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Capability extension expected to have major impact in hypersonic testing

By Bradley Hicks

With the surging demand for hypersonic development, many of the tools used in the transonic and supersonic regimes to provide analyses and measurements must be extended to meet the new capability.

One such tool under development at the Department of Defense High Performance Computing Modernization Program CREATE™-AV Kestrel is an easy-to-use software used to calculate fluid flows via computational fluid dynamics, or CFD.

The CREATE™-AV Kestrel tool is funded by the DOD High Performance Computing Modernization Program CREATE™, short for Computational Research and Engineering for Acquisition and Systems Engineering, to provide high-performance computing to enable CFD. It is Department of Defense High Performance Computing Modernization Program CREATE™-AV Kestrel software, which is used to calculate fluid flows via computational fluid dynamics, was extended to the hypersonic air model in the H3 arc-heated facility at Arnold Air Force Base.

With this, the impact of heat transfer on test articles, such as the one pictured in the graphic, can be computed at higher speeds. (Graphic provided)

HVAC crew keeps things cool while taking heat

By Bradley Hicks

Duane Meadows admits he and members of his crew don’t always receive a warm welcome when they show up around Arnold Air Force Base.

“We’re probably the most hated craft, but we’re the most loved at the same time depending on what we’ve got to do,” he said.

But Meadows is understanding when met with a cold reception. As the lead HVAC technician at Arnold Air Force Base, numbers found across the sprawling acreage must maintain and their vast coverage is a major impact in hypersonic testing.

The 11-man HVAC crew is among the numerous craft groups at Arnold Air Force Base and one of several based out of Building 1478, otherwise known as the Base Civil Engineering Building.

The HVAC technicians are responsible for maintaining the air conditioning and heating units and ventilation systems found across the sprawling acreage of Arnold, including the Gossick Leadership Center, Arnold Lakeside Center, Wingo Inn, and buildings at the Arnold AFB Golf Course.

“It’s not all that uncommon to get called to a building you’ve never heard of before,” Meadows said. “I’ve been here 6.5 years, and I find units every day that I didn’t know existed out here. It’s like hunting Easter eggs sometimes.”

According to Facilities Maintenance Superintendent Terry Rader, the HVAC team works to maintain more than 3,000 assets at Arnold, and those are just the ones on the books. “With exhaust fans and everything, it’s actually closer to 4,000 assets we must maintain,” he said.

Due to the number of assets they must maintain and their vast coverage area, Meadows said each day presents new challenges for the HVAC technicians.

“You may be working on a water pump one minute, an ice maker the next, refrigerator, air conditioner, whatever. You’ve got to be versed in all of this,” he said.

Rader added the group is always on the go, regardless of the time of year.

“That’s the great thing about the Civil Engineering Building – we get stuff done,” Rader said. “There’s a lot of hurry up and wait stuff out here in the testing world, which is research and development. We understand that. These situations to extend the use of hypersonic test facilities. Equilibrium air occurs when O2 and N2 molecules dissociate at extremely hot temperatures, a chemical reaction that leaves oxygen and nitrogen atoms in the air along with O2 and N2 molecules.

A demonstration of Kestrel for equilibrium air was recently completed for a test article in the arc-heated test facilities at Arnold Air Force Base.

In the arc-heated facilities simple thermodynamic models, such as computationally perfect air, are inadequate; higher-fidelity thermodynamic models are essential. A need also exists to compute flows on geometrically-complex test articles. Older codes utilized simple-structured meshes, while Kestrel allows the use of highly-unstructured meshes which can resolve very complex shapes. This combination of high-fidelity thermodynamic models with more flexible mesh capability is what makes Kestrel the current code of choice at AEDC.

According to AEDC Modeling and Simulation Engineer Ken Tenen, the mesh is a set of points in the flow field. A set of differential equations is solved to determine data such as pressure, temperature, density and speed. Algorithms within Kestrel solve these equations at the points within the mesh. From these calculations, high-fidelity simulations are generated to provide important data on stability, performance, and cost to AEDC.

AEDC Public Affairs
By Bradley Hicks

The thermodynamic capability of the Department of Defense High Performance Computing Modernization Program CREATE™-AV Kestrel software, which is used to calculate fluid flows via computational fluid dynamics, was extended to the hypersonic air model in the H3 arc-heated facility at Arnold Air Force Base.

