



SEPTEMBER 2015

SPACE LAUNCH SYSTEM HIGHLIGHTS

The Heat Goes On as Engineers Start Analysis on SLS Base Heating Test Data

Engineers at NASA's Marshall Space Flight Center have successfully completed base heating testing on 2-percent scale models of the Space Launch System propulsion system. SLS will be the most powerful rocket ever built for deep space missions, including to an asteroid placed in lunar orbit and ultimately to Mars. The SLS propulsion system uses two five-segment solid rocket boosters and four core stage RS-25 engines that burn liquid hydrogen and liquid oxygen. Sixty-five hot-fire tests using the mini models provided data on the convective heating environments that the base of the rocket will experience during ascent. Engineers have many months ahead analyzing the data, which will be used to verify flight hardware design environments and set specifications for the design of the thermal protection system for the base of the rocket. The thermal protection system at the base of the vehicle keeps major hardware, wiring and the crew safe from the extreme heat created by the boosters and engines while burning on ascent. The models were designed, built and tested by Marshall engineers, in close collaboration with CUBRC Inc. of Buffalo, New York. Watch a video of one of the [tests](#). (CUBRC Inc.)

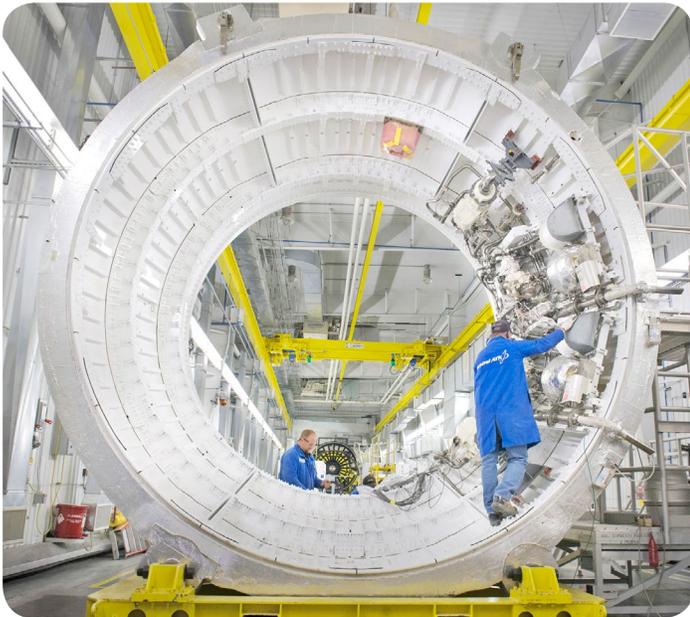


Construction Begins on Test Version of Important Connection for SLS

Welding is underway on major panels of a test version of the Launch Vehicle Stage Adapter, or LVSA, which connects the SLS core stage to the upper stage. “We are starting to see the test version of the LVSA take shape,” said Brent Gaddes, adapter manager for SLS. “This is a unique structure, which presents some challenges due to its large size and conical shape. However, we have a very capable team, both with Marshall and Teledyne Brown, and are building on our experience with the [stage adapter](#) that was used on Orion’s first test flight in 2014.” Read the [full story](#), and [watch a video](#) about the work. (NASA/MSFC)



Twice as Nice: NASA, Orbital ATK Prepare for Second SLS Booster Ground Test



The avionics subsystem and hardware is checked out at one of Orbital ATK’s test facilities before a successful Sept. 22 off-motor hot-fire test. The hot-fire test simulated the test cycle that will be used during the second booster qualification test, which closely resembles real flight conditions. Read more about progress toward that [test](#). (Orbital ATK)



An Orbital ATK employee installs insulation to the rear segment for the second booster qualification test. (Orbital ATK)

Spaceflight Partners: Cobham Mission Systems

EDITOR'S NOTE: Every month, Space Launch System Highlights turns the spotlight on one of the many industry partners helping to create the largest rocket ever built for human space exploration. In this issue, we profile Cobham Mission Systems of Orchard Park, New York.

Cobham Mission Systems of Orchard Park, New York, has been a supplier to NASA space systems since America's first manned space program. Today, Cobham provides a family of 10 different check valves to Boeing for the Space Launch System. A majority of the check valves are designed for gaseous helium, oxygen, and hydrogen under high-flow, low-pressure drop, extreme environmental conditions. The valves help to ensure safe cryogenic use for the **core stage** of the rocket.

