

July/August 2016

AEROSPACE

A M E R I C A

QUANTUM'S PROMISE

Inside the
revolution

page 22

Schafer's Greiman
on space awareness/8



Too late for F-35 affordability?/28

Free money, strings attached/34



NEW SPACE MECCA

Can NASA's Kennedy Space Center recapture the magic of the Apollo and space shuttle eras?

Mark Williamson traveled to Florida to explore that question. He found a facility in the midst of a renaissance driven largely by commercial-space enterprises.

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Five years ago, when NASA retired the space shuttle fleet and shipped the orbiters to museums across the nation, it seemed that the Kennedy Space Center had lost its raison d'être. By the time Atlantis returned from the 135th and final shuttle mission in July 2011, KSC's government and contractor workforce had already shrunk to 8,000, from a high of 16,000 in the mid-1990s.

Today, it remains unclear whether the KSC workforce can ever return to that peak, but on a visit earlier this year I saw evidence of its transition to what KSC's leadership predicts will be a vibrant spaceport driven by the emerging commercial space market.



Orbital ATK is negotiating to lease parts of the former space shuttle facilities at NASA's Kennedy Space Center in Florida. The company plans to use the Vehicle Assembly Building's High Bay 2, possibly for new rockets the company might build.

Mark Williamson

NASA is busy reconfiguring the former shuttle Launch Complex 39B to an Apollo-era clean-pad design to make it usable to a wide mix of government and commercial launch vehicles. The pad has a flame trench, sound-suppression system and lightning towers, but minimal fixed-service structures such as a gantry or umbilical tower. NASA has removed shuttle-specific equipment such as the rotating service structure that gave access to the payload bay. In April, NASA announced the start of negotiations with Orbital ATK for use of the shuttle's Vehicle Assembly Building's High Bay 2, possibly for assembly of a new series of American-built rockets the company says it might build for in-

termediate and heavy payloads. This would mark the first time that government and commercial launchers would be assembled side-by-side in the iconic building – NASA's Space Launch System rockets in High Bay 3 and Orbital ATK's in High Bay 2.

Meanwhile, SpaceX is converting the other shuttle launch complex, 39A, for the company's Falcon Heavy rockets, whose first launch is currently expected later this year. And OneWeb, the Arlington, Virginia-based satellite-internet startup, is set to open a satellite-manufacturing plant by the end of 2017 at Exploration Park, 120 hectares (300 acres) of former wetland and scrubland adjacent to the KSC Industrial Area.

Genesis

KSC's effort to reinvigorate the center follows an earlier, unsuccessful attempt to prepare for a post-shuttle economy, as evidenced by a rusting "Spaceport Florida" sign just south of Titusville, across the lagoon from KSC's entrance gate.

According to Scott Colloredo, director of KSC's Planning and Development Directorate, the end of the shuttle program and the rise of a commercial space industry created "a unique opportunity for Kennedy to reinvent itself" as a public-private international spaceport. In fact, the rebranding efforts began even before the shuttle's final landing, with the 2010 creation of Colloredo's office to chart KSC's future.


Colloredo is optimistic. He says new ideas and new suppliers have forced new approaches to managing KSC's unique assets.

"To think that private companies would be operating at launch pads 39A and 39B, the Neil Armstrong Operations and Checkout facility, Vehicle Assembly Building, all three

of the Orbiter Processing Facilities and other critical NASA assets would have been unheard of until recently," Colloredo says.

A pivotal tool in KSC's metamorphosis was the 2015 deal for Space Florida, a state aerospace economic development agency, to take over management of certain legacy shuttle facilities. Under the 30-year property agreement, Space Florida owns and operates the Shuttle Landing Facility and leases it back to NASA and commercial customers. Space Florida also spent \$20 million to upgrade and modify the former Orbiter Processing Facility-3, and renamed it the Commercial Crew and Cargo Processing Facility, where Boeing is now testing its CST-100 Starliner crew capsule.