With this, the impact of heat transfer on test articles, such as the one pictured in the graphic, can be computed at higher speeds. (Graphic provided)

H3 Arc heater: Null-point Heat Flux Probe Kestrel: Mesh K2, 4000 iter.

See HYPERSONIC, page 3

By Bradley Hicks

Duane Meadows, lead HVAC technician at Arnold Air Force Base, checks on an HVAC unit located outside of the Base Civil Engineering Building. (U.S. Air Force photo by Brad Hicks)

Military appreciation picnic hosts serve up food and fun to past, present and future service members

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Air Force Arnold Medical Banner

Influenza Vaccines are Available at Arnold Air Force Base Medical Aid Station

By Staff Sgt. Alekcia Humphrey

The influenza vaccine has arrived at Arnold Air Force Base Medical Aid Station for all Department of Defense beneficiaries, retirees and families members. You must possess a valid I.D. card and be enrolled in DEERS. Vaccines will be administered as walk-in appointments on the following dates and times: Monday and Wednesday, 3-5 p.m.; and Tuesday and Thursday, 6-9 a.m.

If you are not yet due for a seasonal influenza vaccination during walk-in hours, contact the MAS at 931-454-5351 to make an appointment.

Active duty and reserve members of the Medical Department of Defense participate in the annual flu vaccination preventative program in order to protect the health and well-being of the American military force.

Suggested Times and Frequencies

1. Vaccine administered once every calendar year
2. Maximum age: The vaccine is currently approved for people ages 6 months or older. The influenza vaccine is recommended for everyone, except for people ages 50 years and older, who should receive an annual vaccination
3. About 10-14 days after vaccination

Active Duty, Reserve, and other military connected personnel

Please visit the Influenza Vaccine page on the Medical intranet site: https://www.militaryintranet.com/arnold/vaccine/influenza for more information.

The Department of Defense (DoD) and the Department of Veterans Affairs (VA) recommend full vaccination of all military personnel to prevent influenza and reduce the risk of transmission to others.

Influenza Vaccines are also available at the 455th Medical Group. For more information please call 931-454-5841.
Industrial hygienists, union stewards and craft work together to meet stricter safety standards

By Deidre Ortiz

AEDC Public Affairs

In an effort to meet new, stringent safety standards now in place for welders and pipefitters, the Safety, Health and Environmental personnel at Arnold Air Force Base are working with union stewards of the Air Engineering Metallurgical Trades Council and other craft team members to make adjustments and implement new equipment.

According to Bing Brong, an industrial hygienist at Arnold, there was recently a change to the recommended exposure limit for hexavalent chromium, or hex-chrome.

“The limit is stricter than what was previously set regarding exposure to hexavalent chromium,” Brong said. “So we had been working with the union stewards and craft to provide them with information on the new standards and discuss what types of new PPE (Personal Protective Equipment) that would work best for these operations.”

Part of this process included bringing in different vendors on base to give presentations on the different equipment that is available.

One type of PPE suggested was the use of Powered Air Purifying Respirators (PAPR).

“Each PAPR helmet is $2,500, and our initial estimate is that we need at least 30 of these filters to outfit all welders,” said Warner Holt, group manager of Manufacturing for the Test Operations and Support Contractor.

Though PAPR helmets were not in use by some of the welders at Arnold, with the new limited space in every welder and the direct exposure to fumes with welders now having to wear body coveralls before welding, union stewards were extremely concerned.

Mike Lance, union steward for the pipewelders at Arnold, explained that these are "top-of-the-line breathing devices."

“When using the PA- PARs, you’re only taking in filtered air, so we’re not exposed to any of the hex-chrome," he said. "In addition to the new filters, the welders and pipewelders must change into full body coveralls before performing their work, and anytime they go on break they must properly dispose of the coveralls and put on a new suit before continuing their work."

Another step taken to prevent exposure was to establish confined welding areas, said Lance.

“We are trying to prevent exposure to the rest of the shop,” said Vaughn Wilson, a supervisor at the Model and Machine Shop. "We had constructed for the whole welding to be done in side by side and up against the wall so that we can easily ventilate out the gas of the Model Shop floor."

Wilson mentioned the new requirements were implemented the day before the replacement project for C-Plant and thanked the crew for their cooperation.

