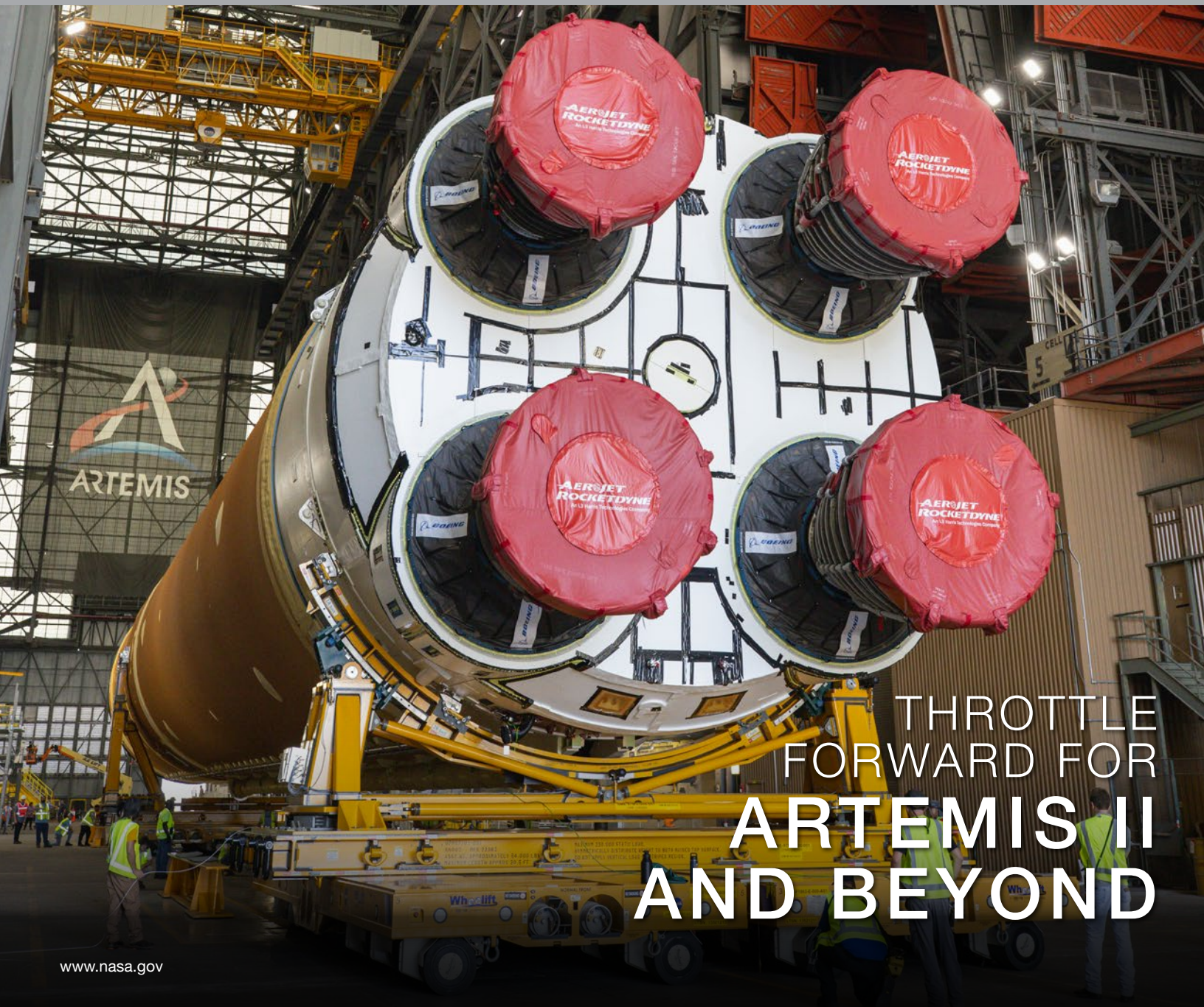


SPACE LAUNCH SYSTEM

JANUARY – JUNE 2024 BI-ANNUAL HIGHLIGHTS



THROTTLE
FORWARD FOR
ARTEMIS II
AND BEYOND

THROTTLE FORWARD FOR ARTEMIS II AND BEYOND

NASA and its industry partners are continuing to make progress toward manufacturing, producing, and assembling SLS (Space Launch System) hardware for the first crewed missions of NASA's Artemis campaign. Hardware is in flow for Artemis missions II, III, IV, and V, and development of new systems that will come online on the Artemis IX rocket is underway. SLS is a key element of the agency's Artemis campaign with its initial, single launch 59,500 pounds (27 metric tons) to translunar injection (TLI) payload capability.

In January, NASA announced updates to the Artemis II and III missions to allow teams to work through challenges associated with first-time developments, operations, and integration. The agency is targeting September 2025 for Artemis II, the first crewed Artemis mission around the Moon, and September 2026 for Artemis III, which is planned to land the first astronauts near the lunar South Pole. Artemis IV, the first mission to the Gateway lunar space station, remains on track for 2028.

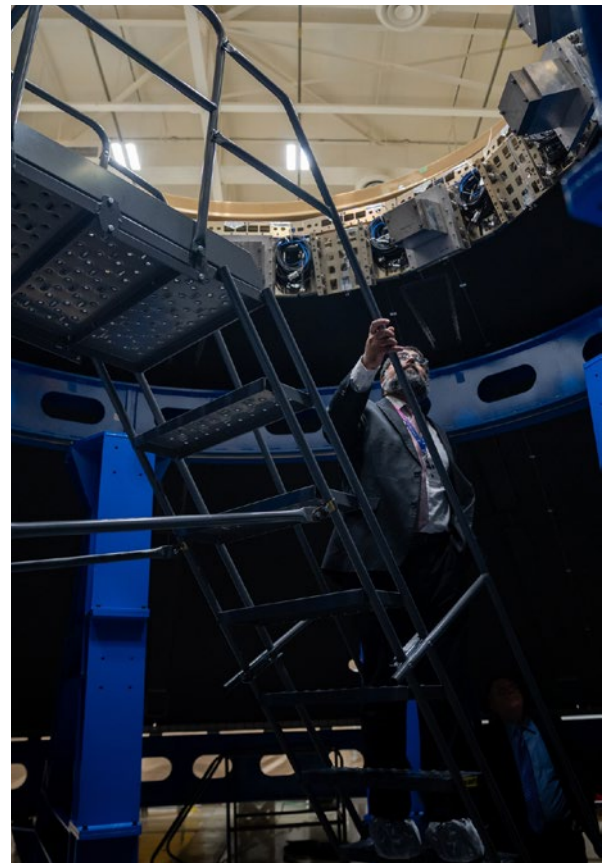