Space Florida negotiated the agreement announced in April under which OneWeb's satellite factory will be located at Exploration Park, says Dale Ketcham, chief of strategic alliances at the state agency. OneWeb Satellites, a joint venture between OneWeb and Airbus Defence and Space, will design



SpaceX is converting Launch Pad 39A, used for three decades by the space shuttle program, for the company's Falcon Heavy rocket.

the satellites and build the first 10 flight models in France. OneWeb Satellites then will manufacture 890 more satellites in Florida.

Likewise, Space Florida will be the landlord for an eight-story complex for Jeff Bezos's Blue Origin company, which broke ground on the facility in late May. Ketcham says Blue Origin's rockets will be the first to be built at the same location from which they will launch.

Transition

Frank DiBello, Space Florida's president and CEO, says NASA had difficulty rising to the challenges of a changing marketplace.

NASA is "neither chartered nor equipped to well manage commercial enterprises and operations," he says.

Space Florida, by contrast, was chartered expressly for that purpose. Much like an airport or seaport authority, Space Florida can finance major capital projects by private customers on public land. To date, Florida has invested some \$1.6 billion of taxpayer money to make the state more competitive in attracting aerospace businesses.

Since the peak of the 30-year shuttle program's heyday, KSC's workforce has shrunk by about 50 percent. Current employment stands at about 7,800: 2,000 civil servants and 5,800 contract workers. That compares to 2,000 civil employees and 14,000 contractors two decades ago.

The decline reflects not only the reduction in the "standing army" required for shuttle operations and the reduced workload at the Cape, but also the lean-business ethos of commercial space operators. That change, DiBello says, will only continue "as the commercial sector becomes the more dominant economic engine within the U.S. space program nationally."

In 2015, the 10 launches of government payloads — ranging from space station supply capsules to spy satellites — outnumbered the six launches of commercially owned payloads, such as communications satellites. But data on launch management, as opposed to payload ownership, suggest a different story. According to Ketcham, KSC made the transition to commercial operation immediately after the shuttle's retirement. Since then, all launches, including those of United Launch Alliance's Atlases and SpaceX's Falcons, have been

managed by commercial launch providers, not NASA. The agency's calendar for the next 10 years includes only two launches of its Space Launch System, whereas Ketcham estimates the commercial sector will oversee more than 100 launches.

Although KSC remains a government-funded NASA center, a key objective has been to repurpose selected facilities to create "a 21st century space launch complex with modernized infrastructure for more cost-effective operations, serving multiple users," as Kennedy Director Bob Cabana puts it.

His colleague Colloredo acknowledges that other NASA field centers also are transitioning to a "partnering approach" with other public agencies or with commercial firms. But "this dramatic change ... is unique to KSC."

The center is valuable as a launch site because of its position in the southernmost state in the continental U.S. Earth's spin provides a greater boost to rockets headed for near-equatorial orbits, so they can launch with heavier payloads.

Growing pains

KSC's reinvigoration will affect not just NASA but Florida's entire Space Coast region, which stretches from Titusville to Palm Bay to the south. The end of the shuttle program, which followed on the heels of the Great Recession of 2008, "was a double blow to this community," DiBello says. He says perseverance and hard work has enabled the region to bounce back.

Colloredo acknowledges that the journey has not been without "some growing pains." When the Orbiter Processing Facility-3 was left vacant after the shuttles, NASA needed time to decide whether to keep it or to demolish it. Ultimately, Colloredo says, the demand from commercial space became obvious, paving the way for Space Florida's agreement with Boeing to manufacture the CST-100 at the location.

Even if KSC never fully matches the glory years of Apollo and the shuttle program, it's easy to spot pockets of transformation throughout the sprawling launch base. Where once the NASA "meatball" was the only insignia in sight, visitors now can spot SpaceX's logo and a giant Boeing mural, testaments to KSC's metamorphosis. ▲



Atlantis lifts off from Launch Pad 39A at Kennedy Space Center in 2011, the final space shuttle flight.