"This crew overcame all obstacles to complete this work in the elements welding in extreme conditions with the heat in the 90-degree range," Wilson said. "They’ve had to get their work environment changed from one in the Model Shop, but especially the welders and equipment needed to work right away get used to wearing the different equipment and dressing in and out between working the job and taking breaks," Wil- son said. "Wearing the new hex choms has been very heavy and they can limit the risk and the positioning. It will take some time, but our number one concern is safety."
Reserve maintainers take part in AF light attack experiment with 704th Test Group

By Tech. Sgt. Bob Jennings
442nd Fighter Wing
Public Affairs

MOODY AIR FORCE BASE, Ga. (AFPN) – It’s not every day a pair of Reserve Citizen Airman maintainers get to help shape the future of the Air Force, but events like the recent light attack experiment can provide the opportunity.

Senior Master Sgt. Scott Lopez, 47th Maintenance Squadron maintenance superintendent at Moody Air Force Base, Georgia, and Tech. Sgt. Lauren Camarena, an electrical and environmental systems craftsmen with the 476th MXS, travelled to Holloman Air Force Base, New Mexico, for two months earlier this year to take part in phase two of the experiment.

The AEDC 704th Test Group was involved in conducting the experiment to test the capabilities and maintainability of the A-29 Wolverine and the A-29 Super Tacana light attack aircraft to determine which plane would best fit the Air Force’s needs in a close-air support role.

The A-29 is a variant of the Beechcraft T-6 Texan used in service by the U.S. Air Force and Navy. The A-29 is in service in multiple countries around the world.

The plan was to fly multiple times a day, testing things like reliability, time of maintenance and cost to operate while 26 Air Force maintainers watched and documented.

Lopez worked as the maintenance superintendent of the team observing the A-29. His active-duty counterpart, Senior Master Sgt. Ben Delhanty from the 358th Aircraft Maintenance Squadron at Mountain Home Air Force Base, Idaho, led the A-29 observation team. Camarena served as an observer, working directly as civilian team worked on the Super Tacana.

“The focus on the maintenance piece was huge,” said Camarena. “It’s like the Air Force said ‘let’s look at this plane before we buy it.’”

The Airmen were not allowed to actually touch any of the maintenance during the experiment. More importantly, they were told not to express any opinions.

“We’re both very open and expressive people,” said Lopez. “So we really had to be careful. We really took that line.”

Each member of the observation teams signed a non-disclosure agreement prohibiting the sharing of information between the A-29 and the A-29 teams.

During the experiment, the teams of select technical teams as they documented more than 170 training mission flown in the A-29, including working with their Allied special operation forces to train more than a dozen foreign joint attack controllers.

“This was a joint operation,” said Lopez. Pilots selected for the experiment included Airmen, Marines, and naval aviators. He also toured the combined operations with all the nations.

“It was an awesome opportunity,” he said.

The team gave the Secretary of the Air Force over 30,000 critical data points from their inspection data sheets. They compiled those sheets into weekly action reports to keep the SECAF apprised of the experiment’s progress.

Data collection, while the primary purpose of the experiment, was just the beginning.

The team also, in conjunction with the 49th Wing, conducted the Standardization Section, certified Air Combat Command’s first maintenance load-qualified joint-service aircraft. They poured over more than 200 maintenance manuals and provided recommendations to build up the Air Force’s maintenance capability for the OA-X project.

At the end of the experiment, Lopez thanked the total force at Holloman AFB, Missouri. “It was an awesome opportunity,” he said. “I think I brought back more of an understanding of close air support.”

Camarena, a former C-17 Globemaster III cargo aircraft maintainance superintendent, said, “Coming off a heavy aircraft you're bringing people down to the fight – this one, you're actually in the fight and seeing what they actually do every day and why they need to do what they do.”

The results of the light attack experiment haven’t yet been released, but Lopez expects a decision to be made in either December 2018 or January 2019. No matter what aircraft is ultimately chosen, the part that two Reserve Citizen Airmen played in the process will be felt for decades to come.

“IT’s an honor to be a part of that,” Camarena said. “To kind of say ‘Hey, we helped pick this aircraft for the Air Force.’”

