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Gulf Coast Aerospace Corridor's bimonthly update of aviation activities in the I-10 region



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Artist's drawings of NASA's Space Launch System, left, and Relativity's Terrain 1.

Space

The I-10 rocket region

Boeing is building the heavy-lift Space Launch System rocket in New Orleans, now Relativity will build 3D printed light launch vehicles 35 miles away at Stennis Space Center, Miss.

Stennis Space Center, Miss.

An intriguing cluster is growing along the Interstate 10 corridor between Southeast Louisiana and South Mississippi. The Stennis-Michoud corridor in the near future will be where not one but two different launch vehicles will be built – one a heavy-lift rocket for NASA, and the other a commercial light rocket.

At the Michoud Assembly Facility (MAF) in East New Orleans, Boeing is the prime contractor for the design, development, test and production of NASA's Space Launch System. Boeing workers have been building the 212-foot tall core stage in the cavernous MAF facility. When operational, the rocket will be used to launch into orbit space vehicles carrying people and cargo to the moon and Mars.

Newcomer Relativity Space of Los Angeles, in an an-

Relativity

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Relativity



Artist's illustration of SSC rocket factory.

Relativity illustration

nouncement June 11, said it will build its Terran 1 rockets at Stennis Space Center (SSC), Miss., using its patented 3D printing technology. It will create 200 jobs and make an investment of \$59 million.

Relativity said it secured an agreement with NASA and an incentive package from the Mississippi Development Authority (MDA) to expand facilities and infrastructure at SSC, where it is already testing the engine, Aeon 1.

The agreement with NASA includes exclusive use of 220,000 square feet within building 9101 at SSC for a nine-year lease. The agreement also includes an option to extend the lease for an additional 10 years.

The facility includes an 80-foot high bay, multiple bridge cranes, and extensive industrial infrastructure. Relativity's partnership with the MDA is supported by a significant cost reimbursement and tax incentive package for Relativity's employment and capital investments for advanced aerospace manufacturing and technology development in the state.

Relativity will be building out first stage assembly, engine integration and testing, and a full 3D printing and robotics-enabled production line at the site. The technologies developed through Relativity's Stennis factory site are the first step toward the company's long term vision of 3D printing the

first rocket made in Mars and expanding the human experience in space.

With this expansion at SSC, Relativity is increasing infrastructure fourfold to over 280,000 square feet of operations, production, testing, and launch facilities and is on track to reach over 350,000 square feet of space in 2019. In the past year, the company increased team size over six times from 14 to 90 employees.

"We believe this groundbreaking technology is the future of aerospace manufacturing, and we look forward to bringing this innovation to the Gulf

Coast," said Jordan Noone, CTO and co-founder of Relativity.

"This partnership will foster innovation, investment, and growth in Mississippi," said Tobias Duschl, VP of Operations at Relativity. "The integration of our 3D printing rocket production and testing facilities at one site will also enable Relativity to offer greater flexibility to commercial and government entities needing faster, more frequent, and lower cost access to space."

New kid on the block

Relativity is one of the new kids on the block. The private aerospace manufacturer was founded in 2015 by Tim Ellis and Noone. The rocket it's developing is designed for orbital launch services. Additive manufacturing is used by Relativity because it uses less tooling and human labor.

In March 2018, Relativity Space signed a 20-year lease with NASA at SSC to test engine components and eventually test full-scale Aeon 1 engines using the E-3 test stand. That was followed in January 2019 with the announcement that Relativity won a competitive bidding process with the United States Air Force to build and operate Launch Complex 16 (LC-16 at



Test of Aeon 1 rocket engine being developed by Relativity.

Relativity photo

Cape Canaveral. Plans are to launch its first rocket from the site in 2020. Relativity plans to start commercial launch service by early 2021.

Relativity has created the Stargate system, which it calls the world's largest 3D printer of metals. It's based on selective laser sintering, which uses laser beams to bond powdered metal, layer by layer. The company aims to 3D print at least 95 percent of its launchers, including the engines, by the end of 2020. The company plans to

eventually print a complete launch vehicle within 60 days.

Terran 1 is an expendable, two-stage launch vehicle. The first stage will use nine Aeon 1 engines, while the second stage will use a single, restartable Aeon 1 engine. The maximum payload will be 2,760 lb to low Earth orbit, or high-altitude payloads of 1,500 lbs.

