Gulf Coast Reporters' League

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AEROSPACE NEWSLETTER

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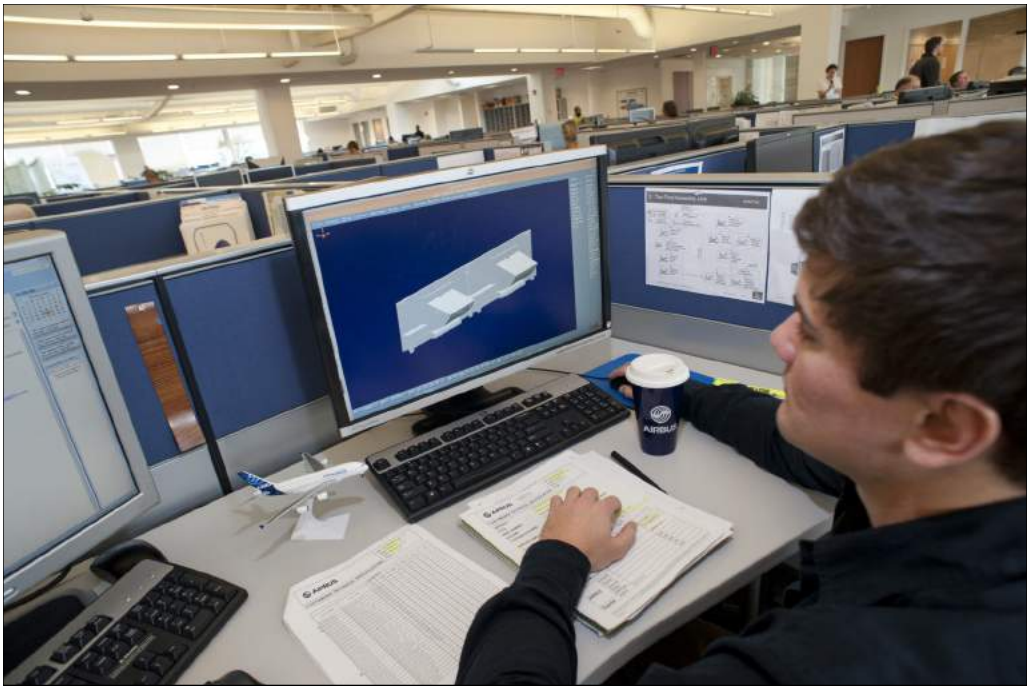

Engineers at the Airbus Engineering Center develop jetliner cabins. *Photo courtesy Airbus*

Airbus Engineering

Exceeding expectations

It was 10 years ago that Airbus put an engineering center in Mobile, and now the growing Airbus footprint here seems 'brilliant' given Trump's call to create jobs in America...

Mobile, Ala.

When Airbus decided in 2006 to open an engineering center in Mobile, it was a bold move for a company that was not doing that well on a number of fronts, including a revolving door of CEOs.

But late last month, when the Airbus Engineering Center marked its 10th year, the decision seems by any measure to have been a brilliant move. The company is on track, the presence in Mobile is growing and it lines up nicely with the new administration's desire to bring jobs to America.

"This has been probably one of the most successful endeavors I personally have been involved with," said Barry Eccleston, president and CEO of Airbus America and aviation business veteran of 40-plus years. "All this has way exceeded my expectations."

Eccleston said others feel the same. Tom Enders, CEO of Airbus Group, Fabrice Bregier, chief operating officer and president of commercial aircraft, and Charles Champion, president of Airbus Operations and executive vice president of engineering, "they will tell you exactly the same thing."

By David Tortorano

Eccleston was among the speakers at the celebration Jan. 30 marking the 10th year of the engineering center. The event honored the 220 engineers and support personnel at the center, not only for their work but for their service in time and money to the community. Attending were workers, state and local leaders, and guests from the charitable and educational entities with whom Airbus Engineering has partnered over the past decade.

Just how bold a move it was is clear given the circumstances at the time. Eccleston said that in 2007 when the engineering center opened "life at Airbus had not been that great." The previous year wasn't very good, with the company going through three different CEOs in 12 months, the A380 coping with technical issue and the recession on the horizon.

