The Texas aerospace, aviation and defense industry is known for its rich history in human air flight, world-renowned accomplishments in space exploration and groundbreaking innovations that propel this sector into the future. The Lone Star State tells a story of more than 110 years of powered flight and many industry firsts. Texas is where the Army’s first military aircraft was piloted, where mission control was located for the first moon landing and where the world’s first commercial rocket launch was built.

With one of the nation’s largest clusters of aerospace industry workers and an extensive network of higher education institutions, the state is one of the most important locations globally for aerospace and aviation operations. Companies have access to a large and diverse talent pool of 140,000 workers, and the state produces nearly 10,000 new aerospace and aviation-related degrees each year.

The broad range of aerospace activities in Texas includes aircraft maintenance, repair and overhaul, fighter plane and helicopter assembly, advanced sensors, navigation instrument development, rocket technology, advanced space-flight research, military pilot training and commercial space travel. Texas also supports major air transportation activity as home to the headquarters for two international airlines, 26 commercial airports and hundreds of fixed base operators.

As a mecca for aerospace manufacturing, the state continues to attract relocating and expanding companies from around the nation and world. In fact, 18 of the 20 largest aerospace manufacturers in the world have major operations in Texas. In recent years, aerospace parts suppliers have moved to the state to take advantage of closer proximity to customers and lower operating costs. Growing aerospace supply chains have allowed Texas to rank #4 in the U.S. for total product and part exports.

Texas plays a vital role in helping protect our country, with a defense footprint that contributes more than $123.6 billion to the Texas economy. The Lone Star State has the second highest concentration of active duty members in the country, across 15 active military installations, plus the headquarters for the U.S. Army’s Futures Command in Austin. With billions of dollars in government defense contracts allocated to Texas companies each year, some of the world’s largest defense contractors continue to grow their operations in the state.

Texas is home to NASA’s world-famous Johnson Space Center in Houston, and with dozens of related spaceflight contractor firms, Texas has served as a trailblazer for monumental breakthroughs in human spaceflight. Texas is also home to state-of-the-art test sites for multiple commercial space firms, including SpaceX and Blue Origin. Not to mention, the world’s first commercial space station is planned to be built by AXIOM Space in Houston.

Research and development (R&D) fuels this sector. Texas universities have spent more than $1.9 billion on aerospace-related R&D since 2015. Corporate innovators are also developing new technologies in urban air mobility R&D. Texas is truly the new frontier for aerospace, aviation and defense.
Major Aerospace & Aviation Companies in Texas

Select firms with engineering, manufacturing, or maintenance facilities in the state.

Waco
Wichita Falls
Amari l lo
Van Horn
Midland
Dallas
Houston
Kerrville
Austin
San Antonio
Brownsville
Kingsville
El Paso
McAllen/Harlingen
Texas’ aerospace and aviation labor force is one of the largest in the nation, directly employing 140,000 workers. Within the industry, the largest subsector in the state is air transportation, which includes airlines, airport operations and aircraft maintenance. This category accounts for about 47% of aerospace and aviation employment in Texas. The state ranks #1 in the U.S. for total direct air transportation jobs.

Additionally, the Texas workforce is significantly more specialized in aerospace manufacturing than most other states, measured by workers per capita. The share of the Texas workforce employed in aerospace manufacturing is more than four times greater than the national average.

Also, general aviation and business aviation play a major role in the industry in Texas. General aviation and business aviation generate jobs in sales of new and previously owned aircraft, maintenance, parts sales, completion, refurbishment and personnel needed to fly and maintain the aircraft.

Texas also leads the nation in the number of workers employed in key aerospace and aviation occupations, including commercial pilots, aerospace engineers, aircraft mechanics, avionics technicians and aircraft assemblers.

### EDUCATION AND TRAINING

Aerospace and aviation education in Texas is supported by a highly developed network of higher education institutions around the state. Ten of the state’s public and private universities provide aeronautical programs offering degrees in aerospace engineering, aviation science and related specialties. Elsewhere, 14 public and private colleges around Texas offer Federal Aviation Administration-approved aviation maintenance technology programs.

