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## RS-25 Engine Testing Blazes Forward for NASA's Space Launch System

By Megan Davidson

The new year is off to a hot start for NASA's Space Launch System. The engine that will drive America's next great rocket to deep space blazed through its first successful test Jan. 9 at the agency's Stennis Space Center.



A hot-fire test of the RS-25 engine and new engine controller unit is conducted Jan. 9 on the A-1 test stand at NASA's Stennis Space Center. Four RS-25 engines will power SLS on future missions, including to an asteroid and ultimately to Mars. (NASA/Stennis)

The RS-25, formerly the space shuttle main engine, fired up for 500 seconds on the A-1 test stand at Stennis, providing NASA engineers critical data on the [engine controller](#)

See [RS-25 Engine](#) on [page 2](#)

## SLS Core Stage Engine: In It for the Long Haul

By Martin Burkey

How easy would it be to take the engine out of your current car and stick it into a different car? If you're a mechanic, you know it is entirely possible but would take some care.

NASA is designing SLS, which will be capable of exploring deep space destinations like an asteroid and eventually Mars, with affordability in mind, and using a combination of heritage hardware and modern manufacturing practices.

That's what NASA's doing now to get the RS-25 rocket engine that successfully powered the space shuttle fleet for 30 years ready to fly on NASA's next great rocket, the Space Launch System.

The agency's new rocket will build on the success of the RS-25 space shuttle main engine, the shuttle's solid rocket booster and the 27.5-foot-diameter external tank

See [Core Stage Engine](#) on [page 3](#)

# Changes in Store for Heads Up, Inside Marshall and ExplorNet

By Molly Porter

Familiar information tools and services used by team members at NASA's Marshall Space Flight Center will formally merge on Jan. 23.

Starting that day, the Inside Marshall intranet website will have a new look and feel and be merged with ExplorNet, Marshall Center's internal online collaboration tool. The redesigned Inside Marshall landing page will become the official portal to all things Marshall.

"This is the first phase in the creation of a more integrated framework for delivering employee communications," said Johnny Stephenson, acting director of Marshall's Office of Strategic Analysis and Communication. "We want to continually adapt and improve communication for Marshall employees while staying focused on the center's mission."

The services and information Inside Marshall and Heads Up provide have been carefully examined, redeveloped and integrated into ExplorNet to align more closely with team members needs.

Links to core information, news and services have been added to the site's header and footer, making them easy to find anywhere in ExplorNet.

The redesigned home page features a new

Announcements section, which displays messages written by and for Marshall team members. Through an announcements section and a dynamic banner employees can find out about key activities and events. The capability offered through the new site eliminates the need for a daily message to employees. Therefore when the new site rolls out on Jan. 23, Heads Up messages will no longer be sent daily to employees. Team members can follow easy step-by-step instructions on how to post announcements [here](#).

Fans of the daily Heads Up email may opt to receive daily announcements about what's happening around the center by visiting Marshall's new events blog called TODAY and adjusting their notification preferences in ExplorNet.

Marshall team members may schedule an orientation session with ExplorNet team members by contacting [Justin Pociask](#).

For more information, read the "[New Center Communications Frequently Asked Questions](#)" in [ExplorNet](#).

*Porter is a public affairs officer with the Office of Strategic Analysis & Communications.*

## RS-25 Engine *Continued from page 1*

[unit](#) and inlet pressure conditions. This is the first hot fire of an RS-25 engine since the end of space shuttle engine testing in 2009. Four RS-25 engines will power SLS on future missions, including to an asteroid and to Mars.

"We've made modifications to the RS-25 to meet SLS specifications and will analyze and test a variety of conditions during the hot-fire series," said Steve Wofford, manager of the SLS Liquid Engines Office at NASA's Marshall Space Flight Center, where the SLS Program is managed. "The engines for SLS will encounter colder liquid oxygen temperatures than shuttle; greater inlet pressure due to the taller core stage liquid oxygen tank and higher vehicle acceleration; and more nozzle heating due to the four-engine configuration and their position in-plane

*See [RS-25 Engine](#) on [page 4](#)*



*The RS-25 engine fires up for a 500-second test Jan. 9. This is the first of eight tests for the development engine, which will provide NASA engineers with critical data on the engine controller unit and inlet pressure conditions. (NASA/Stennis)*

## Core Stage Engine *Continued from page 1*

manufacturing infrastructure. The result will be the most powerful launch vehicle in the world, with more than twice the payload mass of the shuttle.