Today Airbus has a 10-year backlog of over 8,600 aircraft, 200 A380 jetliners have been delivered and the A350, the first program Mobile engineers worked on, has 800 units on order. Airbus, with 3,000 workers in the United States, buys $16.5 billion in U.S. equipment each year.

Mobile Mayor Sandy Stimpson, who proclaimed Jan. 30 Airbus Engineering Day, said Airbus contributed $525,000 to various organizations, logged 2,700 flights out of the city, delivered 17 jetliners spent $180 million in salaries.

The engineering center was established in 2007 when Airbus was competing against Boeing for an multibillion-dollar contract to build tankers for the U.S. Air Force. Airbus won the contract in 2008, but Boeing protested. In 2011 it was awarded to Boeing to build the planes in Washington state, but Mobile later ended up getting an A320 jetliner assembly line, which produced its first jetliner in 2016.

Alabama Commerce Secretary Greg Canfield said that when the tanker was lost, "we could have seen that relationship and the trust that came with it go by the wayside also. But that's not who we are as Alabamians, that's not who you are as Mobilians, and that is not who Airbus is."

Canfield said Alabama takes the long view. "We can make great things in Alabama, but we can design, manufacture and engineer them right here as well. As that's what this engineering center represents. It represents the future of Alabama's opportunities."

A year before the center opened, Site Director Dave Trent, the first Airbus Engineering Center employee, pulled together the small group to work in Wichita, Kan., while the Mobile facility was being built. Of those first 35 engineers, some are still among the more than 200 engineers in Mobile.

Trent praised employees as hard-working, dedicated, tenacious and diverse, representing 25 countries. They will come in during the wee hours to participate in conference calls with colleagues in Europe; they donate their time, money and expertise helping local children aspire for aerospace careers and have adequate school supplies. They have a shared vision.

The engineering center was the second Airbus operation in Mobile. In April 2004, as part of a strategy to build its U.S. industrial base, the company said that EADS CASA North America would establish a customer service and training facility at Mobile Regional Airport to support Coast Guard's HC-144 (CN235) aircraft. The 13,000 square-foot facility became operational in April 2005.

That was followed in June 2005 with the announcement that EADS North America had chosen Mobile's Brookley Complex, now called Mobile Aeroplex at Brookley, to build tankers if it won the Air Force contract. The decision to build the engineering center followed.

The Air Force contract was lost, but Mobile ended up getting the A320 series assembly line, arguably a better deal in the long term.

The three operations combined have about 650 workers. Airbus Military at Mobile Regional became the world-wide support center for the C-212 in April 2015. The engineering center works on all aircraft cabins and the assembly line has delivered 20 jetliners, and gearing up to build four jetliners a month by the end of this year.

Allan McArtor, chairman and CEO of Airbus Group, who said Mobile feels like home, said Airbus chose Alabama "because it was the best environment we could find."

He said the company prides itself on global thinking and agility, and he thinks the company is well positioned for the future.

"We knew by us coming here and setting up shop that we would be, in essence, an economic magnet. We've got over 30 suppliers now that are coming to Mobile and setting up shop. We knew there was going to be a halo effect, our engineering center and our manufacturing facility, it's all happening," he said after the celebration.

"Where's that going to go? I have no idea but it's going to grow this community; it's going to have a multiplier effect, a positive effect on real estate on schools, on downtown development. We're just happy it's all come together and being able to be a part of it," said McArtor, who as chairman of Airbus Americas oversees the operations, activities and strategy of all Airbus Group companies in the United States, Canada and Latin America.

And with a new administration in Washington?

"You've got to admit, it looks like a pretty brilliant decision to come here. Here we've invested in the United States, we've created high-tech, high-paying jobs in the United States, we build helicopters here, we build airplanes here, we have engineering here, we train pilots here in the United States, this is a very Trumpian theme, and so, in retrospect, this is exactly what the Trump administration wants; wants to create jobs, increase the economy and that's just what we're helping to do."

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Technology transfer

The technology goldmine in our midst

Stennis Space Center is just one of the technology goldmines in the region, and it's redesigned a part of its website to make it easier to find the technologies that can be developed for the public...

