Boeing finally completes SLS core stage, packs it for Mississippi tests

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- Boeing has completed the core stage of NASA’s SLS rocket.
- The rocket was loaded onto the agency’s Pegasus barge Wednesday.
- It was a pretty day in southern Lousiana.
- The core stage of NASA’s SLS rocket rolls out of the factory at Michoud Assembly Facility.
- The workforce at the Louisiana-based facility looks happy.
- The core stage is complete.
- A view of the core stage as Boeing installed RS-25 engines in late 2019.
- A closer view of four RS-25 engines attached to the rocket.

On Wednesday, Boeing moved the completed core stage of NASA’s Space Launch System rocket from the Michoud Assembly Facility onto the space agency’s Pegasus Barge. When weather conditions are favorable, the barge will carry the 64-meter rocket from the rocket factory near New Orleans to the Stennis Space Center in southern Mississippi.

“It was a beautiful day here,” said John Shannon, Boeing’s program manager for the SLS rocket, in a teleconference with reporters. “We had a spectacular view of this new national asset.”

Finishing assembly of the core stage represents an important milestone for Boeing, which has spent most of the 2010s working with NASA on designing the SLS rocket and building the first core stage. Boeing began cutting metal on the very first barrels for this core stage, which will fly NASA’s Artemis 1 mission, back in 2015 at the Louisiana-based facility. NASA has spent nearly $10 billion on the SLS rocket’s core-stage development so far.

Green run test

At Stennis, the rocket will be mounted to the B-2 test stand later this month, where Boeing and NASA officials will perform a series of tests and checks to ensure the integrity of the core stage, which includes four space shuttle main engines and two large tanks that house liquid oxygen and liquid hydrogen fuels.

This test and checkout work will conclude with two big events. The first is a “wet dress rehearsal,” in which the rocket is loaded with fuel and brought through a countdown but not ignited. Then, about a week later, the clamped-down rocket’s four engines will be ignited and burn through a flight profile consistent with the core stage’s ascent through the Earth’s atmosphere.

Depending on weather and how well the vehicle performs, Shannon said this “green run” test could be completed by July or August. More likely, however, engineers will have to tackle issues that crop up, and the testing regime will not be finished before October. Although Boeing has already performed a series of pressure tests, seal checks, and electrical tests, Shannon said that cooling the rocket’s tanks down to cryogenic

temperatures for the fueling and test firing may reveal some things that need to be addressed.

Following the tests at Stennis, barring major issues, the core stage will be shipped to Kennedy Space Center on the Florida coast, about a 12-day voyage. There, large solid-rocket boosters will be attached to the side of the vehicle before the upper stage and Orion spacecraft are strapped on in anticipation of the uncrewed Artemis 1 mission. NASA has not yet set a date for this mission, but it seems unlikely to happen before the second quarter of 2021. The mission may well slip further should serious technical challenges arise. (It was originally supposed to fly in 2017).

Long haul

Shannon acknowledged these delays and said Boeing has learned a number of lessons from manufacturing the SLS rocket's first core stage. He added that production of the second one is progressing about 40 percent faster.

NASA's program manager for the SLS rocket, John Honeycutt, added that the space agency has built up production infrastructure at Michoud for the long haul. The agency, he said, is prepared to "build core stages for decades to come."

Whether the agency will need the SLS rocket for decades to come is not clear. NASA has spent the last nine years and billions of dollars on an expendable rocket that will cost as much as $2 billion per flight, according to government estimates. It seems unlikely that, if much cheaper, reusable launch solutions such as SpaceX's large Starship or Blue Origin's New Glenn vehicle prove reliable, NASA would continue flying its single-use booster.

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