The SLS core stage is designed around four RS-25s. NASA has 16 flight engines currently in its fleet, as well as two development engines for ground testing. Engineers have performed extensive analysis to understand how the engines will work for SLS, but will continue to study the integrated design with detailed analysis and, ultimately, by firing the engine on its test stand at NASA's Stennis Space Center.

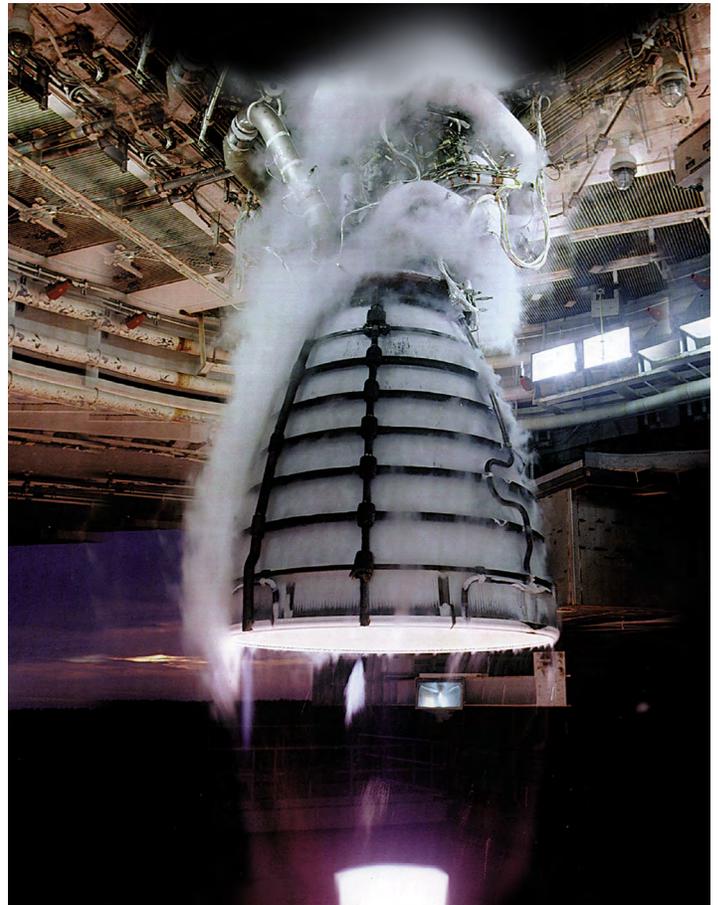
"The RS-25 is the most efficient engine of its type in the world," said Steve Wofford, manager of the SLS Liquid Engines Office at NASA's Marshall Space Flight Center, where the SLS Program is managed. "It's got a remarkable history of success and a great experience base that make it a great choice for NASA's next era of exploration."

Under an existing contract with Aerojet Rocketdyne, prime contractor for the RS-25, engineers at Stennis are testing the engine to begin the process of adapting it to meet SLS performance requirements and environments from the launch pad to space.

On the shuttle, the RS-25 routinely operated at 491,000 pounds of thrust. On SLS, it will operate at 512,000 pounds of thrust for the first four flights. Before launch, the four engines in the SLS core stage will encounter colder liquid oxygen propellant temperatures and a colder engine compartment in the SLS core stage.

Beginning at engine and booster ignition, the engines will encounter higher propellant inlet pressure and greater exhaust nozzle heating due to differences in the SLS design. The higher thrust and greater cooling, heating and pressure will be part of the upcoming test series and later core stage testing. The upcoming tests will also include the new engine controller design that replaces the RS-25's original three-decade-old engine computer.