Some 35 miles away a much bigger rocket is being built for NASA by Boeing at MAF. It will be the most powerful rocket ever built and will carry much larger payloads. It will be the

world's only super heavy rocket capable of transporting astronauts to deep space with landers, habitats and the Gateway elements.

The last of four structural test articles for SLS was loaded onto NASA's Pegasus barge at MAF on June 26 for delivery of the liquid oxygen (LOX) tank test article to NASA's Marshall Space Flight Center in Huntsville, Ala., where structural testing will be performed.

The LOX tank is one of two propellant tanks in the rocket's core stage that will produce more than 2 million

Q&A

Tobias Duschl



Tobias Duschl, vice president of operations at Relativity Space, replied to submitted question from Gulf Coast Aerospace Corridor.

Question: How long had Relativity been considering establishing a production facility at Stennis Space Center (SSC) before the June announcement? Would you be willing to tell me other areas that were considered?

Tobias Duschl: From the start, we have known that at a minimum, we'd need one large production facility to meet our short-term production goals. Eventually, we want to add production to a second site, especially as we expand our product portfolio. Stennis was in consideration as soon as we found out about the opportunity to secure an existing facility at the Stennis Space Center. The other area in close consideration for housing our production is Los Angeles, where our company headquarters are located.

Q: I know being close to the rocket engine test stands is a plus for Relativity, but what are some of the other factors that went into the decision to set up shop at SSC?

Duschl: Stennis offers several advantages for us. Since Relativity's early days, we have had a great partnership with the NASA administration and share their goals for progressing space exploration. Relativity is able to leverage valuable existing NASA infrastructure. The Mississippi Development Authority has also committed a considerable amount of

resources to help us with our expansion at Stennis, including significant cost reimbursement and tax incentive package for Relativity's employment and capital investments for advanced aerospace manufacturing and technology development in the State of Mississippi. Last but not least, Stennis has tremendous infrastructure that we are able to leverage, and there is a good talent pool for us to expand operations.

Q: You likely know that the Interstate 10 region between New Orleans and Northwest Florida has a lot of aerospace activity, including space, aircraft assembly, military aviation - including pilot training and aerial weapons development - and much more. Relativity is at the extreme west portion of this corridor. Did the presences of an aerospace/aviation cluster play any role in your decision to set up production in this region?

Duschl: Earlier this year, Relativity secured the historic Launch Complex 16 at Cape Canaveral, our first launch site. As a result, we expect a lot of traffic between our production and test sites at NASA Stennis and Cape Canaveral. It definitely helps to have so much aerospace located along this corridor, as we expand operations and headcount significantly in the coming years.

Q: Will the 3D printer be moved from California or is a new one being built at SSC, and will it fabricate all of Terran 1?

Duschl: We will be building new printers at Stennis, as we continuously expand our production capacity and progress our research and development. The printers we assemble at Stennis will be capable of printing even larger structures, which will enable us to increase the sizes of rocket components, offering greater flexibility to commercial and government entities needing faster, more frequent, and lower cost access to space.

Eventually, we will have a full rocket production line in Stennis.

Q: You are likely aware that NASA hopes to establish the 1,100-acre Enterprise Park, most of which will be outside the badging area of SSC. That sounds a lot like Exploration Park just outside Kennedy Space Center, which appears to be highly successful. Do you anticipate having a presence at the SSC's Enterprise Park at some point? Whether you do or do not, would you expect such a park would appeal to other space companies or suppliers?

Duschl: The success of such initiatives is closely tied to the available infrastructure, how well-connected the site is, and the type of talent available in the region. We feel that Stennis has a great combination of these factors, and as a result, we expect Enterprise Park to be a success. Towards our goals of running a production line and test operations at Stennis for the next 20 years (at least), we will definitely consider expanding into Enterprise Park and hope to attract suppliers there as well.

Q: Relativity thinks way outside the box. So let me look way down the road and ask you to go out on a limb. What do you think you may be building at SSC 10 years from now, or even 20.

Duschl: Relativity is developing the first and only aerospace platform to integrate machine learning, software, and robotics with metal 3D printing technology to build and launch rockets in days instead of years. At this time, we are applying our 3D printing technology to rockets, with a vision of building and launching a rocket on Mars. There is potential to expand our platform to build other aerospace structures.

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pounds of thrust to help send Artemis 1, the first flight of NASA's Orion spacecraft and SLS, to the Moon.

The nearly 70-foot-long test article is structurally identical to the flight version that is being built.

SLS is being developed to send astronauts into deep space.

