

COVER STORY

Aviation and aerospace: South Florida's \$41 billion economic engine – and growing

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Some aspects of South Florida's aviation and aerospace economy – like the airliners taking off and landing from our airports every few minutes – are obvious. But a large part of this major economic engine can be found in unexpected places.

Surrounded by wetlands in northern Palm Beach County, fighter jet engines are assembled and fired up for testing.

In Miami, a center for flight simulation training attracts thousands of pilots from around the world.

In a Miramar warehouse, workers repair and maintain airplane parts.

And on Biscayne Boulevard in North Miami Beach, a company deploys drones to survey difficult-to-reach property.

It all adds up to an industry with more than 46,000 workers and an economic impact of over \$41 billion in the tri-county region. Over the past five years, aviation and aerospace employment has grown over 20 percent in each of the three counties. The average industry salary ranges from \$79,195 in Broward County to \$94,082 in Palm Beach County – considerably more than the average local income.

In an industry where a skilled workforce and a convenient location are key requirements, South Florida checks both of those boxes. That's why more aviation and aerospace companies are moving to South Florida, home to three international airports and seven executive airports.

More than 1,800 aviation/aerospace firms and supporting business are located here, according to economic development officials. Miami International Airport was the top U.S. airport for international freight in 2016, with nearly 2.2 million tons of shipments.

"I think aviation is our best opportunity right now," said Bob Swindell, president and CEO of the Greater Fort Lauderdale Alliance, which is working to attract companies and facilitate skills training with universities. "I call them opportunity occupations – skilled jobs that don't



PHOTOS BY JOCK FISTICK

Raul Cruz-Alvarez, CEO of Landing Gear Technologies in Hialeah, with his son Rolando Estrada, director of operations.

require a four-year degree, but need more than a high school degree."

Besides providing well-paying jobs, the aviation industry has had a major impact on South Florida's commercial real estate market. According to CBRE Senior VP Harry Tangalakis, there were 679,164 square feet of new industrial leases signed by aviation businesses in South Florida in 2016, up from 406,237 in 2015 and 286,666 in 2014.

"More passengers require more flights and more planes, which in turn require more aviation service providers," he said.

Here's a look at some of the aviation and aerospace business that have sprouted up outside the terminals and runways.

The fixer-uppers

Maintenance, repair and operations (MRO) is a major component of South Florida's aviation industry, especially in Miami-Dade and Broward counties because of their busy international airports. From large companies like Heico Corp., Embraer and GE Aviation to small businesses, local workers are fixing up components that keep aircraft working.

"When we are talking about aviation, Florida has probably one of the best markets for mechanics in the country," said Jim Martin, founder and managing partner of Miami-based ACM Capital Partners and ACM Aviation Staffing.

Martin, whose company has provided MRO workers in major U.S. markets, said no other state matches Florida for the number of heavy maintenance aircraft facilities and ample supply of skilled labor.

Other cities worldwide may have a lower cost of labor or lower corporate taxation, but Miami has a strong labor force, good weather and a gateway location, said Alex de Gunten, business development officer for Hollywood-based Heico (NYSE: HEI) and chairman of the Beacon Council's Aviation Committee. Heico, which reported nearly \$1.4 billion in revenue in 2016, has locations around the world, including a parts and repair facility in Miami.

"The beauty of Miami is there are a significant number of companies, over 480 aerospace and airlines companies," de Gunten said. "There is a pool of talent to work with."

The cluster of aviation parts shops has been a great benefit for MRO companies, Martin said. There are dozens of small shops that buy, refurbish and resell FAA-certified aviation parts. A local MRO can get same-day parts delivery, rather than wait days for a part to ship.

As more MRO companies come to town, some are finding that space is difficult to come by. Raul Cruz-Alvarez, CEO of Hialeah-based Landing Gear Technologies, relocated to a larger facility three years ago and would like to expand further, but has faced constraints. An MRO business usually creates chemical and oil runoff, so it can't be located in sensitive areas or too close to wellfields, he said. Cruz-Alvarez would like to see the county designate an area on or near Miami International Airport for MROs.

Jet engines roar in Palm Beach

The jet turbine industry is a great neighbor, as long as it's not conducting tests next door.