Senior Master Sgt. Scott Lopez, the maintenance superintendent for the 476th Maintenance Squadron at Moody Air Force Base, Ga., and Tech. Sgt. Lauren Camarena, an electrical and environmental systems craftmen with the 476th MXS, pose with an A-29 Super Tacana October 25 at Moody AFB. They took part in the Air Force’s light attack experiment at Holloman AFB, N.M., to help determine what airframe would best suit the Air Force’s needs. (U.S. Air Force photo by Tech. Sgt. Bob Jennings)
The safety focus for the month of November is on walking and working surfaces, with an emphasis on proper lighting and working in winter conditions. It is important to identify where we have hazards on our walking and working surfaces and to address these hazards by installing rails, toe boards, and catwalks. The requirements for walking and working surfaces are simple - keep them clear for safe passage. Walking surfaces include catwalks, stairways, and access platforms.

Safety, Health and Environmental Standard 101 outlines the requirements for scaffolding. The most common causes of injuries associated with scaffolds include: plank slippage, support collapse, personnel slips, trips and falls or personnel contact with a falling object. Platforms are to have standard guard rails, top rails and toe boards installed.

### Keeping walkways and workways clear for safe passage

By AEDC Safety

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The Air Force awards three Launch Service Agreements

By Secretary of the Air Force Public Affairs

WASHINGTON, D.C. (AFNS) – The U.S. Air Force announced today the award of three Evolved Expendable Launch Vehicle (EELV) Launch Service Agreements to (in alphabetical order) Blue Origin, Northrop Grumman Innovation Systems, and United Launch Ali- ance. The award to Blue Origin will be for development of the New Glenn Launch System. The award to Northrop Grumman Innovation Systems is for development of the OmegA Launch System. The award to United Launch Alliance will be for development of the Vulcan Centaur Launch System.

The Launch Service Agreements will facilitate the development of three domestic launch system prototypes and enable the future competitive selection of two National Security Space launch service providers for future procurements, planned for no earlier than fiscal year 2020.

Through public–private partnership agreements, the goal of the acquisition strategy is to satisfy federal law by en- aging two National Security Space launch service providers for future procurements, planned for no earlier than fiscal year 2020.

The team was able to quickly respond to the operational needs and requirements of USAF and other operations, while ensuring that the system was in line with the ongoing operational needs and requirements of the United States Navy, United States Marine Corps, United States Army, and United States Air Force. The team was able to meet the operational needs and requirements of USAF and other operations, while ensuring that the system was in line with the ongoing operational needs and requirements of the United States Navy, United States Marine Corps, United States Army, and United States Air Force.

The Air Force has successfully launched 72 NSS missions, dating back to 2003, using the Atlas V and Delta IV launch vehicles.

“Since the early days of the space program, the Air Force has been a world leader in space launch,” said Air Force Chief of Staff Gen. David L. Goldfein. “As space becomes more contested and complex, the Air Force will continue to develop, qualify and deliver launch systems to the American people.”

The awards will be contracted through Air Force Space Command’s Space and Missile Systems Center (SMC), located at Los Angeles Air Force Base, California, SMC is the U.S. Air Force’s center of acquisition excellence for acquiring and developing military space systems. Its portfolio includes the Global Positioning System, Military Satellite Communications, Defense Meteorological Satellite Program, Space Launch and Range Systems, Satellite Control Networks, Space Based Infrared Systems and Space Situational Awareness capabilities.

To view AF 91-207 on The U.S. Air Force Traffic Safety website, it is available at http://www.asf-pub.af.mil/
Brothers carry on family legacy in aviation

By Senior Airman Justin Clayvon

DOBBINS AIR réserve BASE, Ga. (AFNS) – Decades ago, a father took his two young sons to the aviation museum at Wright-Patterson Air Force Base, Ohio. Although the father might have known it would be a great vacation for his family, he had no way of knowing the impact the trip would have on his sons’ future decision to join the Air Force.

“I remember that one of the airplanes we stopped at, our dad was like, ‘look it’s a Hercules,’” said Staff Sgt. Jeremy Putnam, a 94th Maintenance Squadron jet engine mechanic here. “We were like that’s really cool and they let us in and we climbed around in it. I just remember it being so big! And then, lo and behold, later I’m an engine guy that works on them. We’ve always been around aircraft and drawn to it.”