While the combination of Boeing's SLS and Relativity's Terran 1 does not put the Stennis-Michoud cluster on a level with some of the better-known centers that produce space vehicles, it's

nonetheless an important indication of possible future growth for the Southeast Louisiana-Southwest Mississippi portion of the Interstate 10 corridor.

- David Tortorano

Major centers for spacecraft production in the U.S.

Not many places in the United States can lay claim to building rockets designed to send space vehicles into orbit or deep space. Nor are there that many places where the propulsion systems are built. In the United States, there are multiple areas that stand out as centers for space activities. The following are some key production centers.

Los Angeles-Hawthorne, Calif. – Hawthorne is Southwest of Los Angeles and headquarters for SpaceX as well as its rocket factory, which builds the Falcon 9 and the Dragon space capsule. It plans to open a new factory in San Pedro, a community within Los Angeles, to build the BFR. It also has a site at Port Canaveral, Fla., to store and refurbish previously used Falcon 9 rockets. The Los Angeles area has one of the largest concentrations of aerospace headquarters, facilities and subsidiaries in the nation, including Boeing, Raytheon, Lockheed Martin and Northrop Grumman. It's also home to NASA's Jet Propulsion Lab and the Air Force Space and Missile Systems Center.

Kennedy Space Center, Fla. – Located along the East Coast of Florida, Kennedy Space Center is in Cape Canaveral on Merritt Island is NASA's internationally known launch site that's now heavily involved in commercial space production. Boeing, Blue Origin, SpaceX, OneWeb, Lockheed Martin, Relativity, United Launch Alliance, Airbus, RUAG Space, and Firefly all have or soon will have a presence on the Space Coast, much of it in Exploration Park, just outside the KSC badging area. Blue Origin New Glenn rocket production facility (first stages, second stages, payload fairings), OneWeb's satellites plant and Firefly's production facility for Alpha 2.0 launch vehicle are all in Exploration Park. RUAG Space, which will build aerospace structures for Firefly and others, is in

Titusville. Boeing is moving its space and launch headquarters to Titusville. Blue Origin has leased Launch Complex 36 in Cape Canaveral to build a launch pad for its orbital launch vehicle New Glenn. It will also have a test stand for the BE-4, and a reusable booster refurbishment facility for New Glenn.

Huntsville-Decatur, Ala. – These two cities are in North Alabama. Huntsville is home to NASA's Marshall Space Flight Center and the Army's Missile Command. It's home of NASA's propulsion office, and in more recent years has been involved in production. Blue Origin plans to build its cryogenic rocket engine, BE-4, at a facility here, and will also build a variant of the BE-3. The BE-4, chosen by ULA for the Vulcan Centaur, which will be tested at MSFC. To the west in Decatur, is 1.6 million square-foot United Launch Alliance production facility for Atlas V, Delta IV and Vulcan Centaur.

Chandler-Gilbert-Mesa, Ariz. – Southeast of Phoenix in an area called "the Valley" are three major Orbital ATK facilities: the launch systems group (Chandler), space systems group (Gilbert) and defense systems group (Mesa). The 47-acre Chandler campus provides launch vehicles for commercial, civil and government customers, and it will build Orbital's new heavyweight rocket, Omega. Satellites have been built in Gilbert since 2004. Orbital is now a part of Northrop Grumman.

Iuka, Miss. – In northeast Mississippi not far from the Mississippi-Alabama state line Orbital ATK (now part of Northrop Grumman) builds composite rocket structures for its own line of rockets as well as large composite structures for United Launch Alliance's Atlas V and Delta IV rockets. Orbital merged with ATK (Alliant Techsystems, which acquired

Thiokol in 2001), before it became part of Northrop Grumman.

New Orleans, La. – In East New Orleans is NASA's massive Michoud Assembly Facility, which has been responsible for building large space craft structures for NASA's prime contractors since the early days of the space program. Boeing is building the core stage for NASA's Space Launch System, and Lockheed Martin builds Orion at Michoud.

McGregor, Texas – This city in Central Texas, west southwest of Waco and roughly midway between Austin and Fort Worth, is the rocket engine test facility for SpaceX, which leases more than 4,000 acres on McGregor's outskirts. The location is SpaceX's third largest in terms of employment. As of the end of 2017, SpaceX has use of three leased orbital launch sites: Launch Complex 39A at Kennedy Space Center, Space Launch Complex 40 at Cape Canaveral Air Force Station, both in Florida, and Space Launch Complex 4E at Vandenberg Air Force Base, Calif. SpaceX is also building a commercial-only launch facility near Brownsville, Texas.

