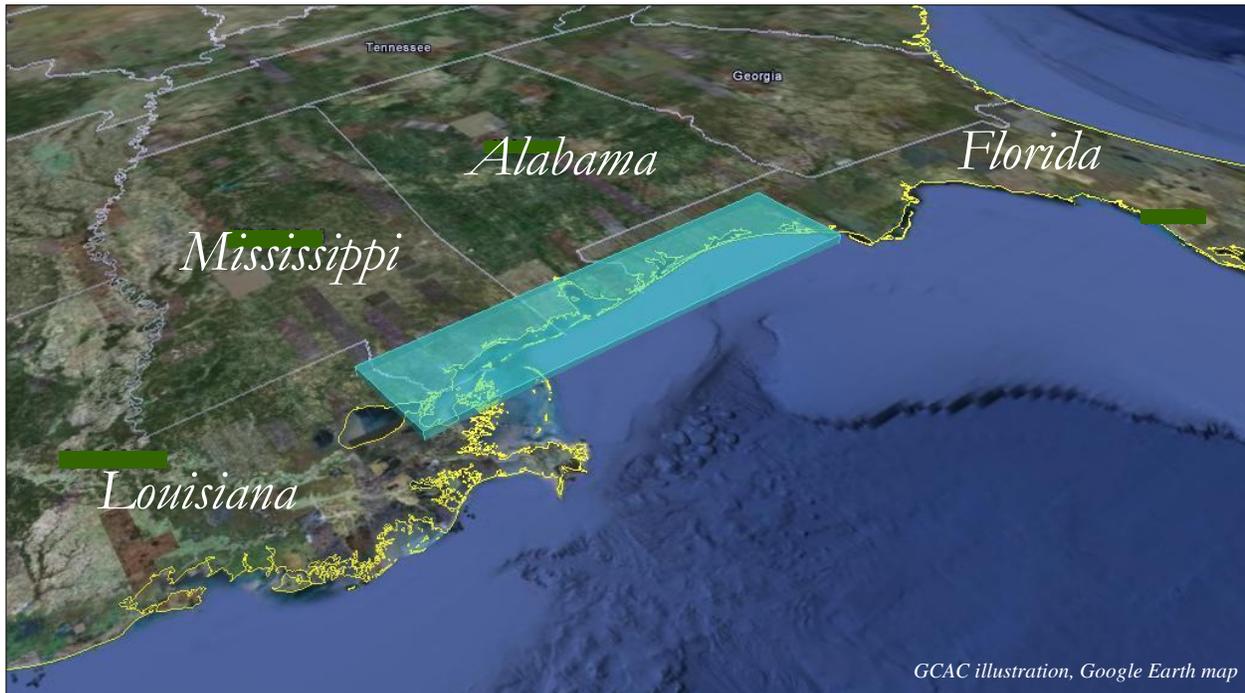


Executive summary



Footprint, training expanding

The purpose of this research and the resulting book is to provide a framework to understand aerospace and aviation activities in the region between Southeast Louisiana and Northwest Florida. And what do we mean by framework?

It's one thing to know jetliners are built in Mobile, Ala. Another to realize final assembly work on another type of aircraft is done 35 miles away in Moss Point, Miss. It's a matter of context - know what is going on in your back yard and the neighbor's back yard.

This year's edition provides additional context by looking at aerospace and aviation activities in all four states of which this region is a part. It makes it all the more clear the unique role of the Interstate 10 region, the only area where the economic interests of all four of those states come together.

U.S. aerospace & defense industry

Sales (2017)	\$865 billion
U.S. jobs (2017)	2.4 billion
Direct jobs (2017)	843,000

Source: Aerospace Industries Association, 2018 Facts & Figures, U.S. Aerospace & Defense Industry

In the two years since the last Gulf Coast Aerospace Corridor book was published in 2017, announcements and expansions have increased the aerospace and aviation footprint along the Gulf Coast Interstate 10 corridor.