Hardware for SLS rockets that will power the first crewed Artemis missions and the first flights of SLS in its more powerful Block 1B configuration are in various phases of production, testing, and assembly. The SLS core stage for Artemis II arrived at NASA's Kennedy Space Center in Florida in July, following final checkouts and hardware acceptance reviews at NASA Michoud. Following their arrival to the Space Coast in the fall, the 10 solid rocket booster motor segments have been undergoing inspection at Kennedy. Before being moved to a storage facility, both boosters received their iconic NASA "worm" logo. Both the Artemis II launch vehicle stage adapter and Orion stage adapter are progressing through final building and integration before shipping to Kennedy later this year. The interim cryogenic propulsion stage for Artemis II is in final processing.

Artemis III hardware continues to progress, including the core stage tanks. Both the liquid hydrogen and liquid oxygen tanks for the core stage are now structurally complete and are being evaluated and outfitted at Michoud. The Artemis III booster segments are complete, and its interim cryogenic propulsion stage is in final processing. New elements for the second variant of SLS, called Block 1B, are being developed. Test articles of the new exploration upper stage, universal stage adapter, and payload fairing are complete and in test stands at NASA's Marshall Space Flight Center in Huntsville, Alabama. New production RS-25 core stage engines, which will debut on Artemis V, recently completed certification testing. Certification is expected to conclude this spring.

