



NASA Completes Core Stage Hardware for First Space Launch System



NASA completed major welding for the liquid hydrogen tank for the first Space Launch System mission at the agency's Michoud Assembly Facility in New Orleans. The tank was the final piece of flight hardware completed for the deep-space rocket's first mission. The liquid hydrogen tank measures more than 130 feet tall, comprises almost two-thirds of the core stage and holds 537,000 gallons of liquid hydrogen cooled to minus 423 degrees Fahrenheit.

After completing major welding on the liquid hydrogen tank for NASA's Space Launch System's (SLS) first flight, all five parts of the rocket's core stage are built and ready for additional outfitting and testing. NASA also finished

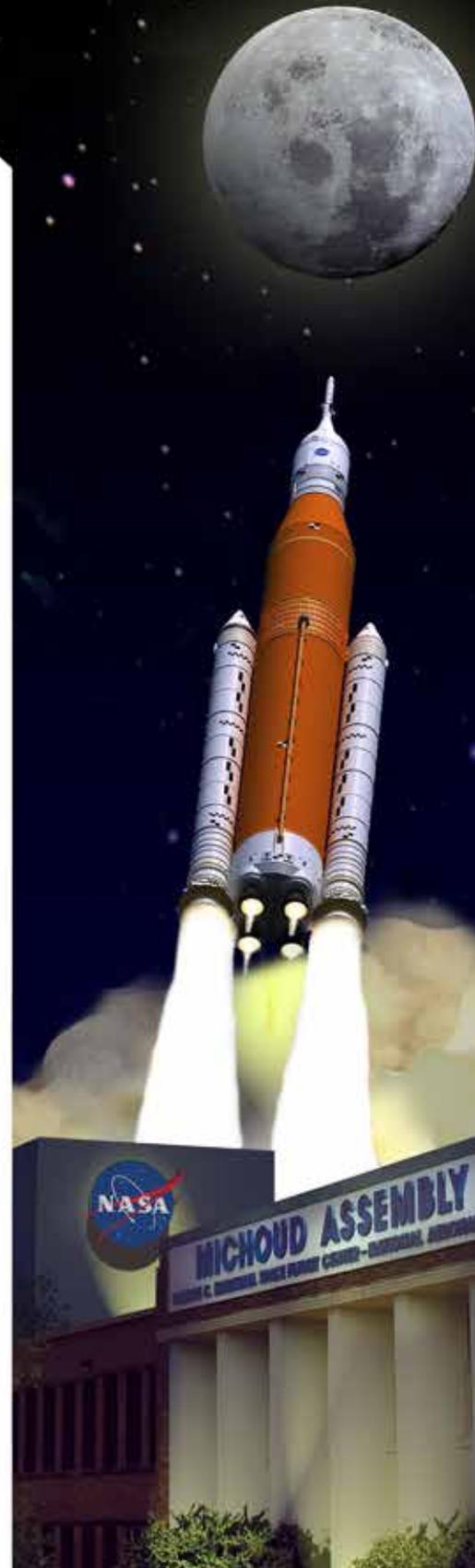
manufacturing all four core stage test articles, and testing is underway on the engine section structural test article at NASA's Marshall Space Flight Center in Huntsville, Alabama.

"The big items are done, and the team is focused on the intricate details of outfitting the flight hardware to perform specific tasks for the most powerful rocket in the world," said Chad Bryant, the SLS core stage manufacturing lead at Marshall. "When assembled, the core stage will stand taller than a 20-story building and include hundreds of cables for everything from data collection to propulsion systems."