Mobile began work on a second passenger jet assembly line, this one for the A220. ST Engineering Aerospace is quadrupling the size of its maintenance, repair and overhaul campus in Pensacola, Fla.

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Aerospace activities at a glance

- Rocket and jet engine testing
- Rocket engine, satellite assembly
- Piston engine assembly
- Unmanned aerial system plant
- Areas approved for unmanned flights
- Jetliner final assembly lines
- Maintenance, repair and overhaul hangars
- Military pilot, maintainer training
- Military electronics/cyber training
- Aviation specialties training
- National Guard aerial combat center
- National Guard helicopter repair depot
- Restricted land and water ranges
- Aerial weapons RDT&E
- Applied geospatial technologies
- Human-machine cognition research
- Advanced manufacturing research
- 43-acre manufacturing plant
- Aerospace/technology parks
- Technology transfer offices
- Business incubators

And in a particularly significant announcement at press time, California-based Relativity Space said it would expand its operation at Stennis Space Center (SSC), Miss., and produce 3D printed rockets there. In addition, NASA at SSC is well underway in developing a 1,100-acre technology park designed to attract aerospace tenants who do not want to go through the tight security procedures required to set up an operation inside SSC itself.

One of the most notable parts of the past two years has been the doubling down on efforts to provide education and training for those interested in the aerospace and aviation field. Airbus launched two training programs - one for high school students, another for non-students with no aerospace experience who want to work for the company.

Work is continuing on Flight Works Alabama in Mobile, a hands-on aerospace education cen-

ter that is also involved in education along with nine academic partners.

And the National Flight Academy in Pensacola, which has focused for six years on piquing the interest of students in aerospace, is now involved in workforce training.

Education leaders across the region as well as in the broader states are putting in place the tools necessary to meet the growing need for aerospace and aviation workers. It has, indeed, been a busy two years.

Economic development leaders have good reason to target aerospace. It's an economic jewel, a multibillion-dollar, research intense, innovative enterprise that produces technologically advanced aircraft, space and defense systems. It involves civilian and military activities and uses talent ranging from those who design aircraft and those who assemble them to those who fly and maintain them. Workers are highly skilled and the pay is better than average.

"The Gulf Coast aerospace corridor has all the right conditions for future growth," said Richard Aboulafia of the Teal Group. "A pro-business environment, strong political support for the industry, and great working conditions all mean good things for the future."

Neal Wade, chairman of the four-state Aerospace Alliance, takes an even broader view and sees the same thing happening throughout Alabama, Florida, Louisiana and Mississippi.

"The Gulf Coast region continues to enjoy excellent growth in aerospace projects and jobs as commercial and defense opportunities expand worldwide," he said. "As one of the largest aerospace corridors in the world, the Aerospace Alliance states are fully committed to enhancing their role in supporting such growth."

All four states have significant aerospace and defense activities, and combined they rank as the fourth largest aerospace region in the country, according to the Aerospace Alliance.

Florida is the No. 2 state in the nation for aerospace, aviation and space establishments,

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with more than 2,000 companies employing 82,000-plus workers.

Florida's best-known aerospace and aviation activity is the Space Coast, home to Kennedy Space Center, Cape Canaveral and Patrick Air Force Base. Since the earliest days of the space race this is the location where Americans ventured into space. It's also where private space companies have set up operations to leverage idled NASA facilities.

In addition to being a gateway to space, it's the air traffic hub for the western hemisphere, a center for flight training and home to aircraft and component manufacturing.

The state is No. 1 in the nation for maintenance, repair and overhaul facilities with more than 600 statewide. For aerospace manufacturing, it ranks 15th in the nation in its attractiveness, according to PwC, highest of the four states in the region.

Alabama is best known for north Alabama's Huntsville, home of the Army's Redstone Arsenal and NASA's Marshall Space Flight Center, and continues to attract operations.