Jeremy’s older brother, Joel Putnam, is a 94th Aircraft Maintenance Squadron crew chief at Dobbins Air Reserve Base. The Putnam brothers come from a family legacy of military aviators.

“Our dad was in the U.S. Army air cavalry and he worked on airplanes,” said Jeremy. “That was a big inspiration for both of us to work on airplanes. We come from a long line of military aviators. Our grandfather on our dad’s side was in the Air Force. On our mom’s side, our grandfather was a helicopter crew chief in the Marines and then Army.”

The brothers’ camaraderie growing up continued into their adult lives as they worked in the military. Joel and Jeremy deployed to Qatar and recently participated in Exercise Swift Response together. Exercise Swift Response is an annual U.S. Army Europe-led multinational exercise featuring high-readiness airborne forces from nine nations.

The brothers spoke about their unique experience of partnering with each other in real-world scenarios of exercises and missions.

“We were doing some reconfigurations for the Swift Response exercise, changing from one layout in the cargo department to another,” said Joel. “We were setting up seats for the Army paratroopers to jump out, and I look up and Jeremy is there helping me—tag teaming.”

“Yes, I didn’t have anything engine related, so I jumped on the airplane to help him set up for the configuration,” Jeremy added.

Joel highlighted that between the two brothers they can take care of a whole plane.

“We can go on TDY together and he can do the engine work and I can do the crew chief stuff,” said Joel.

“We can run the plane, we can get it serviced up, passed go, or handle any major issues,” added Jeremy.

Joel spoke about completing inspections at Dobbins ARB.

“When a plane comes in and is jacked up, as Jeremy works on the motor, Joel will be over in the flaps.”

Jeremy works as an Air Reserve technician full time at Dobbins ARB. Joel serves as a traditional reservist, frequently working on orders at Dobbins ARB.

The bond between the brothers carries into their civilian life as well. The airmen live as roommates and even produce electronic music and disc jockey together. But their favorite experience is working together in the military.

“Going out and doing real world missions together is really cool,” Jeremy said. “When we grew up playing in the backyard together trying to accomplish something, or helping dad work on the cars, it was together, and now being on a much bigger scale, in a bigger family in the Air Force, still being and working together towards the mission is awesome.”

Joel Putnam, a 94th Aircraft Maintenance Squadron crew chief, left, and his brother, Staff Sgt. Jeremy Putnam, a 94th Maintenance Squadron aerospace propulsion technician, pose for a photo in front of a C-130 Hercules at Dobbins Air Reserve Base, Ga. (U.S. Air Force photo by Senior Airman Justin Clayvon)
Military appreciation picnic hosts serve up food and fun to past, present and future service members

By Bradley Hicks

Tallassee resident Wilford "J.J." Johnson wasn’t sure what to expect as he made his way to Arnold Lakeside Center last month to attend a gathering of retired military, veterans and active-duty service members.

"I thought it was just going to be a little gathering of people, and this was much more," Johnson said. "I got there and it was just like a little city, you know. I talked to was very positive people. This was just a something like this and need something like this," he said.

The picnic, held each year at Arnold Air Force Base as a way to say "thank you" to past and present service members and their families, was Oct. 12. The event was the second incarnation of the Military Appreciation: Past, Present and Future Picnic, held Oct. 12 at Arnold Lakeside Center. (U.S. Air Force photo by Bradley Hicks) (This image was manipulated by obscuring badges for security purposes)

"We called it 'Military Appreciation Picnic: Past, Present and Future' because we represent the past, the future and the present. We can do that at Arnold Air Force Base," said Barbara Stewart, director of the Arnold AFB Services Office.

Reflecting upon the event several days later, Stewart said she felt the "Everyone there liked the addition of the information booths which helped them understand where they could go to get help with health-related issues, finances, home improvement and other concerns we all may have," she said. "Everyone liked to talk very positive in their reactions."