Outfitting the Core Stage

Three core stages parts that require the most work inside are the engine section, where the four RS-25 engines will be housed, and the intertank and forward skirt that hold most of the avionics, or the brains of the rocket, that tell it how and where to fly. "Think about this work like building a car," explained Bryant. "We have the main structure or frame built. Now, we are installing the guts and electronics that turn the rocket into a transportation system: propulsion systems in the

continued on pg 3



Letter from Leadership

Michoud Team,



*Keith Hefner,
Michoud Director*

I am pleased by the continued progress and dedication I see each and every day. I want to start off by commending the Ride-out Crew for their swift action when Michoud landed in the direct path of Hurricane Nate on October 7. Fortunately, the site only

closed for a day as a precautionary measure and we did not have anything catastrophic to address.

On October 13, we celebrated the opening of the new gas pumps at the Coast Guard Exchange. This has been a long-time coming. Thank you to Malcolm Wood and our team who worked on this project for many years. Your dedication will be appreciated for years to come. Our long-standing partnership with the U.S. Coast Guard along with the extra safety and convenience these pumps bring to Michoud are enormous benefits to our employees and partners.

On October 13, I also had the opportunity to speak on a panel at the Aerospace Alliance Summit along-side Todd May, director Marshall Space Flight Center and Rick Gilbrech, director Stennis Space Center. The successes we all shared about our individual site missions

as well as the details of how the Centers and Facility work together to achieve milestones for SLS were very well-received. Looking to the future, the story only gets bigger and better as we strive for the day when SLS and Orion will launch on the first integrated mission from Kennedy Space Center.

As an update on the tornado recovery effort, we are close to having a final plan for the demolition of Building 350. In the coming months, you may notice workers in the area setting the stage for demolition to take place. More information will be shared as details become available.

Last, I wanted to remind everyone, that work place safety should always be kept at top concern. If you see something unsafe or become aware of a potential danger, report it or ask for help. We are all responsible for staying safe at work and helping to keep our fellow workers safe.

As always, thank you for your dedication to Michoud.

*- Keith Hefner,
Director of Michoud
Assembly Facility*

Editor's Note: If you have a question or topic you'd like to see Keith address in his column, please email him at keith.hefner@nasa.gov.

Gas Station Opens at MAF



On Friday, a milestone was met at Michoud Assembly Facility with a ribbon cutting to celebrate the opening of gas pumps at the Coast Guard Exchange. The U.S. Coast Guard has been a valued partner of the facility for over 10 years. Many people worked tirelessly to make the new pumps a reality, Center Director Keith Hefner said in thanking those who led the effort. A number of people were recognized by U.S. Coast Guard Rear Admiral Paul Thomas and Capt. Bruce Brown during the ceremony for making the project a reality. At the conclusion of the ceremony, the ribbon was jointly cut by Marshall Space Flight Center Director Todd May and Thomas. Also joining in this honor were the following: (left to right) Gene Flores, Malcolm Wood, Hefner, Brown, Capt. Lucinda Cunningham, Command Master Chief Heath Jones and Crystal Locure.

SLS Meets Milestones

continued from pg 1

engine section, computer and other electronics in the forward skirt and the intertank.”

Then, to keep cryogenic propellant as cold as minus 423 degrees Fahrenheit and to protect the rocket against the harsh temperature environments experienced during launch and flight, engineers apply thermal protection insulation to every large piece on the outside as well as in critical places on the inside.

Testing the Tanks

To build the two largest core stage structures -- the liquid hydrogen and liquid oxygen tanks that hold more than 700,000 gallons of propellant -- NASA welded the thickest structures ever joined using self-reacting friction stir welding. The Vertical Assembly Center, the world's largest robotic welder at NASA's Michoud Assembly Facility in New Orleans, did the job. NASA and Boeing, the core stage prime contractor, had to overcome challenges to weld aluminum at the thicknesses

required for the massive rocket tanks.

The liquid oxygen tank is undergoing hydrostatic testing, which tests the weld strength by filling the tank with 200,000 gallons of water and subjecting the tank to similar pressures and forces that it will experience during flight.