According to the U.S. Department of Labor's Bureau of Labor Statistics from May 2018, Ala-

bama had the third highest employment for aerospace engineers in the nation, and the highest concentration of jobs (local quotient). Huntsville had the nation's highest employment level of aerospace engineers, and a local quotient of 33.11 - 33 times the national level.

Alabama, which is 19th in the PwC Aerospace Manufacturing Attractiveness rankings, has more than 400 companies engaged in the aerospace and defense sectors.

Mississippi, perhaps best-known for its NASA rocket engine test site in South Mississippi, has become a key player in the growing field of unmanned aerial vehicles.

Aurora Flight Sciences, Northrop Grumman Unmanned Systems and Stark Aerospace all build unmanned aerial systems in Mississippi. It's also home to the Raspet Flight Research Laboratory at Mississippi State University in Starkville, chosen by the Federal Aviation Administration to head a team of 16 universities as a center of excellence for UAS research. In 2016, the Department of Homeland Security picked MSU as a base of operation for drone research, much of the work will be in South Mississippi.

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Additionally, Pioneer Aerospace has made parachute systems in the state of Mississippi since the 1930s, and Eaton Aerospace makes commercial aircraft components. GE Aviation makes jet engine components at two locations in the state.

Louisiana's aerospace footprint may be best known for NASA's Michoud Assembly Facility in East New Orleans, but to the west there's the 82,300 square-foot Kopter Group assembly facility at Lafayette Regional Airport, which moved in after the departure of Bell. It will begin assembling SHO9 helicopters in 2021.

Northrop Grumman operates major maintenance, repair and overhaul facilities at Chennault International Airport in Lake Charles, and Aviation Exteriors provides aircraft painting in New Iberia.

Northwest Louisiana is home of Barksdale Air Force Base and the 2nd Bomb Wing, the oldest in the Air Force, and its massive B-52H Stratofortress bombers.

With all that activity in the four states, the Interstate 10 region between Southeast Louisiana and Northwest Florida is the only location where the aerospace interests of all four intersect. It's a roughly 350-mile stretch along the northern Gulf of Mexico and something of a showcase where growth in one area of the corridor can benefit all four.

The I-10 region has a long history of involvement in aviation. It's where the Navy established its first, and for a long time only, air station, and where NASA created major facilities in the earliest days of the space race. It's home to two NASA operations involved in building and testing the next generation of NASA spacecrafts, and where the new breed of private space companies builds and tests space hardware.

It has significant military aviation activities, including pilot training and aerial weapons development. It's where research is conducted not only in aerospace but in related fields like high-performance materials, artificial intelligence/robotics, geospatial applications and more.

Many of the region's aerospace activities put it in select "clubs." With an Airbus assembly line, it joins a group of sites where large passenger jets are assembled, and having two NASA facilities puts it in the small spaceflight group. It's also one of the few region that trains pilots to fly the fifth-generation F-35.

If there's a key message from this year's research, it's the same as our last publication: The region must continue to focus on attracting aerospace while the interest is there. But to do that, it needs to continue to develop its aerospace worker pipeline as a priority. In addition, having the training facilities is one thing, getting potential workers interested in the field is an entirely different matter and particularly difficult to address.

It's also a matter of creating a culture of learning where young people can get excited about a career in aerospace and aviation. As aerospace officials nationwide have made clear, there are a lot of exciting career options for young people, especially in industries where new products are churned out on a regular basis. Ensuring they know that aerospace is just as creative - perhaps more so - is the challenge.

Over the past few years there have been encouraging developments with the creation of learning centers designed to pique the interest of young people: Infinity Science Center in Miss., Flight Works Alabama in Mobile, and the National Flight Academy in Pensacola are getting noticed by the younger generation.

Here are the most recent findings and observations of this ongoing Gulf Coast Reporters' League study. The list includes new findings along with those from the League's past studies:

General

- The I-10 region is involved in a range of aerospace and aviation-related activities, including aircraft manufacturing, space flight, propulsion systems, military aviation, unmanned aerial vehicles, robotics, aerial

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weapons, high-performance materials, advanced manufacturing and RDT&E.

