



# NASA's Michoud Assembly Facility

## 'America's Rocket Factory' Builds Future in Space

For more than half a century, NASA's Michoud Assembly Facility in New Orleans, Louisiana, has been "America's rocket factory," the nation's premiere site for manufacturing and assembly of large-scale space structures and systems. The government-owned manufacturing facility is one of the largest in the world, with 43 acres of manufacturing space under one roof — a space large enough to contain more than 31 professional football fields. Michoud is managed by NASA's Marshall Space Flight Center in Huntsville, Alabama, with several areas of the facility used by commercial firms or NASA contractors.

Today, Michoud is manufacturing and assembling some of the largest parts of NASA's Space Launch System (SLS) — the world's most powerful rocket that will send the Orion spacecraft, astronauts and supplies on bold exploration missions to the Moon and beyond.

Michoud workers, led by prime contractor The Boeing Co., headquartered in Chicago, are building the SLS core stage, the largest part of the 322-foot-tall rocket. Towering at 212 feet tall with a diameter of 27.6 feet, the SLS core stage will be the largest rocket stage ever flown. It will store 730,000 gallons of super-cooled liquid hydrogen and liquid oxygen to fuel the four RS-25 engines which power the rocket. Aerojet Rocketdyne of Sacramento, California, is the prime contractor for the RS-25 engines.

Using state-of-the-art manufacturing and welding equipment — including a friction-stir-welding tool that is the largest of its kind in the world — technicians at Michoud manufactured the core stage's major structures, which are being outfitted with avionics, thermal protection systems and other internal hardware.



An aerial view of the main building at Michoud Assembly Facility, which features more than 43 acres of advanced manufacturing under one roof and convenient interstate, railway and port access. (NASA/MSFC/MAF)

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The avionics will be tested, the structures will be joined together, and the RS-25 engines will be attached to form the core stage for Exploration Mission-1 (EM-1), the first integrated flight of SLS and the Orion spacecraft. SLS will provide the power to send the uncrewed Orion spacecraft 280,000 miles beyond the Earth, farther than any spacecraft built for humans has ever flown.

Orion's large structures and composites are being manufactured at Michoud by prime contractor Lockheed Martin of Bethesda, Maryland. These structures include the Orion crew module pressure vessel, its underlying framework, designed to ensure a sealed life support environment. Fabrication and development of the launch abort system is also underway at Michoud by Lockheed Martin. This system is positioned on a tower atop the crew module and can activate within milliseconds to propel the vehicle to safety and position the crew module for a safe landing.

To help realize these next-generation spacecraft, Michoud is building on its long legacy of successful fabrication and manufacturing of large, complex hardware for NASA flight programs. During the Apollo Program in the 1960s, workers at Michoud built the first stages of the Saturn IB and Saturn V rockets, which took America's astronauts first to low-Earth orbit and then on to the Moon. In the decades after Apollo, Michoud was home to manufacturing of the 15-story-tall external tanks, the largest space shuttle elements, which carried the fuel for 135 shuttle flights from 1981-2011. Experience and expertise gained while building the Saturn stages and the space shuttle external tanks benefit SLS core stage development and manufacturing.

### **Facilities and Capabilities**

Situated on 829 acres of land, the Michoud Assembly Facility features more than 2 million square feet of manufacturing space, and more than 300 acres of green space for expansion. The site includes numerous open, high-bay areas, an extensive overhead crane network and the 45,000-square-foot Vertical Assembly Center, the world's largest robotic tool for building rockets, for the integration and stacking of large-scale structures. Its list of state of the art manufacturing capabilities includes friction stir welding, composite materials fabrication and curing, non-destructive evaluation, fiber placement machines, gantry machining centers, advanced laboratory services, build to print part/component fabrication, modeling and simulation services and much more.



**A qualification test article for the liquid hydrogen tank on NASA's new heavy-lift rocket, the Space Launch System, is lifted off Michoud's Vertical Assembly Center after final welding is complete. (NASA/MSFC/MAF)**

The facility also has interstate highway access, and a port on the Intracoastal Waterway connecting Michoud to the Mississippi River and Gulf of Mexico for transportation of manufactured space hardware. NASA's barge Pegasus, maintained at Michoud, has been modified to transport large SLS elements such as the core stage — the largest piece of hardware NASA has ever moved by barge.

Michoud's location allows the agency and its tenants to take advantage of leading-edge manufacturing, welding, fabrication and material evaluation techniques developed by NASA and its academic and industry partners.

