



Michoud Assembly Facility

**A component of NASA's Marshall Space Flight Center
Providing Large Aerospace Assembly and Manufacturing
Capabilities for NASA Programs and Projects**



An aerial view of the manufacturing area at NASA's Michoud Assembly Facility in New Orleans, La. (NASA/MSFC)

The Michoud Assembly Facility in New Orleans, La., has a long, successful history and proven expertise in the manufacture and assembly of large aerospace systems and structures supporting NASA programs and projects.

Managed by NASA's Marshall Space Flight Center in Huntsville, Ala., Michoud includes one of the world's largest manufacturing plants, with 43 acres under one roof, and a port with deep-water access, permitting transportation of large space systems and hardware.

As NASA enters a new era in space travel, the Michoud facility is poised to continue its legacy, providing vital support to NASA's mission to return humans to the moon, send the first crewed expeditions to Mars and extend a human presence throughout the solar system.

During the Apollo Program of the 1960s, the first stages of the Saturn I and IB, and Saturn V launch vehicles were built at the Michoud facility. The launch vehicles were part of the family of rockets used to send American

astronauts to low Earth orbit and propel the Apollo astronaut capsule to the moon.

In 1973, Michoud put its manufacturing capabilities to work on NASA's next-generation launch system: the space shuttle. Nearly three decades later, the NASA facility continues to support the Space Shuttle Program. The design, manufacture and assembly of the shuttle's external tank is performed at Michoud. The external tank is the single largest element of the shuttle, 27.6 feet in diameter and standing as tall as a 15-story building. The tank holds some 535,000 gallons of liquid oxygen and liquid hydrogen propellant, which is fed to the shuttle's three main engines during launch to power the vehicle to space.



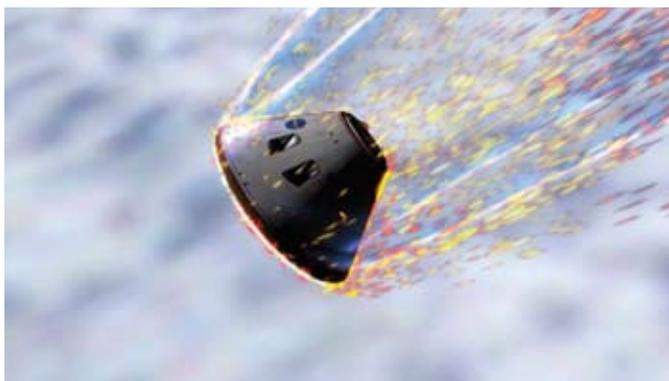
The final assembly phase of space shuttle lightweight external tanks 5, 6 and 7 is under way at Michoud. Each giant cylinder, taller than a 15-story building, is 154 feet tall and 27.5 feet in diameter. The external tank is the largest single piece of the shuttle system. (NASA/MSFC)

Today, work performed at Michoud includes integration of composite materials, which offer lighter weight and equivalent-or-greater strength than metals, into the external tank design. Michoud also is responsible for development of lightweight pressurized tanks

NASAfacts

for advanced satellite and commercial reusable launch vehicle systems, and other advanced manufacturing techniques applicable to the aerospace industry.

Drawing on its proven, world-class facilities, Michoud has been selected to support several major space exploration projects: the manufacture of large structures and composites for the Orion crew exploration vehicle, and the manufacture and assembly of the upper stages of the Ares launch vehicles. The facility also will integrate and assemble a commercial vehicle for NASA's Commercial Orbital Transportation Services project, a NASA effort announced in 2006 to partner with private industry to deliver crew and cargo to the International Space Station.



Concept image of Orion crew exploration vehicle during re-entry to Earth's atmosphere. (NASA/JSC)



Concept image of the Ares I crew launch vehicle, left, and the Ares V cargo launch vehicle on the launch pad. (NASA/MSFC)

These projects will ensure Michoud remains an integral player in carrying out NASA's primary objective of continuing a robust space exploration program that will aid in advancing our nation's scientific, economic and security interests.

Facilities and Capabilities

Michoud is located on 832 acres with 3.8 million square feet of total infrastructure, including nearby Interstate Highway and railway access and a port that accesses the Mississippi River-Gulf of Mexico. The Michoud Canal provides a 36-foot-deep by 250-foot-wide ship channel and an 800-by-800-foot turning basin to serve barges traveling to facilities along the water outlet.



An aerial view of the NASA dock at Michoud Assembly Facility with four barges – from left, the Paleamon, Promise, Poseidon and Orion. The barges ferried the Saturn IB and Saturn V upper stages between Michoud; NASA's Marshall Space Center in Huntsville, Ala.; Stennis Space Center near Bay St. Louis, Miss.; and Kennedy Space Center, Fla. (NASA/MSFC)

This infrastructure includes 900,000 square feet of office space; 400,000 square feet of warehouse space; 200,000 square feet of site operations, including information and telecommunications systems, as well as 27 major utility systems; and 225 acres of green space for new office, manufacturing and test facilities.

