



DECEMBER 2014

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SPACE LAUNCH SYSTEM HIGHLIGHTS

NASA's New Orion Spacecraft Completes First Spaceflight Test

NASA marked a major milestone Dec. 5 on its journey to Mars as the Orion spacecraft completed its first voyage to space, traveling farther than any spacecraft designed for astronauts has been in more than 40 years. (Photo essay continued on Page 2)



The United Launch Alliance Delta IV Heavy rocket with NASA's Orion spacecraft mounted atop, lifts off Dec. 5 from Cape Canaveral Air Force Station's Space Launch Complex 37. (NASA)

...Orion Spacecraft Completes First Spaceflight Test



NASA Administrator Charles Bolden, left, NASA Associate Administrator for the Human Exploration and Operations Directorate William Gerstenmaier, and others in Hangar AE at Cape Canaveral Air Force Station in Florida react as they watch the Orion spacecraft splash down in the Pacific Ocean more than four hours after launch. (NASA)



The Orion crew module is moved by crane Dec. 13 from its crew module recovery cradle and placed in the crew module transportation fixture at the Mole Pier at Naval Base San Diego in California. (NASA)



A video camera onboard NASA's Orion spacecraft captured views out the window during the heat of re-entry as the capsule plummeted back toward Earth. (NASA)



Recovery team members in a Zodiac boat help guide NASA's Orion spacecraft into the well deck of the USS Anchorage following its splashdown in the Pacific Ocean. (U.S. Navy)



Welcome home! On Dec. 18, Orion arrives at Kennedy Space Center in Florida. (NASA/KSC)

Spaceflight Partners: Scot Forge

EDITOR'S NOTE: Every month, SLS 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 Scot Forge of Spring Grove, Illinois.



Scot Forge headquarters in Spring Grove, Illinois. (Scot Forge)

Scot Forge is a 100-percent employee-owned manufacturer of custom open die forgings and seamless rolled rings. The company's roots date back to 1893 when their doors opened as a small hammer shop in Cicero, Illinois. Over the past century, the company has grown to become one of the largest forge shops in the country. As an industry partner to organizations such as ATK and NASA, supporting the Space Launch System is an effort made possible on many fronts.

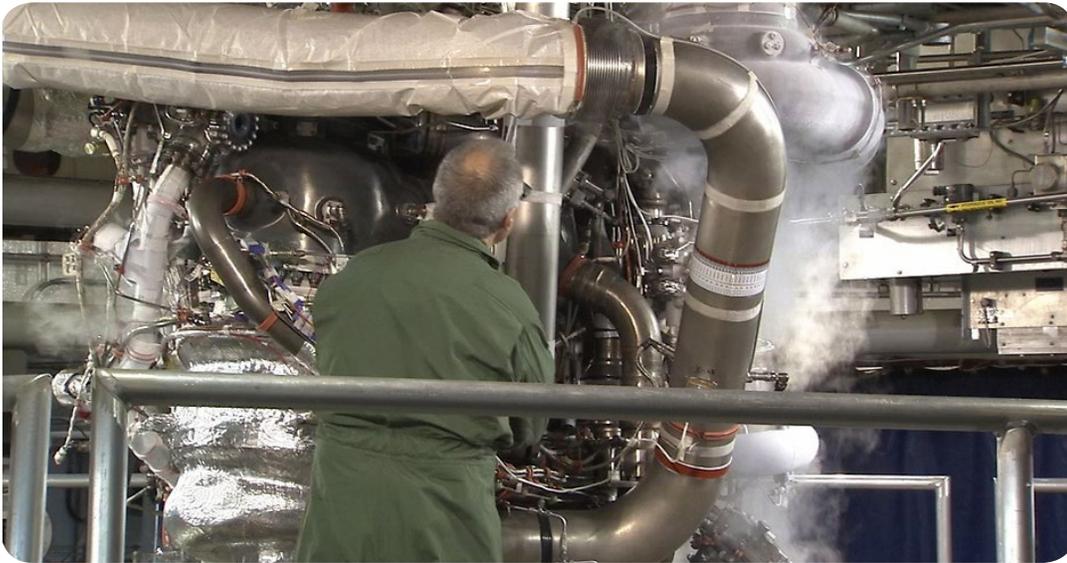
Scot Forge produces a wide variety of critical components that contribute to NASA's Exploration Systems Development programs. Forged parts made by Scot Forge have been installed into the Mobile Service Tower and Crawler Transporter at NASA's Kennedy Space Center in Florida, and test stands at ATK in Promontory, Utah, and the agency's Marshall Space Flight Center. Flight hardware in nonferrous alloys has been adopted for use on the Launch Abort System for Orion, the Orion spacecraft itself and the SLS core stage. This holistic involvement is a cornerstone of the company's approach for serving

the space industry, whether it's ground support equipment or extraterrestrial rovers.

Recently, ATK and Scot Forge partnered in the development of the robust Main Pivot Flexure for ATK's T-97 Test Stand. The challenge was to jointly develop a component that could withstand the incredible forces being exerted by the five segment SLS solid rocket booster. The thrust loads are transferred through the main pivot flexure into the forward test stand and the load cells resulting in motor thrust readings.