Promontory, Utah – Promontory, known historically as the location of Promontory Summit, where the first transcontinental railroad was completed, is 66 miles northwest of Salt Lake City. It is the home of Orbital ATK (Northrop Grumman) Propulsion Systems Division, which manufactures the five segment solid rocket boosters for NASA's Space Launch System. It has more than 2.5 million square feet of production, administration and test facilities. It also works on non-space products for the U.S. military.

- Ted Kordecki, research associate



Airbus A220 employee in Mobile, Ala., gets to work on a new jetliner that is destined for Delta Air Lines.

Airbus photo

First A220 and its unique assembly path

The first Airbus A220 jetliner built in the United States, an A220-300, will be delivered to Delta Air Lines in the third quarter of 2020.

Mobile, Ala.

The first A220 jetliner being built in the United States will have an interesting path to completion. While initial assembly is being done in the A320 building, by the time it's fully assembled it will roll out of a new A220 building.

The first Mobile-made A220, an A220-300 passenger jet that will be delivered to Delta Air Lines in the third quarter of 2020, will have this unusual background because Airbus began production of the jetliner in ear-

ly August before completion of the A220 production facilities.

The first team of A220 employees began work at Airbus' Mobile, Alabama-based production facility following their return from on-the-job training in Mirabel, Quebec, Canada, where the A220 program and primary final assembly line are located.

"The expansion of our commercial aircraft production in Mobile to a second product line, with 400 additional jobs to support it, further solidifies Airbus' standing as a truly global aircraft manufacturer, and confirms without a doubt that Airbus is an important part of America's manufacturing landscape," said Airbus Americas Chairman & CEO C. Jeffrey Knittel.

"With Mobile, and our production network in Asia, Canada and Europe, we have strategically created a worldwide industrial base to better serve our

customers."

"We're extremely excited to start with the new team and the growth that we have on site. I think that's a key message that needs to go across," said Paul Gaskell, head of the A220 FAL (final assembly line) project and A220 Operations Mobile. "We've only been operational three, four years and already we're doubling in size. That's just an unbelievable story."

The first plane

The first A220 being built in Mobile has an unusual assembly method. Airbus is producing the first few aircraft within some current A320 aircraft buildings, as well as the newly-built support hangars.

The first step in the process, the fuselage work, is being done by A220 workers at an A220 station right next to the A320 station in the A320 final

assembly line building.

"We started several months ago installing the station tooling for the A220 next door to our A320," said Gaskell during a July 26 phone interview. He said it's the only A220 station in the A320 FAL.

"We're starting production in already existing facilities for the first station so we're building along side our A320 line, and the follow-on stations are being assembled right now and are very close to completion," Gaskell said in late July.

"What we have, certainly in the fuselage station, we have room to put another fuselage station next to it. So that's what we're doing in the 320 FAL, so we're building the fuselages next to each other, and then once we start putting the wings on etc., that is what we're doing in the new flight line hangars that are basically almost complete," he said.

All the workers putting together the plane are A220 workers. Many of them are new hires, and some transferred over from the A320 line. Most of the workers have been up to Mirabel for on-the-job-training.

The first plane will be finished by the second or third quarter of 2020. This plane is taking longer to build than subsequent ones, but by the middle of the next decade, the Mobile A220 operation will produce between 40 and 50 A220 aircraft per year, Gaskell said.

"It sounds an awful long time but you have to remember it's all brand new tooling ... they're brand new people that had a learning curve so we expect normally to take four or five times longer than we would when we're at full rate."

Daryl Taylor, Vice President and General Manager of the Airbus U.S. Manufacturing Facility, said Aug. 14 that the original A320 facility had room for growth, according to al.com.

"The capacity that is in here in the facility, the existing organization, has allowed us to start the 220 at a faster pace than we did the 320," Taylor said.



Airbus campus in Mobile, Ala.

Airbus photo

"And also very clearly it's permanent tooling, it's permanent methods, it's just in temporary locations. It's not a temporary way to build the aircraft. That's a key factor."

Second line

Airbus announced plans for the addition of A220 manufacturing in Mobile in October 2017. Construction on the main A220 hangar and other support buildings for the new A220 began at the Mobile Aeroplex at Brookley at the beginning of this year.

The first large aircraft components for the first A220 were delivered in June to the Airbus U.S. Manufacturing Facility. The major component assemblies (MCAs) are the aft fuselage and cockpit, which arrived by truck.