“This is the first time we are doing this test for an SLS tank, and it's a major milestone,” said Ben Birkenstock, SLS stages manufacturing engineer at Marshall. “We've covered the tank with sensors, and we'll collect data to show the tank welds hold up when it is loaded with water that simulates propellant.”

The liquid hydrogen tank is being plug welded to fill in holes left during the robotic welding process, and then it will undergo a different type of proof testing using nitrogen gas and load cells to simulate pressures and loads seen during flight. The liquid hydrogen structural qualification test article already completed this proof test.

Saving Lives, Protecting NASA

The prompt response of the Emergency Operations Center (EOC) at NASA's Michoud Assembly Facility in New Orleans is very important. The EOC is the nerve center and focal point for incident command. This dedicated area is equipped with communications equipment and all of the tools necessary to respond quickly to an emergency by gathering critical information, coordinating response activities and managing personnel as the emergency situation dictates.

We have all seen the importance of a trained EOC team during all the catastrophic events we have recently experienced in this country, and even here at Michoud on Feb. 7, when warnings went out on the announcement system that a tornado was heading straight for facility. As soon as the all-clear signal was given, the EOC was activated. The team provided a coordinated response and a clear chain of command for safe operations of the facility to begin. The team quickly took action to stabilize the situation and keep the facility secure. Relying on cell phones, radios and verbal communication, direction was given to begin conducting damage assess-



Todd May director of the Marshall Space Flight Center in Huntsville, Alabama addresses the EOC team here at MAF after he was briefed on the recovery activities following the tornado on Feb 7th. He praised the team for their quick response and dedication to allow our facility to resume normal operations.

ments of buildings and facilities, and accounting for all employees. Crews were dispatched to start work to secure the perimeter and to evacuate all non-essential personnel, until Michoud could resume normal operations.

EOC team members understood their roles and responsibilities and ensured the safety of employees while protecting NASA's rocket

continued on pg 4

Emergency Team

continued from pg 2

factory. "The team did a phenomenal job responding to the February 7 tornado," said Malcolm Wood, the manager of center operations at Michoud, who was part of the team that rode out Hurricane Katrina in 2005.

With a lot of long hours and dedication, EOC team members were able to transition the site quickly and safely from an emergency state to be able to begin restoring operations and enable tenants and employees to return to work.

Steve Turner, Emergency Operations Manager at MAF has activated the EOC 45 times in his 21 years onsite, says: "In an emergency, people have the opportunity to witness the incredible de-

votion and skills of the team. Everyone recognizes the work they do and deeply appreciate their work. They do such an incredible job because of two key factors: one, they're professionals, well trained and serious about their work and two, each and everyone has a passion for Michoud. Each person loves this place! We're a family and, sooner or later, you become a member of the 'family' – a family who care as much for each other as they do the facility."

Every emergency management organization works differently and each has something that motivates the team to excel. At Michoud, it's the family.

Caught in the Act



Jay Fallo, the events coordinator at Michoud Assembly Facility received a "Caring in Action" award after being spotted by a member of the Marshall Space Flight Center Safety & Health Action Team (MSAT) assisting a coworker in need. Fallo noticed that his coworker, on the side of the dangerous roadway, had a flat tire on his vehicle and needed assistance. He stayed with his coworker and acted as a spotter until the vehicle could be safely repaired. The Caring in Action recognition program provides members of the MSAT an opportunity to say "good job" for caring about fellow coworkers' safety and well-being and for taking the time to go the extra mile.

MAF STEM Team



MAF STEM TEAM supported third annual STEM Slidell event – 9/17; Volunteers supported the second annual Science, Technology, Engineering and Math (STEM) event in Slidell, Louisiana. Approximately 170 Slidell students were in attendance for the NASA hosted event held at St. Tammany Junior High School. Students (170) participated in multiple exercises to demonstrate scientific methodologies, technologies, engineering processes and mathematical principles related to Space and Aeronautics. Some of the activities demonstrated propulsion, stability, shock absorption, and the importance of "team work".

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