- Aerospace is a target industry for Alabama, Florida, Mississippi and Louisiana. Multiple local economic development groups have also targeted aerospace, and state and local leaders have joined in a mix of regional alliances to pursue the aerospace industry.
- The United States is a low-cost leader among developed nations when it comes to manufacturing. That bodes well for the region and each of the four states as it seeks more foreign investments and promotes its manufacturing capabilities.
- The Aerospace Alliance was formed in 2009 to promote aerospace activities in the four states, and continues its work, including hosting pre-show events in Farnborough, England, and Paris, France.
- Despite the high level of aerospace activity in the I-10 region, there is no “go-to” organization that focuses on the specific aerospace interests of the I-10 region.

Airbus

- Airbus is currently building an assembly line for the A220, the former Bombardier CSeries and now the newest member of the Airbus family of aircraft. In 2018 Airbus acquired a majority stake in the partnership.
- The Airbus campus at the Mobile Aeroplex has increased in size from 116 to 198 acres, and is growing from 10 buildings to 17.
- The Airbus A320 final assembly plant, which delivered its first jetliner in April 2016, is on track to produce five jetliners per month in 2019.
- Airbus delivered its 100th plane built in Mobile in December 2018.
- The Airbus plant has continued to attract suppliers to the Mobile Aeroplex since it was first announced. Some will want to be close to the plant, others further away to keep from competing for workers.
- Additional aerospace activities directly or

indirectly caused by the Airbus plant will take years to develop. Potential newcomers will keep an eye on progress of the plant before making what could be an expensive investment in the region.

- Airbus in Mobile attracts international interest in the region.

Military

- Hurricane Michael in October 2018 heavily damaged Tyndall Air Force Base, Fla., and likely changed its mission. It is losing its F-22 pilot training mission and is being considered for three F-35 squadrons.
- Naval Air Station Whiting Field, near Milton, Fla., accepted a new outlying field in Santa Rosa County, replacing another field in Escambia County that will now be developed by the county.
- Naval Air Station Whiting Field began receiving in 2019 the first new helicopter simulators in 40 years.
- Military activities bring billions into the region through payroll, contracting and other activities. Between 2000 and 2017, 5,153 contractors in 19 I-10 counties/parishes were awarded 111,732 DoD contracts valued at more than \$95.5 billion.
- The military’s huge complex in this region is a vast schoolhouse that trains tens of thousands of students each year who earn wings, hone combat skills or learn technical fields, including avionics and aircraft maintenance.
- Military aviation activities in the region include pilot and flight officer training, weapons development, search and rescue, unmanned aerial systems, logistics and a variety of combat missions.
- The U.S. Coast Guard has port activities and air operations throughout the region, including the Aviation Training Center in Mobile, Ala., where all Coast Guard aviators learn to fly a particular aircraft type.
- The region has 10 bases with aviation-related missions, and between them more

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than three dozen aircraft types, ranging from high-tech \$145 million fighters all the way down to relatively low-cost, ubiquitous, orange and white Navy trainers and drones.

- Aviation-focused military bases in the Gulf Coast aerospace corridor had a replacement value in 2017 of more than \$21.9 billion. If outlying fields and other aviation annexes are included, it goes up another \$1 billion.
- The Marine Corps declared the F-35 operational, and the Air Force declared its variant combat ready. Eglin Air Force Base, Fla., is home of the F-35 integrated training center and two reprogramming labs.
- A second F-35 reprogramming lab, this one for Australia, Canada, and the United Kingdom, is transitioning from Fort Worth, Texas, to Florida's Eglin Air Force Base.