Read more: go.nasa.gov/3y6Nbxu



Technicians at NASA's Michoud Assembly Facility in New Orleans move the structurally complete liquid oxygen tank for the Artemis III SLS core stage after it finished welding Jan. 8. All major structures for the SLS core stage for Artemis III are now structurally complete.



During a March visit, Amit Kshatriya, deputy associate administrator for the Moon to Mars Program Office at NASA Headquarters in Washington, examines the inside of the payload adapter engineering development unit for the future SLS Block 1B.

TEAMS ADD ICONIC NASA 'WORM' LOGO TO ARTEMIS II ROCKET, SPACECRAFT

NASA's Exploration Ground Systems and prime contractor Jacobs began painting the red logotype onto the segments that form the Moon rocket's two solid rocket boosters Jan. 22. To do so, crews used a laser projector to first mark off the location of the logo with tape, then applied two coats of paint and finished by adding several coats of clear primer. Each letter of the worm logo measures approximately 6 feet and 10 inches in height and altogether, stretches 25 feet from end to end, or a little less than the length of one of the rocket's booster motor segments. Crews [finished painting](#) Feb. 23.

The location of the worm logo will be moderately different from where it was during Artemis I. While it will still be located on each of the rocket's 17-story tall boosters, the modernist logo will be placed toward the front of the booster systems tunnel cover. The SLS boosters are the largest, most powerful solid propellant boosters ever flown and provide more than 75% of the thrust at launch.

Read more: go.nasa.gov/3Up4gKu



Art and science merge as teams add the NASA "worm" logo on the SLS solid rocket boosters and the Orion spacecraft's crew module adapter at NASA's Kennedy Space Center in Florida for the agency's Artemis II mission.



Workers with NASA's Exploration Ground Systems and primary contractor Jacobs complete the painting of the agency's iconic "worm" logo along the side of the twin Artemis II solid rocket booster motor segments for NASA's SLS (Space Launch System) rocket inside the Rotation, Processing and Surge Facility at NASA's Kennedy Space Center in Florida on Friday, Feb. 16.

ARTEMIS II MISSION MANAGER MATTHEW RAMSEY



Matthew Ramsey is the Artemis II mission manager.

Matthew Ramsey is keenly aware of the responsibility he shoulders to ensure the agency's missions to the Moon are safe and successful. As the mission manager for Artemis II, NASA's first crewed mission under Artemis, Ramsey is charged with helping to define the requirements and priorities for the missions and certifying that the hardware and operations needed to support flight are ready.

"For me, it's all about the crew and ensuring their safety as they venture to the Moon and come home," said Ramsey.

"Sending people thousands of miles from home and doing it in a way that sets the stage for long-term exploration and scientific discovery is an incredibly complex task."

During the leadup to Artemis II, Ramsey is responsible for oversight of the daily preparations as NASA prepares to launch and fly the SLS rocket with a crew of four atop it inside the Orion spacecraft.

Read more: [go.nasa.gov/3wdRLts](https://www.nasa.gov/3wdRLts)

ROCKET PROPELLANT TANKS FOR NASA'S ARTEMIS III MISSION TAKE SHAPE



All the major structures that will form the core stage of the SLS rocket for the agency's Artemis III mission are structurally complete. Technicians finished welding the 51-foot liquid oxygen tank structure, left, inside the Vertical Assembly Building at NASA's Michoud Assembly Facility in New Orleans Jan. 8. The liquid hydrogen tank, right, completed internal cleaning Nov. 14.