### TEXAS LEADS THE NATION IN SKILLED AEROSPACE OCCUPATIONS (2020)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Texas Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Pilots</td>
<td>1</td>
</tr>
<tr>
<td>Aerospace Engineers</td>
<td>1</td>
</tr>
<tr>
<td>Aircraft Mechanics</td>
<td>2</td>
</tr>
<tr>
<td>Avionics Technicians</td>
<td>2</td>
</tr>
<tr>
<td>Aircraft Assemblers</td>
<td>2</td>
</tr>
<tr>
<td>Airfield Operations Specialists</td>
<td>5</td>
</tr>
<tr>
<td>Engine Assemblers</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: U.S. Bureau of Labor Statistics
R&D at Texas Universities

From 2015 to 2019, Texas universities dedicated more than $1.8 billion to aerospace technology research, according to the Texas Higher Education Coordinating Board. The University of Texas at Austin and Texas A&M University together accounted for more than half of the total expenditures in this field. Texas A&M Corpus Christi was selected as one of only seven Unmanned Aircraft System (UAS) test sites in the nation, recognized by the FAA. The Lone Star UAS program conducts research vital to integrating UAS into the nation’s airspace. Research concentrates on multiple areas including safety of operations and data gathering in authorized airspace, UAS airworthiness standards, command and control link technologies, human-factors issue for UAS control-station layout and detect-and-avoid technologies. Texas universities are also at the helm of hypersonic high speed flight R&D. Texas A&M University is leading a $100 million research consortium, while the University of Texas at Arlington is partnering with the private sector to develop hypersonic wind tunnel technology.

Within the U.S., Texas is home to about 10% of all aerospace manufacturing jobs. In particular, North Texas is one of the most highly concentrated regions of aircraft and aircraft parts production in the country. The Dallas-Fort Worth metro area, anchored by heavyweights like Lockheed Martin, Bell, L-3 Communications, Boeing and Bombardier, has a total share of workforce employed in aircraft manufacturing more than double the national share. Elsewhere in the state, Amarillo, San Antonio, Waco and Wichita Falls are additional hubs of diverse aerospace manufacturing, from parts fabrication to complete aircraft assembly and overhaul. Texas is a leader in aerospace and aircraft parts exports, ranking #4 nationally. Since 2015, total goods exported from Texas in this sector have increased by 9.2%.

Growing Headquarters & Supply Chain Networks

Thanks to the state’s superior business climate and lower operating costs, the state continues to be a magnet for new and expanded aerospace and aviation company headquarters. Airbus Helicopters USA, Safran Helicopter Engines USA and Bell are all headquartered in Texas, and in 2020, Wesco Aircraft announced the relocation of their headquarters from California to Fort Worth. With a robust and growing aerospace parts manufacturing supply chain network, companies are moving to Texas to take advantage of a closer proximity to customers. In 2020, Killdeer Mountain Manufacturing announced their expansion into Texas. An aerospace and aviation tier 1 supplier, the company will establish a new $8 million manufacturing plant in Kerrville, where they will produce circuit card assemblies and cable fiber harnesses for the aerospace industry.
AIR TRANSPORTATION

Texas is home to the largest air transportation workforce in the nation, with the state’s airlines, airports and related support services directly employing more than 88,000. Dallas-Fort Worth is home to the headquarters of two international air carriers, American Airlines and Southwest Airlines. A third, United Airlines, operates a major hub in Houston.

Texas is home to six of the top 50 busiest airports in the U.S., by passengers boarded annually. These include #4 Dallas-Fort Worth (DFW) and #14 George Bush Intercontinental Houston (IAH).

General aviation and business aviation are also a vital part of the industry. The majority of general aviation aircraft used for business purposes are manufactured, operated, serviced and maintained in the U.S. These aircraft allow companies to access airports that are not served by airlines and allow companies to be more productive.