Corporate

- Major U.S. aerospace and defense companies have operations in the Gulf Coast region, including many with multiple sites. Foreign aerospace and defense companies and non-aerospace companies also have a sizeable footprint in the region.
- There are multiple technology transfer offices and incubators in the region. Two major hot spots for technology transfer are Stennis Space Center, Miss., and Eglin Air Force Base, Fla.
- Aerospace activities in the region are in growth sectors, including commercial jets, unmanned aerial systems, advanced materials, and geospatial technologies. In addition to unmanned aerial systems, three federal operations are involved in some aspect of unmanned underwater vehicles.
- Subsystem work for the F-35 is being done at the Northrop Grumman Unmanned Systems Center in Moss Point, Miss. The expansion, a new operational area, was opened June 2018
- Selex Galileo's operation at Stennis International Airport in Kiln was purchased by Ty-

nek Services Group.

- United Technologies purchased Rockwell Collins and split into three companies. The former UTC Aerospace Systems became Collins Aerospace Systems, the new name for the plant in Foley, Ala. In a late development at press time, UTC and Raytheon announced a merger. How it might impact Foley is unclear.
- While still UTC Aerospace Systems, Collins Aerospace's expanded facility in Foley, Ala., delivered its first fully integrated "neo" engine and nacelle. Safran opened a nacelles operation in Mobile.
- Blue Air Training, which provides training for military close air support personnel, opened a facility at the Pensacola airport.
- L3 Crestview Aerospace was sold in May 2018 to New York investment firm American Industrial Partners as part of a \$540 million cash deal. The investment firm will acquire two components of L3 Technologies – Vertex Aerospace, which includes L3 Crestview Aerospace, and TCS.

Unmanned/robotics

- Fuselage work on the Global Hawk and final assembly of the Fire Scout unmanned aerial systems is done in Moss Point, Miss., by Northrop Grumman.
- Northrop Grumman began flight tests for MQ-8C Fire Scout unmanned helicopters produced in Moss Point in September 2018.
- Unmanned systems are flown in military/federal air space at Eglin Air Force Base, Fla., Camp Shelby, Miss., and Stennis Space Center, Miss., and other locations. The restricted air space at SSC was recently expanded.
- The Institute for Human and Machine Cognition in Pensacola, Fla., is a premiere research center in robotics and human/machine interaction.

R&D/innovation

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- R&D activities in the region involve federal, state and corporate players. Eglin Air Force Base, Fla., spends more in R&D each year than many prestigious universities.
- Eglin Air Force Base, Fla., now has a second reprogramming lab, this one for foreign partners in the F-35 program.
- Commercial space company SpaceX is currently doing R&D on its next generation rocket engine at Stennis Space Center, Miss. Called Raptor, it eventually will power a space launch for a trip to Mars.
- Stennis Space Center, Miss., is where Aerojet Rocketdyne is developing its AR1 engine that is designed to replace the Russian-built RD-180.
- SSC and Michoud each plays a role in federal and commercial space ventures. Each has under-utilized equipment.
- The GE Aviation plant in Auburn, Ala., is the site where the company is mass producing 3D printed parts for its LEAP engine.
- central portion of the corridor.
- The proximity of Stennis Space Center, Miss., and Michoud Assembly Facility, New Orleans, forms a hub of spacecraft manufacturing and testing in the west portion of the I-10 corridor.
- At Michoud, NASA hopes to turn 300 surrounding acres into an advanced manufacturing park. The National Center for Advanced Manufacturing is at Michoud.
- Multiple sites in Northwest Florida, many aerospace-focused, have been certified as ready for development by Gulf Power's First Sites program.
- In August 2018, some \$5 million worth of improvements were finished at Stennis International Airport in Hancock County, Miss. The 8,500-foot grooved and lighted runway is considered essential to attracting new companies to the airport.
- Continental Motors in August 2018 began work on a 275,000-square-foot engine and parts manufacturing facility at the Mobile Aeroplex. The facility consolidates operations scattered among a dozen buildings.