As NASA works to develop all the systems needed to return astronauts to the Moon under its Artemis campaign for the benefit of all, the SLS rocket will be responsible for launching astronauts on their journey. With the liquid oxygen tank now fully welded, all of the major structures that will form the core stage for the SLS rocket for the agency's Artemis III mission are ready for additional outfitting. The hardware will be a part of the rocket used for the first of the Artemis missions planning to land astronauts on the Moon's surface near the lunar South Pole. Technicians finished welding the 51-foot liquid oxygen tank structure inside the Vertical Assembly Building at NASA Michoud.

The mega rocket's other giant propellant tank – the liquid hydrogen tank – is already one fully welded structure. NASA and Boeing, the SLS core stage lead contractor, are currently priming the tank in another cell within the Vertical Assembly Building area called the Building 131 cryogenic tank thermal protection system and primer application complex. It completed internal cleaning Nov. 14.

Read more: [go.nasa.gov/3xVBEkO](https://www.nasa.gov/3xVBEkO)

I AM ARTEMIS: *LAUREN FISHER*



NASA's Lauren Fisher stands in front of the launch vehicle stage adapter for SLS.

Not many music majors get to be hands-on with building a Moon rocket, but Lauren Fisher has always enjoyed the unusual.

Now a structural materials engineer at Marshall, Fisher works on a key adapter of SLS for the first crewed missions of NASA's Artemis campaign.

Manufactured at Marshall by NASA, lead contractor Teledyne Brown Engineering, and the Jacobs Space

Exploration Group's ESSCA contract, the cone-shaped launch vehicle stage adapter partially encloses the rocket's interim cryogenic propulsion stage and connects it to the core stage below and the Orion stage adapter above. The launch vehicle stage adapter also protects avionics and electrical devices from extreme vibration and acoustic conditions during launch and ascent.

Read more: go.nasa.gov/4czRW12

NASA'S SLS ROCKET: BLOCK 1 VS. BLOCK 1B CONFIGURATION

SPACE LAUNCH SYSTEM
SLS BLOCK 1B

ENABLING LONG-TERM LUNAR EXPLORATION AND DISCOVERY

NASA's SLS (Space Launch System) Block 1B, debuting on **ARTEMIS IV**, is a more powerful, capable upgrade of the SLS Block 1 rocket for NASA's Artemis campaign.

SLS BLOCK 1B
366'

SLS BLOCK 1
322'

WHAT'S NEW

The four engine exploration upper stage (**EUS**) delivers **97,360 lbs.** of in-space thrust.

SLS Block 1B can launch more than **83,000 lbs.**, or **38 metric tons**, to the Moon in one launch.

Universal stage adapter (**USA**) internal volume is **10,100 ft³ (286 m³)** or as much as two standard railroad boxcars.

You → (Scale is approximate)

WHAT'S INSIDE

Orion Service Module
Orion
USA
10 m
EUS

Co-manifested payload means that two or more payloads — or crew and cargo — are launched by the same rocket.

THE BLOCK 1B ADVANTAGE

- More mass to the Moon
- Increased launch window options
- Greater cargo volume
- Both crew and large cargo to the Moon in a single launch

The **Lunar I-Hab** for the Gateway lunar space station will ride to the Moon with Orion, inside the universal stage adapter.

www.nasa.gov/sls #ARTEMIS

While every SLS rocket retains similar features, the Block 1B configuration debuting during NASA Artemis IV will have several updates allowing it to carry over 83,700 lbs. to the Moon, including NASA's Orion spacecraft and hefty payloads for deep space missions.

SLS in the Block 1B cargo configuration will launch for the first time beginning with Artemis IV. This upgraded and more powerful SLS rocket will enable SLS to send over 38 metric tons (83,700 lbs.) to the Moon, including

NASA's Orion spacecraft and its crew, along with heavy payloads for more ambitious missions to deep space in a single launch.

Read more: [go.nasa.gov/4cfWMQU](https://www.nasa.gov/4cfWMQU)

NASA EXPANDING LUNAR EXPLORATION WITH UPGRADED SLS MEGA ROCKET DESIGN



On Feb. 22, technicians at NASA's Michoud Assembly Facility in New Orleans prepare elements that will form part of the midbody for the exploration upper stage. The midbody struts, or V-struts, will create the cage-like outer structure of the midbody that will connect the upper stage's large liquid hydrogen tank to the smaller liquid oxygen tank.