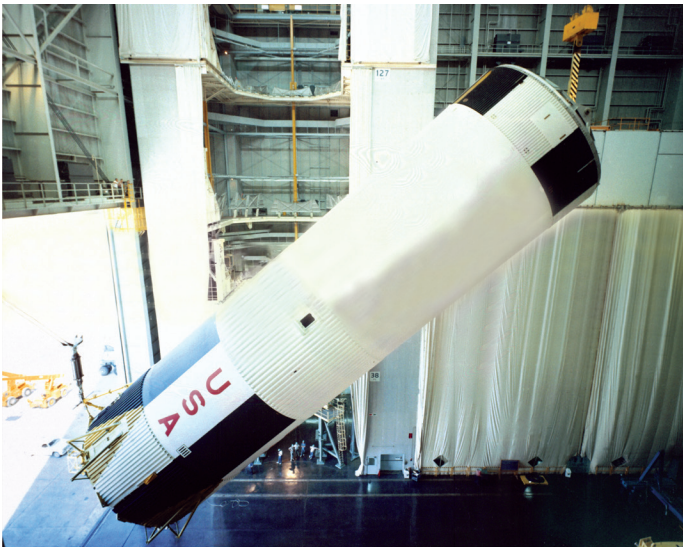
Michoud is a multi-tenant community, a cost-effective example of successfully operating large, government-owned facilities by sharing space with other government and commercial tenants. Since the space shuttle era, the facility has seen a 60-percent reduction in operating costs.

Approximately 3,500 people are employed on-site, including government civil-service workers, contractor employees and tenants. Michoud's tenants include aerospace contractors, other government agencies and commercial firms. The National Center for Advanced Manufacturing — a partnership among NASA, the state of Louisiana, Louisiana State University in Baton Rouge and the University of New Orleans — also makes its home at Michoud.

Michoud's history dates back to the 1700s when it was part of a French Royal land grant and later became the site of a sugar cane plantation and refinery operated by Antoine Michoud. The U.S. government purchased the land in 1940 and built a production facility to manufacture cargo aircraft, tank engines and more. NASA acquired the facility in 1961.



**A structural test version of the intertank for NASA's new heavy-lift rocket, the Space Launch System, is loaded onto the barge Pegasus, at NASA's Michoud Assembly Facility in New Orleans. Pegasus, originally used during the Space Shuttle Program, has been redesigned and extended to accommodate the SLS rocket's massive, 212-foot-long core stage — the backbone of the rocket.**



**Experience and expertise gained while building the Saturn stages (left) and the space shuttle external tanks (right) benefit SLS core stage development and manufacturing.**

For more information about Michoud and its role in the nation's space program, visit:

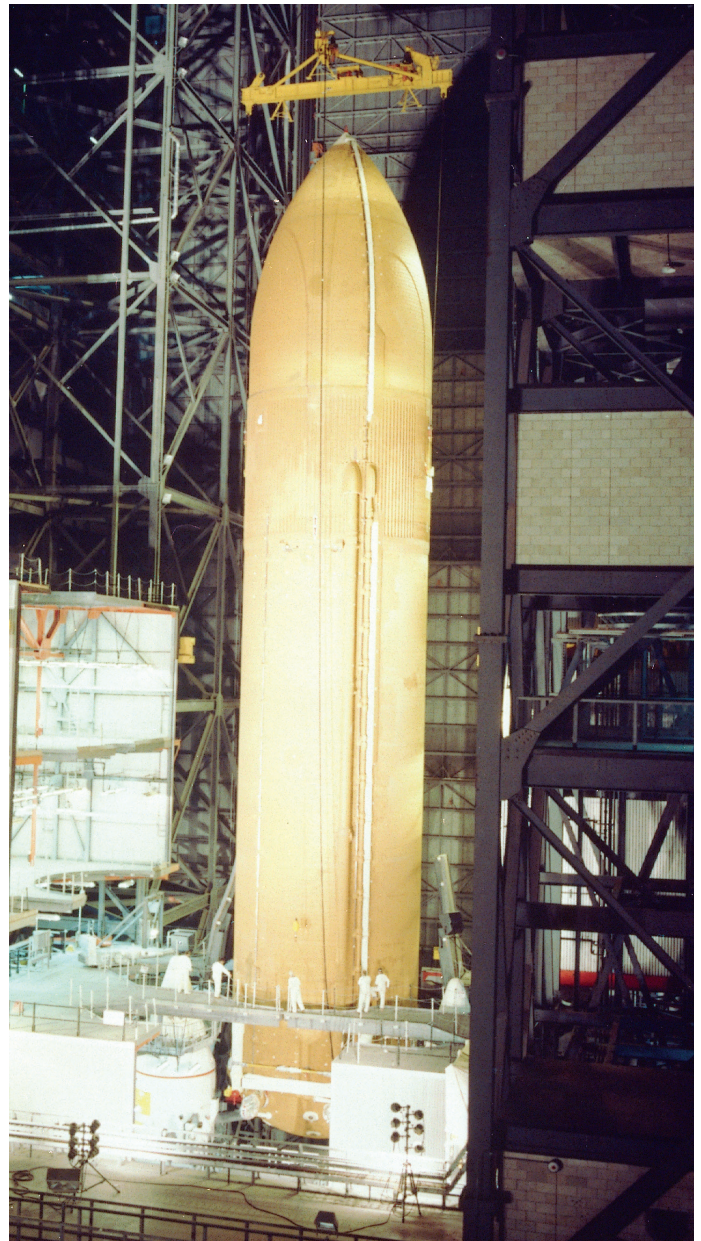
**<http://www.nasa.gov/centers/marshall/michoud>**

For more information about NASA's Space Launch System, visit:

**<https://www.nasa.gov/sls>**

For more information about NASA's Orion Spacecraft, visit:

**<https://www.nasa.gov/exploration/systems/orion/index.html>**



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