Texas has more than 380 public use airports—more than any other state—in addition to heliports and other intermodal facilities. These airports provide sales, service, operations and maintenance positions, along with a boost to the local economies in which they are located. They support Fixed Base Operators (FBOs), manufacturing, maintenance, flight operations, charter services, business aviation departments, airport personnel, air traffic controllers and many other non-aviation specific industries, for example, rental cars, restaurants and hotels.

MAINTENANCE, REPAIR & OVERHAUL

Texas’ aerospace workforce also supports the state’s many maintenance, repair and overhaul (MRO) operations, where aircraft are modified and completed or components, like engines, are rebuilt. Texas is home to many MRO facilities, including, but not limited to the following:

- Boeing Global Services—San Antonio
- Lockheed Sustainment Operations—Fort Worth
- L-3 Mission Integration—Greenville
- Gulfstream—Dallas, Fort Worth
- Textron Aviation—Dallas, Houston, San Antonio
- L-3 Platform Integration—Waco
- Elbit Systems (M7 Aerospace)—San Antonio
- Chromalloy—San Antonio
- Pratt & Whitney—Grand Prairie
- Standard Aero—Dallas, Houston, San Antonio
- BBA Aviation (Dallas Airmotive)—Dallas
- ST Aerospace—San Antonio
- Bombardier—Dallas
- GDC Technics—San Antonio

WORKFORCE CONCENTRATIONS MAP

The highlighted regions are the areas in Texas where workers in this sector can be found.

<table>
<thead>
<tr>
<th>State</th>
<th>Number employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>86,177</td>
</tr>
<tr>
<td>California</td>
<td>79,353</td>
</tr>
<tr>
<td>Florida</td>
<td>68,593</td>
</tr>
<tr>
<td>Illinois</td>
<td>43,453</td>
</tr>
<tr>
<td>New York</td>
<td>39,425</td>
</tr>
<tr>
<td>Georgia</td>
<td>29,758</td>
</tr>
<tr>
<td>North Carolina</td>
<td>22,634</td>
</tr>
</tbody>
</table>

Source: U.S. Bureau of Labor Statistics
From aerospace research and flight training, to military aircraft development and space exploration, Texas is an epicenter for government and defense-related aerospace and aviation. NASA's Johnson Space Center in Houston and 15 active military bases around the state are a testament to Texas’ role in the country’s aerospace and defense initiatives.

The history of global military aviation began in Texas in 1910, when the first military flights took place at Fort Sam Houston in San Antonio. Today, Texas is host to the nation’s largest population of active duty military personnel, with more than 112,000 serving in the ranks of the U.S. Army, Air Force and Navy. Texas is an especially important location for the country’s defense aviation operations, as the U.S. Air Force stations more active personnel in Texas than in any other state. Additionally, after a nationwide search in 2018, the U.S. Army selected Austin as home for its new Army Futures Command, which focuses on science and technology development for the U.S. Army. The Futures Command, strategically located near the heart of Austin’s entrepreneurial ecosystem, has become central to innovation in the area.

Texas is home to four active Air Force bases, in addition to Joint Base San Antonio and three naval air stations. Private defense, space and civil contractors employ tens of thousands in Texas in aircraft and avionics manufacturing, defense R&D and maintenance and overhaul. San Antonio, known as “Military City U.S.A.”, is home to the U.S. Air Force Cyber Command, tens of thousands of Air Force personnel and one of the nation’s largest clusters of cyber and intelligence employees.