As NASA prepares for its first crewed Artemis missions, the agency is making preparations to build, test, and assemble the next evolution of its SLS (Space Launch System) rocket. The larger and more powerful version of SLS, known as Block 1B, can send a crew and large pieces of hardware to the Moon in a single launch and is set to debut on the Artemis IV mission.

"From the beginning, NASA's Space Launch System was designed to evolve into more powerful crew and cargo configurations to provide a flexible platform as we seek to explore more of our solar system," said John Honeycutt,

SLS Program manager. "Each of the evolutionary changes made to the SLS engines, boosters, and upper stage of the SLS rocket are built on the successes of the Block 1 design that flew first with Artemis I in November 2022 and will, again, for the first crewed missions for Artemis II and III."

Early manufacturing is already underway at Michoud while preparations for the green run test series for its upgraded upper stage are in progress at nearby NASA's Stennis Space Center in Bay St. Louis, Mississippi.

Read more: [go.nasa.gov/3xWKz5x](https://www.nasa.gov/3xWKz5x)

I AM ARTEMIS: *ERICK HOLSONBACK*



NASA's Erick Holsonback at NASA's Michoud Assembly Facility in New Orleans.

Whether he's advising student robotic competitions or managing production of a powerful, new Moon rocket stage, Erick Holsonback meets technical challenges with enthusiasm.

Holsonback, a Jacobs Technology employee, is subsystem manager for production and launch operations of the exploration upper stage for NASA's SLS (Space Launch System) rocket. SLS is NASA's super heavy-lift rocket that will launch the agency's Artemis missions to the Moon. The exploration upper stage is one of two

upgrades to the SLS rocket as it evolves to the Block 1B variant for missions beginning with Artemis IV. Along with the rocket's new universal stage adapter, the SLS rocket in its Block 1B configuration will be able to send 40% more payload to the Moon in a single launch.

Holsonback's job stretches from setting up production for the future upper stage at NASA Michoud where it's built, to preparing it for launch from NASA Kennedy.

Read more: go.nasa.gov/3WmSbZg

SIX ADAPTERS FOR CREWED ARTEMIS FLIGHTS TESTED, BUILT AT NASA MARSHALL



SLS Block 1B's payload adapter is lifted as part of moving the adapter to a test stand.

Marshall is currently home to six adapters designed to connect SLS's upper stages with the core stages and propulsion systems for future Artemis flights to the Moon. The first three Artemis flights use the SLS Block 1 rocket variant, which can send more than 59,500 pounds (27 metric tons) to the Moon in a single launch with the assistance of the interim cryogenic propulsion stage.

The propulsion stage is sandwiched between two adapters: the launch vehicle stage adapter and the Orion stage adapter. Beginning with Artemis IV, a new configuration of SLS, the SLS Block 1B, will use the new, more powerful exploration upper stage to enable more ambitious missions to deep space. The new stage requires new adapters.

Read more: go.nasa.gov/4aRNNpk

EVOLVED ADAPTER FOR FUTURE NASA SLS FLIGHTS READIED FOR TESTING



The development test article for the SLS Block 1B's universal stage adapter departs its Leidos manufacturer in Decatur, Alabama, in February.

A test article of the universal stage adapter for NASA's more powerful version of its SLS (Space Launch System) rocket arrived to Building 4619 at Marshall Feb. 22 from Leidos in Decatur, Alabama. The universal stage adapter will connect the rocket's upgraded in-space propulsion stage, called the exploration upper stage, to NASA's Orion spacecraft as part of the evolved Block 1B configuration of the SLS rocket. It will also serve as a compartment capable of accommodating large payloads, such as modules or other exploration spacecraft. The SLS

Block 1B variant will debut on Artemis IV and will increase SLS's payload capability to send more than 84,000 pounds (38 metric tons) to the Moon in a single launch.