Stennis Space Center, Miss.

It is rocket science, but it's also a goldmine for anyone willing to do a little digging.

NASA's Stennis Space Center has updated its website to provide something entirely new for a visitor who clicks on the "technology" tab. With one more click, the visitor is taken to a redesigned web presence for the Stennis Advanced Technology and Technology Transfer Branch.

The hope is the new presence will be informative, useful and easy to navigate. It features a series of pages and links highlighting the technologies developed at the center. The goal is to better inform the public about the work at SSC, and, perhaps most important, help companies that might be interested in further developing the technologies or partnering with NASA on technology projects.

That, ultimately, can mean big bucks.

"We did not want to overwhelm people with a lot of information but let them know what is happening and how they can contact us to learn more," said Duane Armstrong, who leads the Stennis technology branch.

"That's the goal, to make it easy for people to learn about the work here at Stennis and to get whatever additional information they need."

Stennis Space Center is NASA's largest rocket engine test complex. It has hundreds of scientists and technicians working in fields as varied as rocket propulsion, geospatial technologies and underwater research. It also has universities from two states and workers for some of the biggest companies in aerospace. On top of that, it has one of the world's largest supercomputers and the largest concentration of oceanographers in the world.

Stennis Space Center (SSC) dates to the 1960s, when it was created to test rocket engines for NASA. The 14,000-acre SSC is surrounded by a 125,000-acre acoustic buffer zone. Over time it expanded and other federal agencies set up operations.

The largest tenant is the Navy, which operates its oceanographic research community from SSC. It's also the location of the National Data Buoy Center, NASA Shared Services Center, data centers and more. But the core NASA mission remains, and today it's heavily involved in the Space Launch Systems program. But a big part of NASA's history is ensuring its work eventually gets to the public through spinoffs.

Spinoffs are commercialized products incorporating NASA technologies or expertise. According to NASA, more than 2,000 technologies with origins in space and aeronautic missions have helped the world. NASA employees report more than 1,600 new inventions each year. It can mean big dollars for private companies.

"Every dollar spent on technology for space missions is a dollar spent on Earth, benefiting the economy," said former NASA Administrator Charles Bolden in the foreword of *Spinoff 2017*, an annual that highlights the work.

"But the agency also makes sure these innovations go beyond their orig-

inal uses to benefit the public as widely as possible."

He went on to write, "NASA technologies can be found in your mobile devices, in self-driving tractors that work the fields, and in the latest 3D printers used by makers and hackers. They are making brain surgery safer and spotting rainforest fires before they spread. Spinoffs are even more diverse than the broad array of NASA missions they come from."

Technology transfer can involve a product that incorporates NASA technology or expertise that benefits the public, including those designed for NASA use and then commercialized.

Others are developed as a result of a NASA-funded agreement or know-how gained during collaboration with NASA. Some products are developed through Small Business Innovation Research or Small Business Technology Transfer contracts with NASA.

There are also companies that incorporate NASA technology in their manufacturing process or receive significant contributions in design or testing from NASA laboratory personnel or facilities.

There are also successful entrepreneurial endeavors by ex-NASA employees whose technical expertise was developed while employed at the agency. Some are commercialized as a result of a NASA patent license or waiver, or developed using data or software made available by NASA.

One of the technologies that was developed at SSC is the High Dynamic Range Stereo X, or HiDyRS-X, a high-speed camera that can capture never before seen detail from rocket engine tests. It was developed as part of SSC's rocket testing program. It was featured in the October 2016 edition of the *Gulf Coast Aerospace Newsletter*.

NASA has been using high-speed video to record rocket test firings and launches since the early days of the space program. But they could not capture the extremely bright exhaust alongside the relatively dark test structures without washing out the plume.

Today, while NASA is developing the Space Launch System, the most powerful rocket ever designed, testing is underway on a ground-breaking camera system that can capture multiple properly exposed images at the same time and play them back in slow motion. Its being developed through a partnership between NASA and Innovative Imaging and Research (I2R) Corp., founded in 2007.