Texas is the top recipient of defense spending in the country. The U.S. Department of Defense awarded $83 billion in contracts to Texas businesses in fiscal year 2020—more than any other state. The Boeing Company, L-3 Harris, Lockheed Martin, Bell, BAE Systems and Raytheon are some of the largest players in the defense arena with major operations in Texas. It is estimated that Raytheon’s business operations in North Texas contribute $4.8 billion to the Texas economy—and that impact only continues to grow. In 2019, Raytheon announced it would build a new facility to support 500 new high-tech jobs at its Space and Airborne Systems headquarters in McKinney. In 2020, BAE Systems announced a major expansion to their Texas operations with a new $150 million campus in Austin. The site will include engineering, manufacturing, laboratory and office space to primarily support U.S. Department of Defense customers.
NASA awarded Texas-based Firefly Aerospace a $93.3 million contract to deliver 10 payloads to the lunar surface aboard its Blue Ghost lander (rendering above) as part of the agency’s Commercial Lunar Payload Services (CLPS) program. (Image: Firefly Aerospace)

GIANT LEAPS START IN TEXAS

No state has played a more important role in the history of human spaceflight than Texas. The Johnson Space Center serves as the home for NASA's International Space Station mission operations, the Orion Program and a host of future space developments. NASA is developing the next generation of transport systems through strategic partnerships with Texas companies that are leading the way in commercial spaceflight technology.

While Houston is known as the epicenter of Texas’ space technology industry, spacecraft manufacturing and testing is happening in areas across the state—from Brownsville and Harlingen in the Rio Grande Valley, to McGregor and Austin in Central Texas and Midland and Van Horn in West Texas.

NASA JOHNSON SPACE CENTER

For more than half a century, NASA’s Lyndon B. Johnson Space Center (JSC) in Houston has led the U.S. and the world toward monumental advancements in human space discovery. JSC was established in 1961 as the Manned Spaceflight Center and the home of Mission Control for the U.S. human space flight program, including the historic Apollo missions that took humans to the moon for the first time and all of the 135 space shuttle flights. Together, Houston and JSC share an identity around the world as landmarks of historic space travel and scientific breakthrough.

Today, JSC leads NASA's International Space Station operations and the development of the Orion crew vehicle, which NASA is designing to carry astronauts to new destinations in deep space. JSC is also playing a vital role in the future of space exploration through its technology development and commercial partnerships, as well as its management of NASA's Commercial Crew and Cargo Program, which invests financial and technical resources into the private-sector space transportation industry.

Building on decades of exploration, NASA is working to send humans to Mars. In 2020, NASA sent the Mars rover to collect rocks and soil samples for study. The rover, which landed in February 2021, helps NASA understand the current weather, winds, radiation, and dust environment, and will demonstrate technologies which will help humans once there.

It is clear than both JSC and NASA play critical roles in education, research, tourism and industry growth in Texas. An estimated 51% of JCS’s total budget is expended on contracts with Texas-based businesses—about $2.3 billion. NASA’s direct and indirect impact on Texas is $4.7 billion annually and the organization supports more than 52,000 public and private jobs in the state. Texas’ relationship with NASA will continue to develop and evolve into the future.

The Lyndon B. Johnson Space Center serves as a landmark of historic space travel and scientific breakthrough.
Texas is home to state-of-the-art development and test sites for the world’s most innovative commercial space firms.

**COMMERCIAL SPACE INDUSTRY**

Texas is home to state-of-the-art development and test sites for multiple commercial space firms, including Boeing, SpaceX, Blue Origin and Firefly, all leading the way in cargo, satellite and space tourism transport. NASA has ramped up programs to support the U.S. commercial space transportation industry. Based at JSC, the Commercial Crew and Cargo Program Office (C3PO) invests in the development of private transportation systems capable of ferrying both cargo and human crews to the International Space Station (ISS).