In Building 4619's Load Test Annex High Bay at Marshall, the development test article will first undergo modal testing that will shake the hardware to validate dynamic models. Later, during ultimate load testing, force will be applied vertically and to the sides of the hardware.

Read more: go.nasa.gov/4aRNNpk

NASA'S ARTEMIS IV: BUILDING FIRST LUNAR SPACE STATION



Gateway's Lunar I-Hab module under construction at a Thales Alenia Space industrial plant in Turin, Italy.

Astronauts on Artemis IV will live and work in humanity's first lunar space station, Gateway, which will enable new opportunities for science and preparation for human missions to Mars. The mission will bring together an intricate choreography of multiple launches and spacecraft

dockings in lunar orbit, and will feature the debut of NASA's larger, more powerful version of SLS and new mobile launcher.

Read more: [go.nasa.gov/4ckzDgi](https://www.nasa.gov/4ckzDgi)

NASA ACHIEVES MILESTONE FOR ENGINES TO POWER FUTURE ARTEMIS MISSIONS



NASA conducted a full-duration RS-25 hot fire April 3 on the Fred Haise Test Stand at NASA's Stennis Space Center in Bay St. Louis, Mississippi.

NASA achieved a major milestone April 3 for production of new RS-25 engines to help power its Artemis campaign to the Moon and beyond with completion of a critical engine certification test series at NASA Stennis.

The 12-test series represents a key step for lead engines contractor Aerojet Rocketdyne, an L3Harris Technologies company, to build new RS-25 engines using modern processes and manufacturing techniques for SLS rockets that will power future lunar missions beginning with Artemis V.

“The conclusion of the certification test series at NASA Stennis is just the beginning for the next generation of RS-25 engines that will help power human spaceflight for Artemis,” said Johnny Heflin, SLS liquid engines manager. “The newly produced engines on future SLS rockets will maintain the high reliability and safe flight operational legacy the RS-25 is known for while enabling more affordable high-performance engines for the next era of deep space exploration.”

Read more: [go.nasa.gov/3JCMWgp](https://www.nasa.gov/3JCMWgp)

HOUSTON, WE HAVE A PODCAST: CERTIFYING ARTEMIS ROCKET ENGINES



From Earth orbit to the Moon and Mars, explore the world of human spaceflight with NASA each week on the official podcast of NASA's Johnson Space Center in Houston. Listen to in-depth conversations with the astronauts, scientists, and engineers who make it possible.

On episode 338 of *Houston, We Have a Podcast*, experts from Stennis discuss the facilities that support RS-25 engine testing for SLS and future Artemis missions. This episode was recorded May 3, 2024.

Read more: go.nasa.gov/3AeLGys

I AM ARTEMIS: *JOSH WHITEHEAD*



NASA's Josh Whitehead has a passion for systems engineering. He now helps lead the team developing the rocket that will fly the first crew to deep space since the Saturn V.

Launching a rocket to the Moon takes perseverance and diligence. Josh Whitehead – a world-class engineer, race-winning long-distance runner, and father – knows that it also takes a good attitude.

“Positive energies are vital, particularly when working through challenges,” Whitehead says. “Challenges are opportunities to learn and grow. There’s always more than one way; always more than one solution.”

Whitehead’s job as the associate manager for the Stages Office of NASA’s SLS (Space Launch System) rocket supports design, development, certification, and operation of the 212-foot-tall core stage. The massive core stage with two propellant tanks that collectively hold more than 733,000 gallons of super-cold propellant is one of the largest cryogenic propulsion rocket stages.

Read more: [go.nasa.gov/3QpCa0A](https://www.nasa.gov/3QpCa0A)

NASA RELEASES HOORAY FOR SLS! CHILDREN'S BOOK



The first in a series of children's books, this story introduces the youngest in the Artemis Generation to the elements needed for the Artemis missions to get to the Moon and beyond.