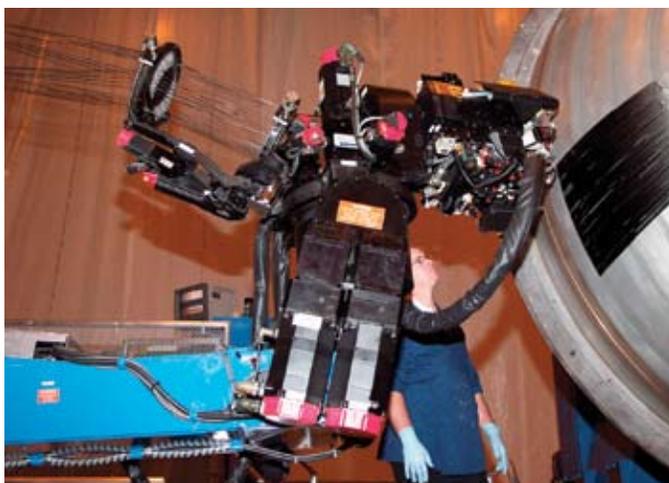
The facility consists of more than 2.2 million square feet of manufacturing space, including open high-bay areas and a 45,000-square-foot Vertical Assembly Facility for the integration and stacking of large-scale hardware and structures. It also has one of the world's largest manufacturing plants with about 43 acres under one roof and features a full complement of state-of-the-art plant and tooling equipment.



Engineers at NASA's Michoud Assembly Facility install an F-1 engine on the Saturn V S-1C first stage. The S-1C first stage included five F-1 engines and powered the Saturn V rocket through the first 37.9 miles of launch. (NASA/MSFC)

Michoud is home to the National Center for Advanced Manufacturing, a partnership between NASA, the state of Louisiana and the University of New Orleans. The center provides advanced manufacturing technology for use in aerospace commercial markets. Through this partnership, new welding, fabrication and material evaluation techniques developed by NASA and its partners will play a crucial role in development of NASA's next-generation exploration and launch vehicles.

Michoud's laboratories are equipped with the latest materials, processing and production support for testing large structures, components and full-scale hardware. This includes pneumatic testing, which uses air pressure to test the structural strength of a system, and hydrostatic testing, which checks the strength and leak-resistance of a system or component by internal pressurization with a liquid, usually water.



An engineer at the National Center for Advanced Manufacturing at Michoud inspects the results as the head of the Advanced Fiber Placement Machine uses robotic movements to place layers of composite fibers on a curved surface. (LMSSC-MO)



The National Center for Advanced Manufacturing's Non-Destructive Evaluation System employs a twin 5-axis traveling column configuration and multiple inspection system capability. (LMSSC-MO)

Louisiana Impact

Michoud is one of the largest employers in New Orleans, with more than 4,200 employees on-site. It also serves as home to several other government entities, including the U.S. Department of Agriculture National Finance Center, a forerunner in the application of computer technology in managing administrative functions; and the U.S. Coast Guard Integrated Support Command, the primary provider of facilities engineering, training, housing and health services for the nation's leading maritime law enforcement agency.

Lockheed Martin, NASA's prime contractor for the shuttle external tank and the Orion crew exploration vehicle, performs work on site at Michoud. Rocketplane-Kistler of Oklahoma City, one of two companies selected to develop and assemble a transportation system for NASA's Commercial Orbital Transportation Services project, also will host its development work at Michoud.

In addition, Michoud is strategically located within the Almonaster-Michoud Industrial Park, offering industry attractive co-location options for possible business opportunities.

Historical Overview

The original tract of land was part of a 34,500-acre French Royal land grant to local merchant Gilbert Antoine de St. Maxent in 1763. By the early 1800s, the property was owned by architect and engineer Bartholomey Lafon, whose maps of the waters surrounding the tract were used by Gen. Andrew Jackson in defeating the British in the Battle of New Orleans in 1815.

Later, the land was acquired by French transplant Antoine Michoud, who moved to the city in 1827. Michoud operated a sugar cane plantation and refinery on the site until his death in 1863. His heirs continued operating the refinery and kept the original St. Maxent estate intact into the 20th century. Two brick smokestacks from the original refinery still stand on the Michoud facility grounds.

In 1940, the U.S. government purchased the land as a site for war-related construction. Three years later, the world's largest production building at the time, covering 43 acres under one roof, was completed. The plant was used during World War II to build cargo planes and other aircraft, and again during the Korean War to produce tank engines.

The Michoud facility was acquired by NASA in 1961, after its availability was brought to the space agency's attention by Wernher von Braun, known as the father of the Saturn family of rockets, who was named the Marshall Center's first director in 1960.

Marshall Space Flight Center

The Michoud Assembly Facility is a government-owned, contractor-operated component of NASA's Marshall Space Flight Center. The Marshall Center directly employs some 7,000 civil servant and contractor employees and manages a \$2.3 billion dollar budget.

Marshall has a proven history of developing key space transportation and propulsion technologies for NASA space exploration missions. Today, Marshall leads development of the agency's next-generation launch vehicles, the Ares I crew launch vehicle and Ares V cargo launch vehicle; leads the Lunar Precursor and

Robotic Program effort that will pave the way back to the moon; manages Space Shuttle Program propulsion elements and science operations on the International Space Station; and pursues scientific breakthroughs to improve life on Earth.

For more information about NASA's Marshall Space Flight Center, visit: **www.nasa.gov/marshall**

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