NASA plans to restart RS-25 production to provide engines for future flights by working with Aerojet Rocketdyne to further adapt and modify the engine design to be more affordable, while increasing the



*The RS-25 engine fires up for a 500-second test Jan. 9. This is the first of eight tests for the development engine, which will provide NASA engineers with critical data on the engine controller unit and inlet pressure conditions. (NASA/Stennis)*

planned thrust to 521,700 pounds.

"We had identified significant cost and time saving ideas for the RS-25 before the shuttle program ended," Wofford said. "We see many opportunities for process and manufacturing savings with the change to an expendable engine and the maturation of technologies, such as 3D printing and structured light scanning."

Initial production will be for six new engines and more beyond that once NASA gains experience with the design and manufacturing changes. With that, the RS-25 is expected to be exploring space for many more decades and building on its space shuttle legacy.

*Burkey, an ASRC Federal/Analytical Services employee, supports the Office of Strategic Analysis & Communications.*

# Marshall, USSRC Ring In the New Year with 2015 FIRST Robotics Kickoff

NASA Administrator Charles Bolden greets students attending the kickoff event Jan. 3 for the 2015 FIRST Robotics Competition, hosted by the Marshall Space Flight Center and the U.S. Space & Rocket Center. FIRST, For Inspiration and Recognition of Science and Technology, is a robotic engineering challenge designed to encourage students to pursue advanced careers in technology and engineering. Eleven high school teams from Alabama, Tennessee and Mississippi attended the kickoff to learn about this year's design challenges and to pick up the kit of parts they will use to build their robots. (NASA/MSFC/ Christopher Blair)



During the next six weeks, students participating in the 2015 FIRST Robotics Competition will build and test robots designed to move and stack common recycling containers -- garbage cans and plastic bins -- for this year's game, called "Recycle Rush." Teams will return to the Marshall Center on Feb. 22 for the "Robots to Rocket City" demonstration event, held the week before district and regional competitions begin around the country. Winning teams can advance to the FIRST national championships in St. Louis, April 22-25. (NASA/MSFC/ Christopher Blair)



## RS-25 Engine *Continued from page 2*

with the SLS booster exhaust nozzles."

The engine controller unit, the "brain" of the engine, allows communication between the vehicle and the engine, relaying commands to the engine and transmitting data back to the vehicle. The controller also provides closed-loop management of the engine by regulating the thrust and fuel mixture ratio while monitoring the engine's health and status. The new controller will use updated hardware and software configured to operate with the new SLS avionics architecture.

"This first hot-fire test of the RS-25 engine represents a significant effort on behalf of Stennis Space Center's A-1 test team," said Ronald Rigney, RS-25 project manager at Stennis. "Our technicians and engineers have been working diligently to design, modify and activate an extremely complex and capable facility in support of RS-25 engine testing."

Testing will resume in April after upgrades are completed on the high pressure industrial water

system, which provides cool water for the test facility during a hot-fire test. Eight tests, totaling 3,500 seconds, are planned for the current development engine. Another development engine later will undergo 10 tests, totaling 4,500 seconds. The second test series includes the first test of new flight controllers, known as green running.

The first flight test of the SLS will feature a configuration for a 70-metric-ton (77-ton) lift capacity and carry an uncrewed Orion spacecraft beyond low-Earth orbit to test the performance of the integrated system. As the SLS is upgraded, it will provide an unprecedented lift capability of 130 metric tons (143 tons) to enable missions even farther into our solar system.

To watch a video of the first RS-25 hot fire, click [here](#).

*Davidson, an ASRC Federal/Analytical Services employee, supports the Office of Strategic Analysis & Communications.*

# New Initiative Emphasizes Mission Assurance and Flight Safety

By Molly Porter

A team at NASA's Marshall Space Flight Center is working to promote and strengthen the Marshall Center's focus on mission, hardware and crew safety.