"With the arrival of these assemblies, A220 production in Mobile will shortly become a reality," Gaskell said at the time. "The arrival of these MCAs is taking place almost four years to the day from when our first A320 MCAs arrived. It's amazing to see how much we've grown over that time, and an exciting time for Airbus, Mobile and Alabama."

Wings, vertical and horizontal tail planes, tail cones and landing gear arrived later.

Hiring for A220 and A320 production is continuing. Part of that effort

involves sending Airbus officials to areas with high levels of aerospace personnel to lure them to Mobile.

In November 2018, Airbus named HPM as its program manager for planning, design and construction of its new A220 assembly line. HPM also was responsible for the expansion of Airbus' current facilities to accommodate the expected increase in A320 series production.

HPM, with offices in Birmingham, Huntsville, Auburn and Mobile, Ala., Atlanta, Dallas and Tampa, worked with Airbus in Mobile more than a decade ago with the Airbus Engineering Center. It was also program manager for the A320 series production facility, which was completed in 2015.

Airbus and its 12,000th

In May 2019, Airbus marked the delivery of the 12,000th aircraft in its 50-year history. The A220-100, assembled in Mirabel, Canada, was delivered to U.S.-based Delta Air Lines. It was the 12th A220 delivered to Delta since the carrier received its first A220 in October 2018.

The A220 started scheduled service with Delta in February 2019. Delta is the first U.S. airline to operate the A220 and the largest A220 customer, with a firm order for 90 aircraft.

Since Airbus and Bombardier final-

ized an arrangement for Airbus to lead the A220 program July 1, 2018, ground was broken in January 2019 in Mobile, Ala., for the construction of a second A220 final assembly line..

Airbus delivered its first aircraft, an A300B2 to Air France, in 1974. In 2010, Airbus handed over its 6,000th aircraft, 36 years after its first. It took Airbus nine years to double that number, reaching 12,000th Airbus aircraft delivery.

Airbus Canada Limited Partnership marked its first anniversary on July 1, 2019, one year after Airbus became the majority partner in the A220 aircraft program. Highlights of this first anniversary include orders and commitments signed for more than 230 A220s, the ground-breaking for a new A220 manufacturing facility in Mobile, and expansion at the Mirabel facility.

Airbus Canada has delivered more aircraft in its first year than the total delivered up to July 1, 2018, when it took the lead of the program. In total, the A220 ends the first year of Airbus leading the program with a firm order book of over 500 aircraft, plus 80 additional commitments announced at this year's Paris Air Show. In 2019, Airbus is also celebrating the 35th anniversary of its presence in Canada.

Delta ups orders

In June at Le Bourget, France, Delta ordered five additional A220-100 aircraft, bringing to 95 the total number



First sections arrive by truck in June 2019 to Mobile plant.

Airbus photo

of orders placed, including both the A220-100s and A220-300s.

The airline is the first to select the new increased maximum takeoff weight option for its entire fleet from 2020. Airbus announced in May that it would increase the maximum takeoff weight (MTOW) for the A220. The new MTOW will increase the maximum range capabilities.

Delta placed an initial order for 75 of the A220 jetliners in 2016 and booked an additional 15 in December 2018. With this latest order, Delta's orders total 45 A220-100s and 50 A220-300s.

Delta's A220-100s are produced in Mirabel, Québec, Canada, while the

A220-300s will be built at a new U.S. assembly plant being built in the Alabama port city. The A220 assembly line is adjacent to the existing Airbus A320 assembly facility.

Airbus is a global leader in aeronautics, space and related services. In 2018 it generated revenues of \$71 billion and employed a workforce of around 134,000. Airbus offers a range of passenger airliners, tanker, combat, transport and mission aircraft, civil and military helicopters and is one of the world's leading space companies.

- David Tortorano

Airbus executive has a homecoming of sorts

One of Airbus' top global executives, Chief Operations Officer Michael Schoellhorn, said he liked what he saw on his first visit to the company's manufacturing operation in Mobile, Ala.

Schoellhorn, a German, was announced as COO in February. He was in Mobile Aug. 14 to look at the U.S. manufacturing facility and said that his visit to Alabama was "some sort of a homecoming as well."

In the 1980s, while serving in the German military, he spent about a year stationed at Fort Rucker in Southeast Alabama, training as a helicopter pilot. Speaking to media on Wednesday in Mobile, he said that experience had given him a lasting appreciation for the American South, leading him to spend part of his career with Bosch in Charleston, S.C.