**SPACEX**

SpaceX designs, manufactures, tests and launches satellites and spacecraft for orbit and cargo transport. Founded by Tesla CEO, Elon Musk, the company shuttles astronauts and spacecraft to the ISS. In early 2012, SpaceX completed an office and launch pad expansion at its McGregor rocket development facility, where the company conducts engine tests for its Falcon 9 launch vehicle. SpaceX was the first private company to send a spacecraft to the ISS, when the Falcon 9 delivered a Dragon cargo capsule, one of the company’s products, to the ISS. SpaceX has delivered cargo to and from the ISS since 2012, and in 2020, began transporting people to the orbiting laboratory under NASA’s Commercial Crew Program. SpaceX’s site in Boca Chica Beach, near Brownsville, is the world’s first commercial rocket launch site, developed in 2019. SpaceX has completed multiple high-altitude flight test of the Starship prototype—a fully reusable, two-stage-to-orbit super heavy-lift launch vehicle. The Starship will be the world’s most powerful launch vehicle ever developed, with the ability to carry in excess of 100 metric tonnes to Earth’s orbit. In 2021, the Starship was selected as NASA’s Human Landing System under the Artemis program to carry out missions to the Moon and Mars.

**BOEING**

In Houston, Boeing supports civil space programs and various NASA programs such as the ISS, Commercial Crew Development program and the Space Launch System. Boeing’s Crew Space Transportation (CST) system will provide NASA with transportation to and from the ISS. Boeing’s Crew Space Transportation (CST) system will provide NASA with transportation to and from the ISS. Boeing’s CST-100, also known as Starliner spacecraft is a reusable capsule-shaped craft that can accommodate up to seven passengers, or a mix of crew and cargo to low-earth orbit destinations such as the ISS. Boeing has designed the spacecraft to be compatible with a variety of expendable rockets and ULA’s Atlas V vehicle. The CST-100 capsule has an innovative, weld-less design and features Boeing LED “Sky Lighting,” wireless internet and tablet technology for crew interfaces. Boeing’s Starliner marked the first time in human spaceflight history that NASA had contracted with a commercial company for a human spaceflight mission. The Starliner’s first successful mission took place in 2019.

**BLUE ORIGIN**

Blue Origin is a private aerospace company started by Amazon founder Jeff Bezos, to develop a lower-cost system for human spaceflight. Blue Origin’s New Shepard vehicle is a rocket-propelled, vertical take-off, vertical-landing spacecraft designed for suborbital space tourism. The company conducts flight tests of prototype vehicles at its launch facility in the West Texas city of Van Horn, located in Culberson County. In 2015, Blue Origin conducted the first development test flight of the New Shepard space vehicle, and that same year, completed the craft’s first successful powered vertical landing, enabling vehicle reuse. In 2017, the Crew Capsule 2.0 took its first flight and returned to Earth via parachute assisted descent. The company made history with the New Shepard program after sending their first humans into space in July 2021.

**FIREFLY AEROSPACE**

Firefly Aerospace, headquartered in Austin, is a provider of economical launch vehicles, spacecraft and in-space services. Firefly is developing a number of vehicles tailored for the small to medium launch market: Alpha, Lunar Lander, Beta, Gamma and Space Utility Vehicle. In May 2021, Firefly was awarded a $93.3 million contract to deliver a suite of ten NASA-sponsored science and technology demonstration payloads to the Moon.
SPACEPORTS & LAUNCH SITES

According to the Federal Aviation Administration (FAA), Texas is currently home to two of the 12 commercial spaceports that hold an active launch site operators license in the U.S., the Houston Spaceport and the Midland International Air and Space Port. The Lone Star State also has commercial launch sites in McGregor, Van Horn and Boca Chica.

MIDLAND INTERNATIONAL AIR & SPACE PORT

The Midland International Airport (MAF), located in West Texas, is the first airport in the U.S. with regular passenger air service to also be issued a commercial spaceport license by the FAA. Now known as the Midland International Air and Space Port, the facility is home to the Spaceport Business Park, which accommodates a wide range of aerospace and aviation businesses. Also located on site is the Midland Altitude Chamber Complex, which is a testing facility featuring three hypobaric chambers for testing equipment and training personnel.