The Mission Success Is in Our Hands initiative is a center-wide campaign led by Marshall's Safety & Mission Assurance directorate and the Jacobs Engineering group. The campaign strategy is geared toward creating learning opportunities and providing recognition for contributions that enhance the safety of NASA and Marshall's missions.

"Marshall has always been committed to flight safety and mission assurance," said Steve Pearson, deputy director of the Safety & Mission Assurance directorate. "As we embark on new opportunities, which mean new technologies, new challenges and new technical solutions, it is of utmost importance that we continue to focus on flight safety as a priority."

A major part of the initiative is a series of discussions called Shared Experiences. The forums are designed to engage decision makers and other team members in conversation with trusted leaders who will share their personal insights on topics related to mission assurance, what they learned and what they might do differently.

"I think this initiative is a great way to emphasize mission assurance and to learn how we can make our missions safer," said Jan Davis, Jacobs vice president and deputy general manager. "I will be talking about lessons that we can learn from the Challenger accident based on my personal experiences and research that I have done."

Davis will lead the first forum on Jan. 21 at 11:30 a.m. in Building 4203, Room 1201. The forum is open to all Marshall team members who are encouraged to bring their lunch. Drinks and dessert will be provided.

To learn more, visit [Mission Success Is in Our Hands](#) on ExplorNet.

*Porter is a public affairs officer in the Office of Strategic Analysis & Communications.*

## Pegasus Barge Continues Modifications for Space Launch System

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 brought 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. Pegasus will transport the [core stage](#) of NASA's Space Launch System. SLS will be the most powerful rocket ever built for deep space missions, including to an asteroid and ultimately to Mars. (NASA/Steven Seipel)



# Dieter Grau, Member of von Braun's Team of Scientists, Dies

By Michael Wright

Dieter Grau, one of the original German scientists who came to America with Wernher von Braun at the end of World War II and developed the space program that put humans on the moon, died Dec. 17. He was 101 years old.

Grau helped design the electrical system of the early rockets developed by von Braun's team and later served as director of quality assurance at NASA's Marshall Space Flight Center.

Grau, who was born in 1913 in Berlin-Charlottenburg, Germany, was a graduate of the Institute of Technology in Berlin. He earned his Bachelor of Science and Master of Science degrees

in electrical engineering following schooling there from 1932 to 1937.

Grau moved from Germany to the United States with von Braun at the end of World War II. He was one of 100-plus German scientists and technicians brought to America by the U.S. military in what was called Operation Paperclip. They spent several years at Fort Bliss, Texas, before transferring to Huntsville to resume their work for the Army at Redstone Arsenal. The team transferred to the Marshall Center when it was formed in 1960.

*Wright is the Marshall Center historian.*

## Obituaries

**Hilliard Mullins**, 87, of Fayetteville, Tennessee, died Nov. 20. He retired from the Marshall Center in 1983 as a management specialist. He is survived by his wife, Ada Cathleen Mullins.

**Charlene Elaine Emmons**, 78, of Evanston, Illinois, died Dec. 4. She retired from the Marshall Center in 2001 as a personnel security specialist.

**Joseph Gordon Robertson**, 91, of Huntsville, died Dec. 15. He retired from the Marshall Center in 1987 as an aerospace engineer. He is survived by his wife, Hazel Shockley Robertson.

**Dieter Grau**, 101, of Huntsville, died Dec. 17. He retired from the Marshall Center in 1973 as a director of the Quality & Reliability Assurance Laboratory.

**Robert Harvey Labbe**, 85, of Huntsville, died Dec. 27. He retired from the Marshall Center in 1974 as a security officer. He is survived by his wife, Margaret M. Labbe.

**Sheila P. Moore**, 61, of New Market, Alabama, died Jan. 1. She retired from the Marshall Center in 2011 as a management support assistant.

**James M. Lominick**, 76, of Huntsville, died Jan. 2. He retired from the Marshall Center in 1994 as an aerospace engineer.

**Stephen V. Rohr**, 84, of Huntsville, died Jan. 4. He retired from the Marshall Center in 1989 as an industrial relations officer. He is survived by his wife, Nancy Rohr.