The Cobham Mission Systems space business began by providing John Glenn's Project Mercury breathing regulator, and continues today with valves being developed for the Orion spacecraft, the European Service Module and SLS. Recently, they designed and produced several complex valves and quick disconnects for the Boeing Nitrogen Oxygen Recharge System (NORS) that delivers nitrogen and oxygen to the International Space Station. Cobham was founded by Sir Alan Cobham in 1934 and has grown to employ more than 12,000 people worldwide.



Cobham check valves used on the SLS systems. (Cobham)

Faces of SLS

#JOURNEYTOMARS

Greg Byrd

Boating, fishing, beach volleyball and ROCKET ENGINES! See what keeps life exciting for Greg Byrd, Aerojet Rocketdyne SLS engine assembly and test integrator at NASA's Stennis Space Center.



Learn more about [Greg Byrd](#).

FACES OF SLS

Stennis Space Center

Steel Swings for New SLS Test Stand at NASA Marshall

A crane positions steel pieces for the twin towers of a 215-foot-tall structural test stand for SLS at NASA's Marshall Space Flight Center in Huntsville, Alabama. When completed, hydraulic cylinders at Test Stand 4693 will push, pull and bend the liquid hydrogen tank of the SLS's massive core stage to subject the tank and hardware to the same loads and stresses they will endure during launch. During the tests, engineers will also apply pressure loads to the tank, which will be partially filled with inert nitrogen rather than combustible liquid hydrogen. Test Stand 4693 is being built in Marshall's West Test Area on the foundation of the stand where the Apollo Saturn V F-1 engine was tested during the 1960s. (NASA/MSFC)



NASA Tests Provide Rare Opportunity to Get 3-D Printed Part Comparison Data



A key part of the F-1 engine — the rocket engine that propelled the Saturn V and sent men to the moon — just completed a series of tests that will provide new data for today's rocket engine designers. While this rocket engine component is not currently being flown, engineers were able to test a 1960s-era rocket engine part, the gas generator, in 2013, and then make one with additive manufacturing and test it on the same stand — giving NASA engineers a direct one-to-one comparison of a key rocket component.

The results from these tests of a 3-D printed F-1 gas generator adds more information to help NASA and the aerospace industry reduce the risks associated with using 3-D printing to make future engine parts, especially for future versions of spacecraft, **like SLS**. (NASA)



Go behind the scenes of building the world's most powerful rocket with our blog, [Rocketology!](#)

Celebrating a Servant's Heart



Members of the SLS Program team are all smiles Sept. 17 at NASA physicist Trent Griffin's "Good Morning America" surprise at the U.S. Space & Rocket Center in Huntsville, Alabama. Griffin was featured as a **hometown hero** on the ABC television program for his community service efforts. (NASA/MSFC)



Trent Griffin, right, is congratulated by Marshall Center Director Patrick Scheuermann for his work in the community and his outreach efforts to encourage students to enter the science, technology, engineering and math fields. (NASA/MSFC)

On the Road in Seattle...



NASA, SLS and SLS prime contractor Boeing were in Seattle on Sept. 22-27 to talk about America's next great rocket and NASA's Journey to Mars with students at area schools, and visitors at The Museum of Flight. The museum hosted NASA "Journey to Mars" exhibits throughout the week. (NASA/MSFC)



Chris Crumbly, manager of the SLS Program's Spacecraft/Payload Integration and Evolution Office, shares his thoughts on the journey to Mars with Raisbeck Aviation High School students Sept. 22 at the Museum of Flight in Seattle. (NASA/MSFC)



Seattle Seahawks fans got a chance to learn more about SLS before the team's Sept. 27 home-game opener. (NASA/MSFC)



A flag that was flown in space is presented Sept. 25 to Seattle Seahawks coach Pete Carroll, second from left, during NASA's visit to the city. (NASA/MSFC)



Mars or bust! SLS's Sharon Cobb, left, and Chris Crumbly, third from left, were part of a panel about the journey to the Red Planet on Sept. 26 at The Museum of Flight. (NASA/MSFC)



Seeing double! NASA astronaut Jeanette Epps herself a twin talks to twin sisters about space at the "Journey to Mars" exhibits, hosted by The Museum of Flight. (NASA/MSFC)

Follow SLS on:



SLS on Deck:

- SLS Critical Design Review completion
- Interim Cryogenic Propulsion Stage structural test article completion
- Multiple SLS vendor visits