STEM-sponsored teams that participated were TACOCAT with the Agathos Classical School from Columbia and the Flying Fish Team from Shelbyville.

Olga Oakley, Air Force STEM outreach director, commended the students for putting their knowledge and skills to the test during these competitions. “The teams worked very hard throughout the season and overcame many challenges while designing their robots,” Oakley said. “We hope the FIRST Tech Challenge teams inspire the FIRST Lego® League teams and excite the younger generations in regards to the future of STEM.”

Lego League teams are made up of elementary and middle school students, while FTC teams are made up of students in seventh through 12th grades. As part of the FTC competitions, the teams are challenged to design, build, program and operate their robots to compete in challenges in an alliance format. These student teams are guided by adult coaches and mentors, and through these challenges develop their STEM skills. This is all while learning the value of hard work, innovation and teamwork. Teams must raise funds, design and market their team brand, and do community outreach, for which they can win awards. Additionally, participants have access to college scholarships through this program.

For more information about the FTC Championship competition results, visit: https://www.tnfirst.org/tennesseeevents/TN-FIRST-Tennessee-FTC-Championship.

Team members with the Tennessee Robotics Club concentrate as they compete in a match at the Tennessee FIRST® Tech Challenge competition Feb. 8 at Middle Tennessee State University in Murfreesboro. Placing first in the Inspire Award category, the group will go on to compete at the national level in Houston, Texas in April. (Courtesy photo)

Students with the Small Town Robotics team from Shelbyville gather together for a photo during the FIRST® Tech Challenge competition Feb. 8 at Middle Tennessee State University in Murfreesboro. Small Town Robotics is one of the area teams sponsored by the Arnold Air Force Base Science, Technology, Engineering and Mathematics program. (Courtesy photo)

Following the awards ceremony, students with the Tennessee Robotics Club from Murfreesboro pose with their individual medals and team trophy at the FIRST® Tech Challenge competition Feb. 8 at Middle Tennessee State University in Murfreesboro. As winners of the Inspire Award, the Tennessee Robotics Club (TRC) members will go on to participate at the national competition in Houston, Texas. TRC is one of five area teams sponsored by the Arnold Air Force Base Science, Technology, Engineering and Mathematics program. (Courtesy photo)
AFRL creates safer-than-steel synthetic winch cable for cargo aircraft

By Donna Lindner

AF Research Laboratory

W R I G H T - P A T - T E R S O N A I R F O R C E B A S E, Ohio – The C-17 Globemaster III aircraft fleet commonly uses winch cables made of steel to pull pallets, vehicles and other items onto the aircraft from the ground via the all ramp.

The current steel cable experiences dangerous snapback upon breakage, which can injure personnel and damage aircraft. The synthetic cable eliminates the danger since it does not snap back if it were to fail. “The cable is simply safer,” said Ed Clark of the APTO Office. “Serious injury occurs when a steel cable breaks, eliminating those injuries is imperative.”

“The change from steel to a synthetic material is most noteworthy in the significant weight difference and improved mission capabilities,” said Senior Master Sgt. Jeff Witherly, C-17 evaluator, loadmaster, Air Force Special Operations Command, Team Charleston, Air Transportability Test Loading Activity (APTO) Office.

“The cable is simply safer, more maneuverable and manipulate around the cargo compartment. The fact that it does not retain energy, unlike steel, is a huge safety advantage as it will not whip if it were to break,” said Witherly.

During the first quarter of 2020, six sets of cables will be installed on two Globemaster III aircraft at three different operational bases. The Air Mobility Command and the C-17 Program Office will evaluate them for approval as a suitable substitute.

Samson Rope Company is working with the Air Force to design the system. They manufacture industry-specific synthetic rope that is engineered to meet various demands. Upon approval, the new synthetic cables will be used across the globe.