► BY THE NUMBERS

THE AVIATION INDUSTRY IN SOUTH FLORIDA

Source: Beacon Council, Greater Fort Lauderdale Alliance, Business Development Board of Palm Beach County

24,646

Aviation/aerospace jobs in Miami-Dade County, up 23 percent since 2011

\$82,881

Average annual salary of aviation jobs in Miami-Dade

\$34 billion

Economic impact of aviation in Miami-Dade

13,374

Aviation/aerospace jobs in Broward County, up 26.3 percent from 2012

\$79,195

Average salary of aviation/aerospace jobs in Broward

17,730

Aviation/aerospace jobs in Palm Beach County, up about 20 percent from 2011

\$94,082

Average salary of aviation jobs in Palm Beach

\$6.78 billion

Economic impact of aviation/aerospace in Palm Beach

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That much was apparent during a tour of Pratt & Whitney's 7,000-acre campus, along an isolated stretch of the Bee Line Highway in northern Palm Beach. Workers fixed an F-135 jet engine - used in F-35 fighter planes - in a sturdy building on the edge of the wetlands, and fired it up for testing. Even with earplugs and earmuffs, the engine was face-rattling loud.

Just another day at work at Pratt & Whitney, which has been there since 1958. The F-135 wasn't just tested there, it was manufactured there before being shipped off to the U.S. military.

Today, Pratt & Whitney, a subsidiary of United Technologies Corp. (NYSE: UTX), has over 1,000 employees in Palm Beach and has been growing quickly in recent years, said Mike O'Neill, manager of its validation and assembly floor plant. In 2013, it completed a 100,000-square-foot jet engine production facility to go with its existing 400,000-square-foot plant.

It operates 24/7, including engine testing. That's why it's miles away from homes.

The company recruits heavily from colleges, especially Florida public schools such as the University of Florida, University of Central Florida and Florida Atlantic University.

The work of assembling jet engines is incredibly advanced. Pratt & Whitney's plant has PW100 engines, which are installed in planes such as the Airbus A320neo. The engines are suspended from an assembly line built into the ceiling while they are manufactured by hand. The system can raise and lower the engines, or rotate them 360 degrees, so mechanics don't need ladders that might damage the engines.

Pratt & Whitney leases space at its campus to two other companies: Lockheed Martin subsidiary Sikorsky, for helicopter manufacturing and testing, and Aerojet Rocketdyne, for rocket propulsion. Sikorsky-made Blackhawk helicopters can regularly be seen hovering over the wetlands at a secluded testing airfield.

Many smaller turbine companies were created with talent from these three giants, and some of them provide services to the larger businesses, said Kelly Smallridge, president and CEO of the Business Development Board of Palm Beach County. The high skill level of this work is why the average aviation/aerospace salary in Palm Beach is so high, and many experienced engineers earn over six figures.

Shirley Coates Brostmeyer, CEO of Jupiter-based Florida Turbine Technologies, heads a 180-employee firm that develops and tests turbines for NASA and the U.S. Department of Defense, working mostly on smaller engines for missiles and drones. She has focused her recruiting on the local workforce and Florida college graduates because the high cost of living makes it difficult to recruit people from other parts of the country.

"For a long time, the state of Florida has been driven by real estate and development, and I guess that is well and good



Jaime Botero and Gustavo Castro, both from Columbia, spend time in a flight simulator at the Pan Am International Flight Academy in Miami.

as long as you can continue attracting people to the state," Brostmeyer said. "But technology companies, it seems to me, are the future."

Drone innovations taking flight

The drone industry is one of the newest and fastest-growing segments of the aviation business. Citing the FAA's prediction of 3.55 million hobbyist drones and 442,000 commercial drones by 2021, the Beacon Council recently formed an unmanned aircraft systems group within its aviation committee.

"Commercial interest in unmanned aircraft systems is accelerating rapidly," De Gunten said. "Miami-Dade County is uniquely qualified to serve as a year-round hub of drone innovation, as well as the U.S. gateway into Latin America."

North Miami-based VolAero UAV Imaging Services is one of the young companies using innovative drone technology in the commercial sector. Founded in late 2016, the company deploys drones with special cameras and software to conduct imaging, modeling and construction monitoring of difficult-to-reach locations. VoleAero CEO Charles Zwebner showed videos of its drones sweeping over wetlands in minutes, instead of the many hours required

by an on-foot survey, and dipping underneath bridges for inspections.