I2R specializes in remote sensing, geospatial and optics-based products and services to industry and government customers. It has been working on different varieties of high dynamic range imaging for several years. The new technology captures light and dark images simultaneously without being saturated.

> *"We did not want to overwhelm people with a lot of information but let them know what is happening and how they can contact us to learn more."*
>
> -Duane Armstrong

While the application for NASA is quite clear, there also are possible practical applications for drivers when bright sunlight interferes with the backup camera or boat operators when bright sunlight impairs their vision.

The revamped site's home page features news, a looping slide show highlighting the branch and tabs to specific pages on technology development, technology transfer, technology-related events and contact information. Once accessed, the pages highlight a variety of areas.

One features a link to electronic copies of NASA's annual *Spinoff* publication, which highlights dozens of technologies developed at the agency, then introduced for use into the larger world. For each year, links provide information for the individual Stennis-related technologies included in the annual publication. All Stennis-related technologies in *Spinoff* issues dating back to the start of the publication are highlighted on the site.

The latest edition of *Spinoff* highlights 50 different companies that are using NASA technologies for products and services in every sector of the economy, including the world's most widely used digital image sensor, which traces back to a NASA scientist who wanted to miniaturize cameras for interplanetary travel.

The edition also highlights self-driving tractors. Beginning in the 1990s, NASA researchers developed software capable of correcting for GPS signal errors, enabling accuracy to within inches. The technology was acquired by John Deere and used to develop the world's first widely used self-driving farm equipment.

Spinoff 2017 also includes a section, Spinoffs of Tomorrow, that highlights 20 technologies ripe for commercialization, including a new wing design that could make airplanes more efficient.

Another page identifies the six areas of technology development work. A scroll-down menu offers examples of the work, as well as information on current technology projects and cooperative agreement policy. Additional pages provide information on Stennis technologies currently patented, licensing options, NASA's Technology Transfer University efforts to bring real-world technologies into the classroom, scheduled technology events the Stennis office is attending and electronic links to request information or a copy of the NASA *Spinoff* publication.

Although the site is active, work is continuing to improve the experience for visitors.

- Staff report

Technology Development and Transfer

Economic development

Santa Rosa County's pitch to aerospace

Sitting in the middle of a highly active aerospace neighborhood, Santa Rosa County launches a program pointing out why it's a good choice as a home for aviation-focused companies...

Milton, Fla.

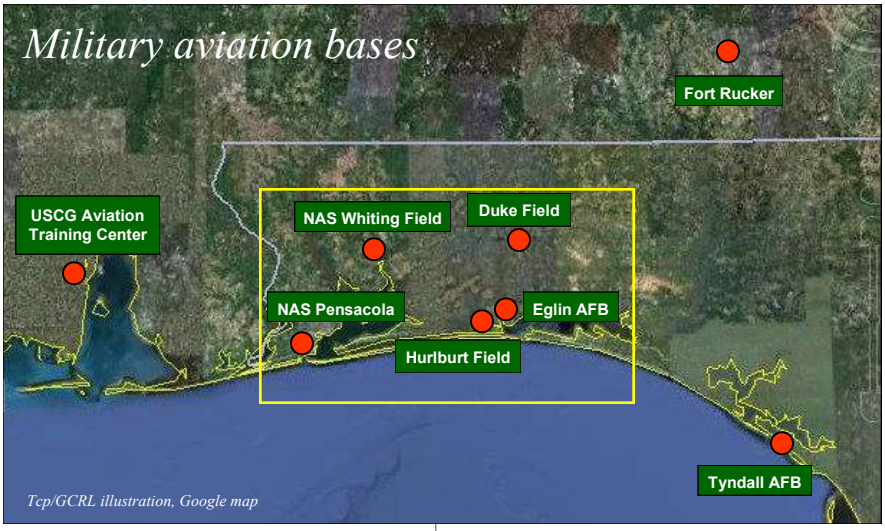
Orange and white Navy planes and helicopters are a common sight in Northwest Florida's Santa Rosa County. Indeed, it's home to one of the most active naval aviation bases in the world.