"Hooray for SLS!" is the first in a series of children's books that introduces young explorers ages 3 to 8 to the unique elements needed for the Artemis missions to get to deep space and the Moon, like SLS. The book is available for download.

Read more: go.nasa.gov/4cenGJe

WHAT'S NEW IN SLS SOCIAL MEDIA

FROM STUDENT LAUNCH TO NASA'S SPACE LAUNCH SYSTEM: MEREDITH PATTERSON

Just last year, Marshall engineer Meredith Patterson, was helping her North Carolina State University Student Launch team roar through the North Alabama skies. Using her experiences in the annual Artemis Generation student challenge, she now helps the SLS boosters team reach new heights and destinations.

See more here: bit.ly/3wnxiSP

 NASA's Space Launch System ✓
March 1 at 10:00 AM · 🌐

"My leadership skills grew, my system engineering skills grew, and my technical writing skills grew," said Meredith Patterson.

Patterson participated in [NASA Student Launch](#) challenges while she was in college which fueled her passion for aerospace engineering.

Fast-forward a few years, and she is now helping make history working at [NASA's Marshall Space Flight Center](#) on the SLS boosters for the [NASA Artemis](#) campaign!

Learn more about her journey here as we celebrate [#WomensHistoryMonth](#) >>
<https://go.nasa.gov/3Tf16Kb>



8 MINUTES OF PURE POWER: THE RS-25

The RS-25 rocket engine is a tested, reliable, proven engine with 136 flights under its belt. Learn more about this historic engine that is powering SLS and enabling Artemis.

Watch here: bit.ly/3xZs9kq



SLS ON THE ROAD

ARTEMIS TEAM MEETS COLLEGE FOOTBALL CHAMPIONSHIP FANS



SLS team members participated at the College Football Playoffs Fan Central in Houston, Jan. 5-7. NASA and its industry partners spoke with college football fans, family members, and the public about NASA's return of humans to the Moon through NASA's Artemis campaign.

NASA VISITS WITH COMIC-CON FANS



SLS team members, along with other Artemis partners, met with comic book fans and space enthusiasts at the Atlanta Comic Convention Feb. 9-11 in Atlanta. Guests were given information about SLS and the Artemis missions returning humans to the Moon and eventually on to Mars.

SPACEFLIGHT PARTNERS: *Vishay Tansitor*


LOCATION: Bennington, Vermont

WHAT THEY DO FOR SLS: In support of NASA Artemis, Vishay Tansitor supplied space-grade devices with established reliability — backed by more than 12 billion test hours, completed at their facility in Bennington, Vermont.



GET THE LATEST SLS UPDATES SENT TO YOUR INBOX EACH MONTH!

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SLS in 3..2..1. 


Top Three Countdown
What you need to know right now

3... Adapters! — Marshall is currently home to six adapters designed to connect SLS's (Space Launch System) upper stages with the core stages and propulsion systems for future Artemis flights to the Moon. — [Read more](#)

2. From One Crew to Another — Members of the Artemis II crew met with the crew of NASA's Pegasus barge prior to their departure to deliver the core stage of NASA's SLS rocket to the Space Coast. — [Read more](#)


1. On the Move — On July 16, NASA rolled out the SLS rocket's core stage for the Artemis II test flight from its manufacturing facility in New Orleans for shipment to the agency's spaceport in Florida. — [Read more](#)

Picture of the Month
We know how to wow



Move teams with NASA and Boeing position the SLS core stage for Artemis II on special transporters to guide the flight hardware from the factory floor onto the agency's Pegasus barge.

What's Trending
The best of SLS social media this month



FOLLOW THE PROGRESS OF NASA'S NEW LAUNCH VEHICLE FOR DEEP SPACE:

X..... [Twitter.com/NASA_SLS](https://twitter.com/NASA_SLS)

Facebook..... [Facebook.com/NASASLS](https://facebook.com/NASASLS)

Get updates in your inbox each month by subscribing to [SLS in 3..2..1.](#)