"I met with people today and walked the shop floor," Schoellhorn said. "I am extremely excited to see our guys here and what they

have accomplished in only four years. They have a really can-do attitude." He said that pushing ahead with A220 assembly and site construction simultaneously did create challenges, but it also provided a business advantage.

"Yes, it's temporary in nature," he said of the arrangement. "It has enabled us to also win business by being able to ship to our U.S. customers as early as they wanted. It is something that I think was well mapped out, but by the same token it's not the final setup."

Airbus officials said that the Mobile plant now directly employs about 800 people, not counting employees of other companies who work on-site in support roles. That 800 is expected to grow to around 1,100 by the end of the year and could hit 1,500 in a few years when both assembly lines are running at capacity.

- Condensed from al.com, Aug. 14, 2019

Analysis

The ups and downs of a major project

The news from Tallahassee in June was discouraging for people in Pensacola.

Gov. Ron DeSantis vetoed \$131 million of proposed spending from this year's budget, including \$1.5 million for the expansion of the ST Aerospace maintenance, repair and overhaul campus at Pensacola International Airport.

ST Engineering already has one hangar at the airport, but the \$210 million project will add three additional hangars and supporting buildings.

Pensacola City Administrator Chris Holley said the state has been helpful with the project, and it's hard to be critical of a veto over \$1.5 million when the state came up with money from the Department of Transportation a few months back to move the project forward.

Holley said the project, expected to create 1,300 jobs, has a five-year time frame for build-out, enough time he said to go back to the Legislature.

Then came some good news. In July the U.S. Department of Commerce Economic Development Administration opted to invest \$12.25 million in the city of Pensacola to help establish a new aircraft maintenance training facility at the airport.

The money will be matched by more than \$36 million in local and state funds. The new facility, a 175,000 square foot hangar, will be used for commercial and technological aviation and will create 400 jobs.

ST Engineering said the new facility

will have state of the art technology including robotic delivery systems. The building will be able to withstand winds of 170 mph.

Mayor Grover Robinson it's all part of "Project Titan," which will eventually include four hangars - the one already operating, the one announced for training and two more.

The new hangar will be similar to the first, but a significant difference will be the attachment of a 65,000 square-foot support services center.

"The Support Services Center will enclose all of our customer reps' offices; it will have our engineering areas, it will have our procurement, our logistics management will be there," said Bill Hafner, president of ST Engineering in Mobile, Ala.

With a project this big, there will be plenty of bumps along the way. But if anything, those who have pushed for this project have been persistent.

Research

The Florida Institute for Human and Machine Cognition (IHMC) and Andrews Research and Education Foundation (AREF) in June announced they are partnering on research projects.

They signed an agreement to collaborate on human-performance research. IHMC and AREF will share office and lab spaces at their Pensacola and Gulf Breeze facilities.

The scientists and doctors will collaborate on research into area ranging from optimizing physical and cognitive performance to developing technologies aimed at helping high-performing humans like professional athletes, astronauts and fighter pilots.

They'll work together to study ways to help human movement, vision and reaction in extreme environments. Immediate plans include IHMC and AREF personnel working together on current research projects as well as de-

veloping proposals for future projects and grants.

Space

The show will go on.

After considering canceling a planned full-duration test-firing of the Space Launch System (SLS) core stage in Mississippi ahead of the heavy-lift rocket's first flight, NASA Administrator Jim Bridenstine announced the agency will press ahead with the eight-minute test next year.

He cited safety and reliability benefits for future astronauts riding on the launcher on missions to the moon. The first SLS test flight, carrying an unpiloted Orion crew capsule to lunar orbit, is set for blastoff in 2021 from pad 39B at NASA's Kennedy Space Center in Florida.

For more than half a decade, workers at NASA's Stennis Space Center (SSC) in southern Mississippi have modified and outfitted the B-2 test stand — previously used for Saturn V, space shuttle and Delta IV rocket testing — to accommodate the 212-foot-tall, 27.6-foot-wide SLS core stage.

The mission is designated Artemis 1, the first flight in NASA's Artemis program to return astronauts to the moon as a stepping stone toward eventual expeditions to Mars. NASA has planned the so-called "green run" test of the SLS core stage since the program's genesis in 2011.

(Compiled from Gulf Coast Aerospace Corridor daily news feed from mid-June to mid-August.)



David Tortorano



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