On top of that's, it's right in the middle of a three-county neighborhood with five aviation-focused military bases and two commercial airports, and centrally located between five aircraft manufacturers in the Southeast.

With hundreds of defense contractors, land available for development and a sizeable workforce, the county's economic development office is making a push to get the world out that Santa Rosa County is at the "heart of a growing aerospace cluster."

It's doing so in part through a new brochure, and eventually a special section on its website that will highlight aerospace and aviation in the county.

Shannon Ogletree, executive director of the Santa Rosa County Economic Development, said the outreach is designed "to increase awareness of Santa Rosa County and the region." He said he hopes people "will see our locations and our area as a good place for doing business."



Military footprint

Santa Rosa County is to the east of Escambia County and west of Okaloosa County in the western Panhandle. Santa Rosa County along with neighbor Escambia County make up the Pensacola-Ferry Pass-Brent Metropolitan Statistical Area. The MSA is one of the Navy's most active training areas where pilots, flight officers and aviation maintenance personnel are trained at Naval Air Station Whiting Field and Naval Air Station Pensacola, home of the Naval Air Technical Training Center, the Navy's largest. It graduates 15,000 students a year.

The military jewel for Santa Rosa County is NAS Whiting Field, just north of the county seat of Milton. The 4,700-acre air station is west of Blackwater River State Forest in a sparsely populated area of Santa Rosa County. Across the state line in Alabama is Conecuh National Forest.

Whiting Field, one of the Navy's two primary pilot training bases, provides services and material support for the training of U.S. Navy, Marine Corps, Air Force, Coast Guard and international student aviators. With two separate primary fields and 13 outlying fields, it trains 1,200 students every year and is the busiest air station in the world with 1.5 million flight operations and over 160,000 annual flight hours, 14 percent of the Navy's total.

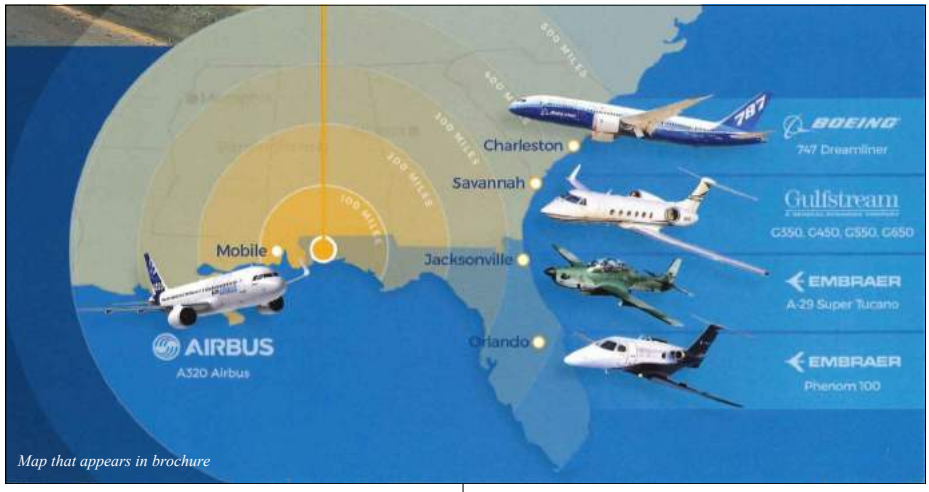
The county values the base so much, it has an Encroachment Partnering Program with the base, county and state. More than 3,000 acres have been buffered/conserved around Whiting to protect its mission.

The replacement value of the Whiting is considerable, according to the Department of Defense fiscal year 2015 base structure report. NAS Whiting has a plant replacement value of $708.2 million. To the west, NAS Pensacola has a plant replacement value of $2.57 billion. In addition, the Navy's Corry Station in Pensacola, which trains information warfare personnel, has a replacement value of $813.8 million.

The MSA's bases are close to three other aviation bases. Neighboring Okaloosa County has R&D powerhouse Eglin Air Force Base, which also trains F-35 pilots and maintainers, Hurlburt Field, home of Air Force Special Operations Command, and Duke Field.