Ultimately, it was agreed to pursue a monolithic forging design that would be made from a high-strength stainless steel. Scot Forge technicians were challenged to meet critical strength and toughness requirements. Advanced forging practices, heat treat modeling and tight process control all helped to optimize the manufacturing parameters. The result of this effort yielded a product that exceeded even the highest expectations. The test firing on the T-97 Test Stand is scheduled for March 11.

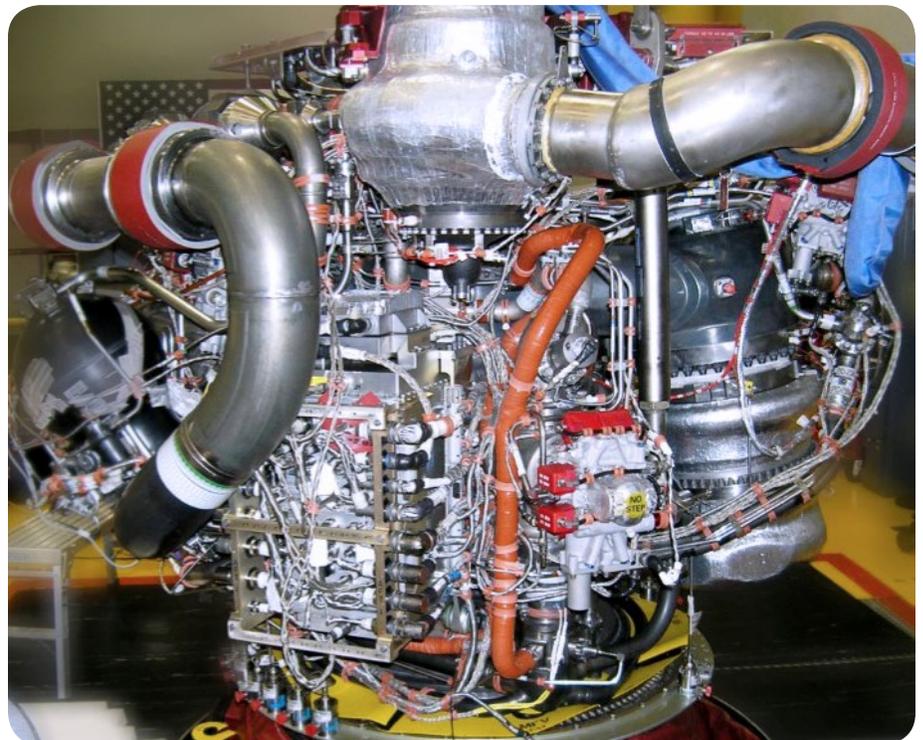
Chill Test, Warm Success



NASA engineers at Stennis Space Center near Bay St. Louis, Mississippi, took a major step Dec. 11 towards hotfire testing of RS-25 rocket engines that will help power the SLS on missions to deep space destinations. A-1 Test Stand operators at Stennis completed a chill test of developmental engine No. 0525, clearing the way for hotfire testing to begin in 2015. A chill test is a full dress rehearsal for hotfire testing. More information can be found [here](#). (NASA/Stennis)

New “Brain” for RS-25 Engine is No Technological Flashback to the ‘80s

Take a look at your current devices. Can you imagine swapping that smartphone for a gigantic cellphone from the 1980s? Surfing the Internet with dial-up speed? Working out to your favorite music with a cassette player? Today’s technology is better, faster and more innovative. People have to keep up with the rapidly changing times, and so does the “brain” for the RS-25 rocket engine. For the full story click [here](#). (NASA)



Pegasus Barge Continues Modifications for SLS



Work continues on NASA's Pegasus barge, which is undergoing refurbishments at Conrad Shipyard LLC in Morgan City, Louisiana. Conrad crews recently built and replaced the vessel's 115-foot center section with a new, 165-foot center section. The team also is finishing the final welds, surface preparation and painting for the barge. The modifications increased the total length of the barge from 260 feet to 310 feet—a little more than the length of a football field. The barge modification work, acceptance testing and delivery are scheduled for completion in March 2015. Pegasus will carry the core stage of SLS. (NASA)

It's Beginning to Look a Lot Like a Test Stand for SLS

Progress continues! Some 156 truckloads of concrete were successfully poured Dec. 13 for a new, 215-foot test stand at NASA's Marshall Space Flight Center in Huntsville, Alabama. Test Stand 4693 will be used for structural loads testing on the liquid hydrogen tank for the core stage of SLS. The 4693 structure—being built on the foundation of the stand where the Saturn V F-1 engine was tested—will have a twin-tower configuration and be made with more than 2,500 tons of steel when completed in 2015. After the concrete cures, crews will begin preparing for the next concrete pour on the stand, including setting inner anchor rods and reinforcing steel. (NASA/MSFC)



SLS On the Road...

SLS had a great time supporting Orion's first flight test!



(Media Fusion)



(NASA/MSFC)



(NASA/JSC)

Follow SLS on:



(Media Fusion)

SLS on Deck:

- SLS antigeysers testing complete
- First RS-25 engine test
- Modifications continue on Pegasus barge