SPACEX

SpaceX’s launch site in Boca Chica Beach is the world’s first commercial rocket launch site. Also known as Starbase, the facility employs approximately 1,400 people. The company has been testing Starship prototypes at the site since 2019. SpaceX’s McGregor testing site is used for research and development of new rocket engines and thrusters as well as final component testing. SpaceX recently announced plans for $10 million in infrastructure improvements at the facility, which currently employs about 500 people.

HOUSTON SPACEPORT

Owned and managed by the Houston Airport System, the Houston Spaceport is located at Ellington Airport in the heart of Space City. Phase I of the facility expansion and infrastructure improvements began in 2019 and are expected to cost $18.8 million. The facility will support reusable launch vehicles, with potential use for space tourism, R&D services, astronaut training and more. The spaceport is slated to be the home of the world’s first commercial space station, built by Axiom Space, and the city’s first Spaceflight Technology Incubator.

BLUE ORIGIN

Blue Origin currently conducts all engine and flight tests for the New Shepard reusable launch vehicles at their privately-owned and operated launch facility outside of Van Horn in Culberson County. Blue Origin received FAA permit approval in 2014 and launched their first flight test in 2015.

LAUNCHPAD FOR NEW TECHNOLOGIES

URBAN AIR MOBILITY

Corporate innovators in Texas are developing new technologies in urban air mobility. In 2017, Texas-based Bell announced a partnership with Uber Elevate’s air taxi program. In 2019, Bell unveiled its design for a full-scale vertical-takeoff-and-landing (VTOL) air taxi. The VTOLs will be used for transportation and also delivery logistics services. Uber Elevate has identified the Dallas-Fort Worth area as one of its key development locations and has partnered with Bell and Hillwood, the company that manages the Fort Worth Alliance Airport, to work on the technology and plans. In 2021, Hillwood and Bell demonstrated a point-to-point unmanned aircraft systems package delivery in North Texas at the AllianceTexas Mobility Innovation Zone. Other companies such as Airbus, Boeing and Austin-based LIFT Aircraft are developing new VTOL, flying car and flying taxi technologies. Texas continues to stay on the forefront of this rapidly-evolving sector.
The Office of Aerospace & Aviation, within the Texas Economic Development & Tourism Office, works closely with decision makers in the aerospace industry, other governmental agencies and academic institutions to coordinate industry development efforts. In addition, the State of Texas offers a robust incentive program portfolio for aerospace, aviation and defense companies looking to expand or relocate in the state:

**SPACEPORT TRUST FUND**

The Spaceport Trust Fund (STF) is a financial tool to support the development of infrastructure necessary for establishing a spaceport in Texas. Fund proceeds are available to any spaceport development corporation which has secured a viable business entity capable of launching and landing a reusable launch vehicle or spacecraft. In 2021, the Texas Legislature passed the appropriation of $10 million to the state’s Spaceport Trust Fund.

**TEXAS ENTERPRISE FUND**

The Texas Enterprise Fund (TEF) awards “deal-closing” grants to companies considering a new project for which one Texas site is competing with other out-of-state sites. The fund serves as a performance-based financial incentive for those companies whose projects would contribute significant capital investment and new job opportunities to Texas. Since its inception in 2004, TEF has awarded more than $41 million to aerospace, aviation and defense companies, which have committed to creating nearly 4,000 new jobs in Texas.

**GOVERNOR’S UNIVERSITY RESEARCH INITIATIVE**

The Governor’s University Research Initiative (GURI) was established to help Texas public institutions of higher education recruit distinguished researchers from around the world to the state of Texas. The program seeks to bolster the standing of Texas public colleges and universities and economic development efforts statewide.

**R&D AND MANUFACTURING TAX EXEMPTIONS**

A research and development tax incentive is available for companies conducting qualified research activities (QRAs) in the state. The incentive provides Texas companies the option of selecting either a sales tax exemption on property purchased by personnel engaged in QRAs or the franchise tax credit. State sales and use tax exemptions are available to manufacturing operations for tangible property, natural gas and electricity.

For more information on Texas’ aviation and aerospace industry, contact Joe Magruder at (512) 475-2209.

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