Arnold AFB Milestones

35 YEARS
Dennis Holmes, AF
30 YEARS
Dee Pemberton, AF
30 YEARS
Donnie Holmes, TOS
Randy Stanley, TOS
Carey Troy, TOS
25 YEARS
Anthony Askew, TOS
15 YEARS
John Allan, TOS
Charles Brown, TOS
TOS
Thomas Campbell, TOS
James Daniels, TOS
Jeremy Morris, TMAS
Stacy Parker, TOS
Nicola Reese, TOS
Kenneth Yasser, TOS
Randy Vinke, TOS
5 YEARS
Ryan Bailey, TOS
Russell Baker, TOS
Teddie Reddington, TOS
Lorenzo Gregory, TOS
Mirah Layne, TOS
David Miel, TOS
Dustin Nash, TOS
Brian Pastor, TOS
Jarvis Powell, TOS
Bobby Rodger, TOS
Michael Shanks, TOS
Gregory Smartt, TOS
Douglas St. John, TOS
Kathryn Wanger, TOS
RETIRED
Charles Anderson, TOS
Teresa Butler, TOS
Hal Lorenz, TOS
Richard Gunn, FSS
Dan Marven, AF
Maurice May, AF
Winfield Stacy, TOS
George Wilson Jr., TOS
NEW HIRES
Hunter Adams, TOS
Jeremy Delrey, TOS
Evan Dickey, TOS
John Dickinson, TOS
Wesley Godhart, AF
Robert Greene, AF
Keith Gregg, TOS
Mitchell Hehl, TOS
Jackson Ibele, TOS
Charles Kirk, TOS
Aron May, TOS
Debbie Platt, AF
Dennel Pracht, TOS
Donnie Jenkins, TOS
Anthony Thomas, TOS
Matthew Ward, TOS
Benjamin Wright, TOS
PROMOTIONS
Jay Baldwin, FSS, promoted to FES crew chief
Lonnie Brown, FSS, promoted to FIS crew chief
Myra Kline, AF, promoted to NH-03 as government purchased agency/organization program coordinator

Members of the Air Force Research Laboratory’s Advanced Power Technology Office, Air Mobility Command, Air Force Special Operations Command, Team Charleston, Air Transportability Test Loading Activity, Wright-Person Air Force Base, Warner Robins, Georgia, Boating and cable designer Samson Rope met on Joint Base Charleston to conduct an operational evaluation of new synthetic winch cables. (Courtesy photo)
By Brian Brackens
Air Force Life Cycle Management Center

JOINT BASE SAN ANTONIO, Texas –

The Air Force Gunsmith Shop – part of the Air Force Life Cycle Management Center’s Armament Directorate – recently completed delivery of a new rifle for aircrew in most ejection seat aircraft.

Known as the Aircrew Self Defense Weapon (GAU-5A), which is a 5.56 mm caliber rifle, was designed by the Gunsmith Shop in close coordination with the small arms engineer to provide downed aircrew with additional firepower while they wait for rescue.

“We were asked to design a stand-off weapon that was capable of hitting a man size target at 200 meters,” said Richard Shelton, Chief of the Gunsmith Shop. “It disconnects at the upper receiver, is located inside the seat kit (of ACES 2 ejection seats), and can be put together within 30 seconds if needed.”

The new rifle is based on the M4 Carbine and weighs under seven pounds. From Feb. 2018 through January 2020, approximately 2,700 rifles were delivered to aircrew members.

According to the Small Arms Program Office the cost to develop and field this new weapons system was $2.6 million dollars. This weapon was developed to meet an urgent operational need to increase downed aircrew survivability. It is stripped of optics and aircrew must utilize the iron sights only.

Not only is the Gunsmith Shop in the design business, but it also repairs, refurbishes and overhauls all small arms for the Air Force, which includes anything from .50 caliber machine guns down to pistols.

“We were established in 1956 by Gen. Curtis LeMay,” Shelton said. “The original intent of the office was to improve marksmanship and shooting abilities of Airmen, and over time the shop grew into what it is today.”

The shop is comprised of civilian and military employees who are certified gunsmiths, small arms repairman and machinists. They are the only ones in the Air Force that are allowed to work on government issued weapons at the depot level.

“The most rewarding part of my job is getting assets (small arms) through the shop and returning a weapon that has been beat up and heavily used, and returning it to the user practically brand new,” said Shelton. “The other rewarding thing is when we work with the using community to develop specific weapons for a specific Air Force need.”

Currently the Shop is refurbishing M9 handguns and M14 Honor Guard rifles. The next project will be a large M4 refurbishment, along with other ongoing small arms production lines.