A drone storage and testing center would be ideal for Miami because it could be a hub for drone companies seeking both domestic and international deals, Zwebner said.

According to the FAA, there are over 8,000 drones registered in South Florida.

"What the industry is looking for is people with well-rounded knowledge, understanding drones and cameras and images and software," Zwebner said. "Miami does have a pretty good pool of people coming out of the schools with those qualifications."

Pilots seek virtual training

When pilots get to handle new airliners, it's best they endure their trials and errors in a virtual environment. That's where flight simulators come in.

Miami is home to major flight simulator training centers for both Boeing and Airbus, in addition to the Pan Am International Flight Academy. It was spun out of Pan Am World Airways in 1992 and is now owned by the parent company of Japan's All Nippon Airways. Few cities in the world have as many major flight simulation facilities.



Mark Johnson

Mark Johnson, executive VP and COO of the Pan Am flight center, said the facility trains employees from airlines all over the world. It has 24 advanced flight simulators in Miami, plus an air traffic control simulator.

According to Pan Am, pilots visiting its Miami facilities for flight training generate about 100,000 room nights a year, while air traffic control students account for an additional 12,500 room nights. That generated at least \$9.5 million in hotel revenue and \$4.5 million in restaurant/entertainment spending.

Many of the pilots are seeking certification for specific aircraft types, Johnson said. Since Miami has so many international flights, it's a convenient location for time-strapped pilots to drop in for training.

Preparing the next generation

Landing Gear Technologies' Cruz-Alvarez said he can find repair jobs to work on all day long, but he can't find enough talent to complete the work. He has 41 employees, and the most experienced technicians earn about \$40 an hour.

"Getting good talent is the No. 1 challenge for any repair station in South Florida," Cruz-Alvarez said. "There are not enough kids coming out of school, and the training the kids are getting is not on par with where the industry is going."

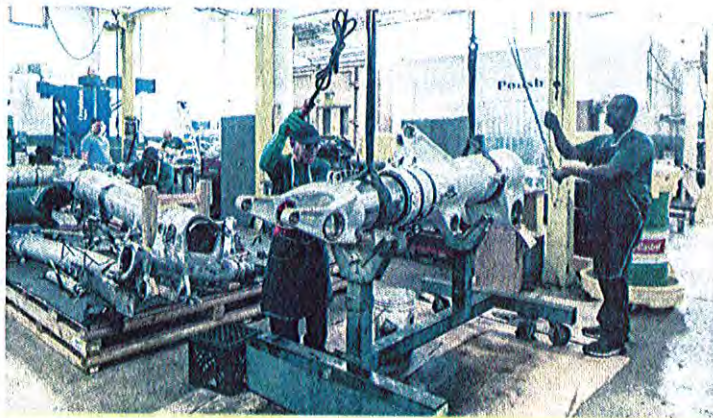
Miami-Dade County Public Schools' George T. Baker Aviation Technical College has been a major source of talent, but James Kohnstamm, the Beacon Council's senior VP of economic development, said the school must turn away some students because it doesn't have enough funding. The Beacon Council is looking for more opportunities for aviation training.

In Palm Beach, aerospace engineers from Pratt & Whitney teach courses at Palm Beach State College to train the next generation of skilled workers, the BDB's Smallridge said.

Broward College recently expanded its aviation campus at North Perry Airport, which will allow it to grow its maintenance program to 400 students from 250, said Russell McCaffery, dean of transportation programs at the college. It also teaches pilots, air traffic controllers and airport managers, mostly offering associate degrees or certificates. In August, Broward College will launch a B.S. degree in aerospace sciences.

A mechanic can start at \$40,000 to \$45,000 a year, and in five to seven years pull down about \$75,000, McCaffery said.

"We are fortunate now with the strong economy; at the moment, our students aren't having trouble finding jobs at all," McCaffery said. "Most of our students are actually employed in the field while they are still in school, if they want to work."



Augustine Betancourt and Clemente Del Los Santos at Landing Gear Technologies, which specializes in repairing and refurbishing commercial aircraft landing gear.