Some attendees of the Military Appreciation: Past, Present and Future Picnic spend a little time on Woods Reservoir. Boat rides were one of several activities in which picnic attendees could participate. The picnic is held annually as a way to show appreciation to past and present service members and their families. (U.S. Air Force photo by Bradley Hicks)
The “Bricks in the Loop” cyber-physical training platform at Joint Base San Antonio-Lackland, Texas (AFNS)— As the cyber realm evolves, effects from cyberattacks are moving from the digital to the physical. Just three years ago, nearly $225,000 in ransomware costs and the potential damage of a single cyber-physical attack could occur from a malicious cyber-physical act, the 90th Cyber Operations Squadron has developed an innovative new training tool. “Bricks in the Loop” helps cyber Airmen conceptualize and understand the relationship between the network and physical world. It models operational technology infrastructures, and Christopher De La Rosa, 90th COS cyber leader, explains that creating a physical training environment made up of toy, plastic bricks paired with an IT network built from open source or low-cost, and easy-to-use software options. The build cost less than $4,000 and took only four months. The “loop” serves as a training environment that could effect a physical asset. Airmen the opportunity to see how a cyber action could affect a physical asset. Unfortunately, any cyber-physical training option using life-size training assets would be too costly to create, so current options are predominantly virtual-based, according to De La Rosa. To remedy this, his team created a scaled, physical training environment made of toy, plastic bricks purchased off-the-shelf. They then paired this with an IT network built from open source or low-cost, and easy-to-use software options. The build cost less than $4,000 and took only four months. The “loop” serves as a simulated Air Force installation with assets such as a fire station, police station, airport, airport terminal, hotels, tanker trucks, and other vehicles. These elements can purposefully be hacked and made to light up, move forward or backward, open, stop working all together, all to alert the maneuver a cyber action has taken place. The toy bricks are built on a 220-kilogram scale so they can be easily transported and re-built to support student training or to model service-level exercises. “The look and functionality of the environment allows the training to easily translate the model to critical missions on most bases, and the potential damage that could occur from a malicious cyber-physical attack on those missions,” De La Rosa said. “There are many more scenarios relevant to Air Force bases that, if disrupted, may have a critical impact on assigned missions.” In the future, the team hopes to include additional assets that will need to move training scenarios, including fuel operations, security, water filtration, and fire alarms and suppression systems. The team is also seeking to include an additional asset to ensure access and control feature providing tracers the opportunity to connect from anywhere. Training cyber Airmen isn’t new to the 90th COS. In the last two years alone the squadron has de veloped 10 cyber capabilities comprising real-time operations and innovation efforts, CMF support efforts, and more, and is only forming capabilities and enabling efforts, with much more in the future. As AFCYBER Airmen continue to deliver full-spectrum global cyber capability and outcomes to the Air Force, joint force and nations, as will the 90th COS in its endeavor to keep our forces proficiently trained and ready.
The 14th Flying Training Wing’s senior leadership and innovation team opened the Spark Cell’s Innovation Lab Oct. 19, at Columbus Air Force Base, Mississippi.

The room is open 24 hours a day on the second floor of building 926 for individuals to utilize equipment and work on projects. Spouses, civilians, active-duty personnel and anyone else with an idea to solve a problem is welcome to use the Spark Cell.

“This is your Spark Cell,” said Col. Samantha Weeks, 14th FTW commander. “This is for all of (Columbus AFB) to put up problems and collaboratively come up with solutions. … The chief of staff of the Air Force told us to think big, start small and scale fast and that’s what the Spark Cell is here to help us do.

Maj. Ryan Brewer, 14th FTW director of innovation, was the lead on the creation of Spark Cell and said this is not a place for personal projects for the sake of it, but rather a place for personal and professional development to help the Air Force and the 14th FTW get better.

An example of how to use the space effectively is learning how to program computer applications to create a solution to a problem.

“The first rule is to strip your rank when you walk in,” Brewer said. “We are trying to strip the barriers to solutions and success. We want an Airman to be able to walk up to a lieutenant colonel and say they have an idea that will change the world.”

The Spark Cell has numerous tablets, laptops, TVs, microphones and whiteboards with programs ranging from photo editing software to computer programming applications to allow anyone with any skill set to set the framework for their innovative ideas.

In the future, the innovation team plans to allow people to check out equipment overnight if needed. The Spark Cell is meant to give opportunities to connect with other innovators whenever and however possible.

Capt. Philip Huebner, 37th Flying Training Squadron instructor pilot, speaks during the Spark Cell grand opening Oct. 19 on Columbus Air Force Base, Miss. (U.S. Air Force photo by Airman 1st Class Keith Holcomb)