Beyond those are Tyndall Air Force Base, which trains F-22 pilots, and the U.S. Coast Guard Aviation Training Center in Mobile, Ala. Also in the region is Fort Rucker, where Army aviators train.

Not surprisingly, there are a lot of contractors in the area who do work for the military here and elsewhere. In 2015, Santa Rosa County had 200 defense contractors who won 124 contracts that year valued at $14.5 million. Between 2000 and 2015, contractors in the county were awarded 1,491 contracts valued at some $353 million.



Map that appears in brochure

In good company

Santa Rosa County and its neighbors are highly active in a state that is a hot spot for defense. And the military impact goes beyond aviation.

Florida's $52 billion military and defense-related industries are the state's third top economic sector. It tops the list in Santa Rosa County, according to the brochure.

In fiscal year 2015, Florida was ranked No. 5 in the nation in defense spending at $17.6 billion, 2 percent of the state GDP and 4.3 percent of the total U.S. defense spending.

Okaloosa, Escambia and Santa Rosa counties were all in the top 10 counties in the state for defense spending in 2015. Okaloosa County accounted for $1.7 billion (3rd), Escambia accounted for $1.5 billion (6th) while Santa Rosa accounted for $459.7 million (10th).

Florida has a total DoD payroll of $6.6 billion and 126,292 personnel. Of those, Escambia County is second in the state in with 19,900, Okaloosa County third with 14,048, and Santa Rosa County fifth with 7,466.

And it's clear many of the former military opt to stay in the region. According to the brochure, about 34,000 military retirees and a wealth of civilian DoD contractors provide a unique workforce ideal for aerospace, defense and information technology. The number of military retirees grows by roughly 2,400 each year.

Santa Rosa County boasts a workforce of over 70,000 people. Half of those people travel to jobs away from their homes, outside the county.

From high school forward, aviation-specific education programs are in place across the region, including the University of Florida Research and Education Engineering Facility near Eglin Air Force Base.

Other aviation

PricwaterhouseCoopers for two consecutive years ranked Florida best in the nation for attractiveness to aerospace manufacturers, and No. 2 in the 2016 survey. Florida is one of the most dynamic of a broader trend bringing aerospace to the Southeast.

Santa Rosa County is using that to its advantage. The brochure points out that it's located centrally for five aircraft manufacturers: Airbus in Mobile, Ala.; Embraer in Jacksonville and Melbourne, Fla.; Gulfstream in Savannah, Ga.; and Boeing in Charleston, S.C.

In Santa Rosa County, qualified aviation and aerospace manufacturing companies can receive Incumbent Worker Training (IWT) Grant funding. Incentive programs also are in place for companies purchasing lands owned by Santa Rosa County.

Santa Rosa County has three shovel-ready Certified Florida First Sites: Santa Rosa Industrial Park East, Vic's of Navarre, and Northwest Florida Industrial Part at I-10.

In addition, the aerospace-specific property at Whiting Aviation Park has limited access to Navy runways at Whiting for testing and development opportunities.

Transportation

Transportation infrastructure includes two commercial airports. To the west is Pensacola International Airport, the busiest commercial airport in Northwest Florida, and to the east Destin-Fort Walton Beach Airport.

Santa Rosa County's public use airport, Peter Prince Field, is located south of NAS Whiting Field.

Interstate 10, U.S. 98, and U.S. 90, major east-west highways, run through the county, which also has access to CSX rail and the Port of Pensacola, a designated foreign trade zone.

And on top of all that, the county is known as a vacation hot spot. Not bad.

- David Tortorano

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To receive a copy of the brochure, contact Shannon Ogletree at the Santa Rosa County Economic Development office, or call 850-623-0174.

Analysis

F-35 shows worth; UTC a best plant

Since the last newsletter in December, the biggest news has been - and will continue to be - the early stages of the new administration of businessman and reality show host Donald J. Trump.

As we wrote in the December issue, Trump's desire to build the nation's defense is, on the surface, good for the aerospace corridor. But we still have to see how that pans out.

David Tortorano

So far, the biggest impact on this region has been the federal hiring freeze. It doesn't impact military personnel, but it does impact civilian government workers. Many vacant positions will remain so for the short term.