Airports/aviation parks

- A new ST Engineering maintenance, repair and overhaul hangar had its grand opening in 2018 at Pensacola International Airport. Three additional hangars are being built.
- NASA is looking for a non-federal private partner to lead development of a 1,100-acre technology corridor called Enterprise Park, just outside the gates.
- PSA Airlines, a subsidiary of American Airlines, opened a new maintenance facility at Pensacola International Airport.
- Aerospace and aviation-focused technology parks have been established or are developing across the region.
- Many of the non-commercial and commercial airports in the region have land and buildings available for new tenants.
- The proximity of Mobile Aeroplex in Mobile, Ala., and the Jackson County Aviation Technology Park in Moss Point, Miss., forms a hub of aircraft manufacturing in the

Space

- At Stennis Space Center (SSC), Miss., work is finished on the B-2 test stand that will be used to test the Space Launch System.
- The New Orleans-built Orion Multipurpose Crew Vehicle was finished and shipped to Kennedy Space Center, Fla.
- Infinity Science Center in Mississippi has a Saturn V first stage for temporary display.
- In early June 2018 at SSC, Aerojet Rocketdyne completed assembly of the first AR-22 rocket engines, a variant of the RS-25, for the Boeing Phantom Express
- Commercial space company Relativity Space on June 11, 2019, said it would build its 3D rockets at an expanded operation at Stennis Space Center, Miss. It's a continuation of a relationship that began in March 2018 when Relativity entered into a 20-year agreement

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to use exclusively SSC's E-4 test complex. It's all part of NASA's effort to find commercial companies to use underutilized assets, like test and launch facilities.

- Stratolaunch in November 2017 signed an agreement to use the E1 test stand at SSC. In late 2018, it successfully tested a component of its hydrogen-fueled PGA rocket engine with the pre-burner hot-fire test.
- Stennis Space Center in April 2019 wrapped up four-plus years of testing the RS-25 rocket engine, formerly used in the Space Shuttle, that will be used in the Space Launch System (SLS).

Education/workers

- Airbus has launched two training programs, one for high school students, and one for non-students.
- The National Flight Academy is now involved in workforce training.
- ST Engineering has a scholarship program for students interested in aerospace.
- There are 16 universities, several with "very high" research activity, with interests in the Interstate 10 region.
- Mississippi Gulf Coast Community College is among the nation's top associate degree producers in science, technology, engineering and math.
- The National Security Agency and Department of Homeland Security designated the University of West Florida's Center for Cybersecurity a national center of academic excellence in cyber defense education.
- States and local areas have workforce programs to train blue and white collar workers for the aerospace and related industries. Many of the programs are company specific. Alabama, Louisiana, Mississippi and Florida are right-to-work states.
- High schools in the region have programs targeting aerospace, advanced materials and geospatial career fields.
- Hancock County, Miss., is considering estab-

lishing an aerospace academy.

- Florida A&M University-Florida State University College of Engineering and researchers and engineers from Eglin Air Force Base have begun a new partnership to train graduate and undergraduate students in areas critical to the Air Force.

The authors hope this study will provide the public, development officials and politicians with a better understanding of the capabilities of this region. Understanding what's here, what's needed and working together has benefits.

Every Aerospace Alliance Summit since the first in 2011 has brought up the issue of education and training. The alliance's Neal Wade said in his opening remarks of the 2018 summit that surveys all point to education as a top critical need of the aerospace industry.

John Watret, chancellor of Embry-Riddle Aeronautical University, said at the most recent summit that the first time they focused on education and training they had 11 people, "and each year the small rooms end up filling up."

Ron Garriga, Embry-Riddle associate executive director of U.S. Campus Operations, said the industry will need 790,000 pilots, 754,000 technicians and 890,000 new cabin crew over the next 20 years to maintain the world's fleet.

"Ladies and gentlemen," Garriga said, "if that doesn't concern you, where have you been? ... We have got to get our pipeline together."

Indeed. The plans to build rockets in the region, the addition of a passenger jet assembly line and expansion of an MRO campus make it clear the industry wants to be here.

Responding to the needs of the current pipeline and understanding how those needs will change in the future will be critical for the Gulf Coast region to be a leader.

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