But there were significant aerospace stories since December in space, military and commercial aerospace fields.

Nature's wrath

The rough weather that hit the Gulf Coast in early February damaged the Michoud Assembly Facility in East New Orleans. But NASA said the tornado did no damage to critical space hardware being built there. All of Michoud's 3,500 employees were accounted for, with five suffering injuries. 200 cars also were damaged.

NASA uses Michoud to support assembly of the Orion crew vehicle and the core stage of the Space Launch System, and one of the buildings damaged was the main assembly building.

Later reports said emergency crews were continuing to assess damage and reported that 40 to 50 percent of all Michoud's buildings suffered some kind of damage. One key area of interest is the Vertical Assembly Center, used to weld components of the SLS.

NASA's first space shuttle external tank was destroyed in the storm. The external tank-ground vibration test article was in outdoor storage at the facility. There were reports the tank was sent flying and destroyed.

We still don't know how the Trump administration will impact the space program, other than to say he does like deep space exploration. But whether that means SLS we don't know.

In a related matter, we reported in early January that the first fully-welded Space Launch System core stage propellant tank was moved to its proof testing facility at MAF to prepare for the first set of tests.

The liquid hydrogen (LH2) qualification tank will be a pathfinder for core stage prime contractor Boeing and NASA to begin validating the newly-assembled core stage hardware, along with the facilities, testing procedures, and analytical models that will help qualify the design and development of the stage for its first flight.

The LH2 qualification tank was rolled from the Final Assembly area of Building 103 to Building 451, a test facility at MAF away from the main assembly area, on Dec. 10.

In another SLS-related milestone, NASA engineers have completed construction of a test stand 4693, NASA's largest SLS test stand, at Marshall Space Flight Center in Huntsville, Ala. The stand will be used to ensure SLS's liquid hydrogen tank can withstand the extreme forces of launch and ascent.

SLS and Orion will be used on deep-space exploration missions.

One of the best

A round of applause, please.

UTC Aerospace Systems' facility in Foley, Ala., is one of *Industry Week* magazine's 2016 Best Plants winners. It has about 600 people who assemble nacelle components and oversee integration of propulsion systems for A320s, including those built in Mobile.

The site also will support other new aircraft platforms including the Bombardier C Series, the Embraer E2 and the Mitsubishi Regional Jet. The OE manufacturing facility is about 230,000 square feet, but later this year an 80,000-square-foot expansion now under construction will open. It will house engine integration activities.

The OE facility is co-located with the Alabama Service Center, a 210,000-square-foot maintenance, repair and overhaul facility for nacelle systems that serves customers in the Americas, and employs about 200 people. The UTC operation is Baldwin County's largest manufacturing employer.

We had a story about UTC's Foley operation and its work with Mobile's Airbus in the April 2016 issue of the *Gulf Coast Reporters' League Business Quarterly*. The magazine is on hiatus for now, but you can find the story here.

Mobile 'neo', and kudos

The A320 series assembly facility at Mobile Aeroplex will be working on new engine option jetliners by the end of the year. Even before that, around mid-year, the Airbus plant in Tianjin, China, will be assembling A320neo passenger jets. A320neo jetliners are already being assembled at the Airbus plants in Toulouse, France, and in Hamburg, Germany.

The designation "neo" stands for new engine option, a more fuel-efficient engine, to distinguish the planes from the current engine option aircraft. The A320 is the most popular single-aisle plane in the world.

The plant in Mobile delivered its first jetliner, an A321 for JetBlue, in 2016. So far 20 jetliners have been delivered to airline customers, three of them this year. Customer, in addition to JetBlue, include American, Spirit and Delta.

"We are well on our way to reaching rate four by the end of this year," said Kristi Tucker of Airbus in Mobile.

On the kudos front, the Mobile facility, officially called the U.S. Manufacturing Facility, has achieved LEED certification from the U.S. Green Building Council.

LEED (Leadership in Energy and Environmental Design) is awarded for the design, construction and operation of high-performance green buildings. Five buildings received LEED Silver status: main gate, delivery center, logistics center/service/final assembly line hangar, final phase/flightline hangar and transshipment hangar.

Some of the green design and construction features at the campus include energy-saving LED lighting and the use of recycled building materials.

One that got away

In late January announcements by Raytheon and Leonardo to end the pursuit of the U.S. Air Force's T-X trainer competition. That was a bit of bad news for Mississippi.

Raytheon in October 2016 chose a 130-acre site near the airport in Meridian, Miss., as the final assembly facility.

The companies said they were "unable to reach a business agreement that is in the best interest of the U.S. Air Force." Published reports said the issue focused on where the work on the plane would actually be done.

After the split with the prime contractor was announced, the Italian company said it would compete alone for the $16 billion Air Force T-X contract. It proposes using the T-100 offering, based on the M-346, in service with Italy and Israel. Leonardo's U.S. subsidiary, Leonardo DRS, will serve as prime contractor. But there's been no word on the final assembly location.

Other competitors to replace the Northrop T-38C with 350 new aircraft are Boeing/Saab with a clean-sheet design and Lockheed Martin/Korea Aerospace, offering a modified version of the T-50A.

Northrop Grumman withdrew from the competition a week after the Raytheon/Leonardo split

F-35 zaps competition

The F-35, the often-criticized, behind-schedule, expensive and still troubled program, did show its considerable stuff in the latest test of its performance.

In its first serious test, it showed that it can dominate the skies. The test was Red Flag, the Air Force's annual, weeks-long multinational shakedown of military aviation technology. It happened over the Nevada desert.

Over 110 sorties, the fleet of 13 F-35A jets posted simulated kill ratio of 15:1, according to *Aviation Week*. And the test went hard on the newcomer, even throwing in extra "enemy" F-16s.

The F-35s didn't just shoot down the enemy, but used their sensor-fusion and data link abilities to talk to other planes and help them destroy threats they wouldn't have seen on their own.

I've been a supporter of the F-35, and got a chance to look at one up close during a visit to Eglin Air Force Base, Fla., during a media tour. Yes, it's had cost overruns, delays and continuing issues, but it's in a league of its own. How it will do with the Trump administration is still up in the air, so to speak. He's been critical of its costs, and asked Boeing to price out a comparable F/A-18. I can only assume he's not talking about trying to duplicate the vertical takeoff and landing capabilities of the F-35B.

But before leaving office, then-Air Force Secretary Deborah Lee James said we need both the F-35 and the A-10. Both planes have polarized debate during her tenure. She noted that the F-35 "is a cut above anything the pilots have seen before, and we need it and we want it."

Before leaving office, then-Defense Secretary Ash Carter said all the work done to fix the F-35 program is finally paying off. Costs are coming down and the Marines and airmen beginning to operate the F-35B and F-35A say they're awed by its capabilities.

The ability of even a handful of F-35s to increase the kill-power of a squadron of legacy fighters should send a strong message to Trump.

Meanwhile, *Defense News* reports that Italy is unhappy about the share of the work it's getting on the F-35 program.

Italy is one of the partner nations in the program, and in June 2002 committed $1 billion. It plans to buy 90 fighters, and was told its work share would be about 65 percent of the investment. But Guido Crosetto, head of the association of defense firms and a former undersecretary, says it's less than 20 percent. Some in Italy think the money would be better spent on schools and healthcare.

Italy is currently turning out its own F-35s at a final assembly line in Cameri, and has built six so far. The first four flew to Luke Air Force Base, Ariz., for training and two are operational, based at Amendola Air Base.

STEM monies

Continental Motors joined with other members of the Mobile Aeroplex and Mobile Airport Authority Foundation to contribute to a STEM initiative to sponsor 36 students to attend the National Flight Academy's program in June 2017 in Pensacola, Fla.

The program at the National Museum of Naval Aviation is on a landlocked, virtual aircraft carrier. Students live aboard the carrier surrounded by advanced technologies and virtual reality missions that encourage learning. They participate in the practical uses of STEM skills. It's a great way to spark interest in STEM.

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***Page 1 mast**: Live GBU-12s are loaded on an F-35 at Eglin Air Force Base, Fla., for a live fire test in January. U.S. Air Force photo*