

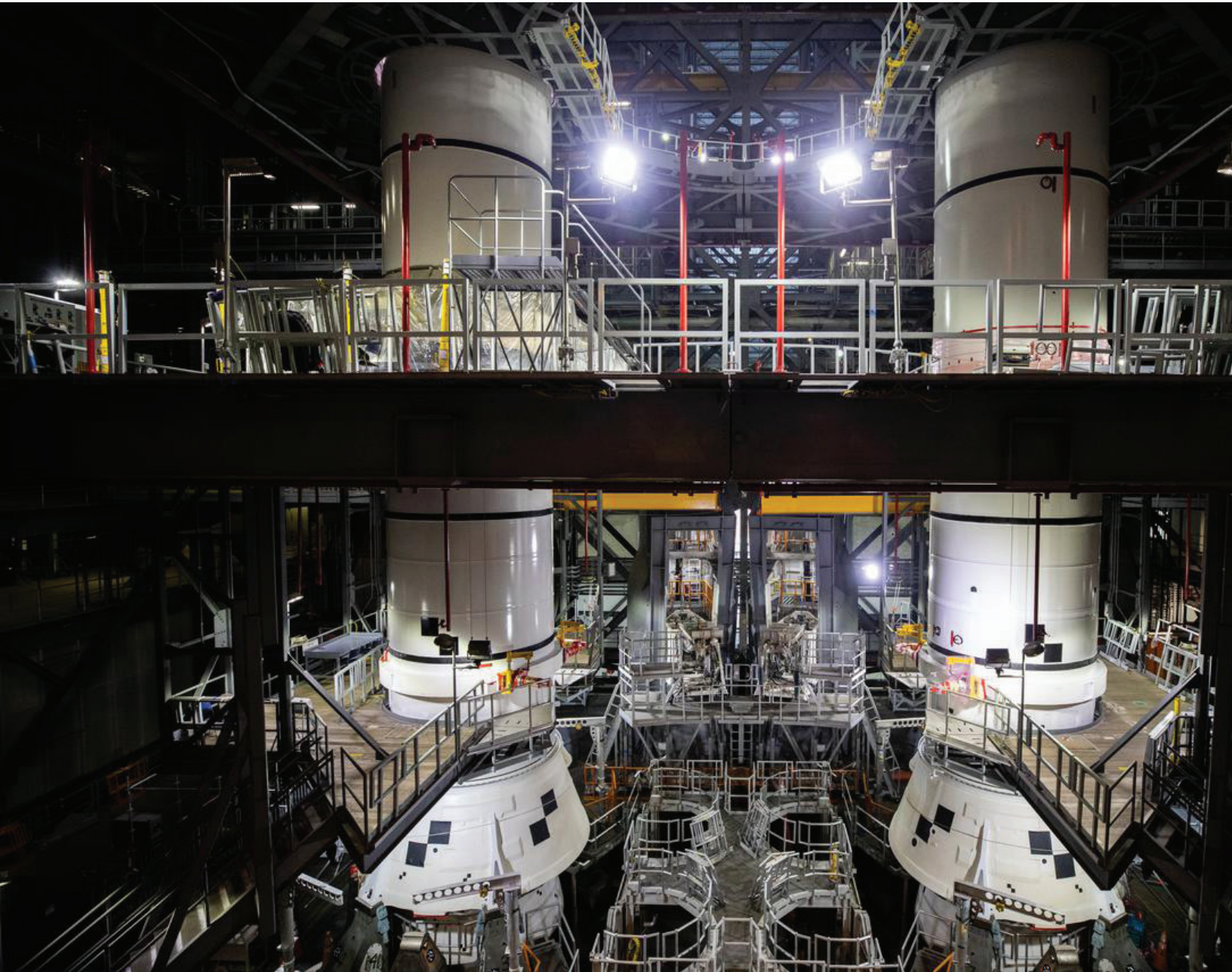


SPACE LAUNCH SYSTEM

OCTOBER 2020 – JANUARY 2021

BOOSTERS STACK UP AT KENNEDY

ARTEMIS I LAUNCH PREP STACKS UP



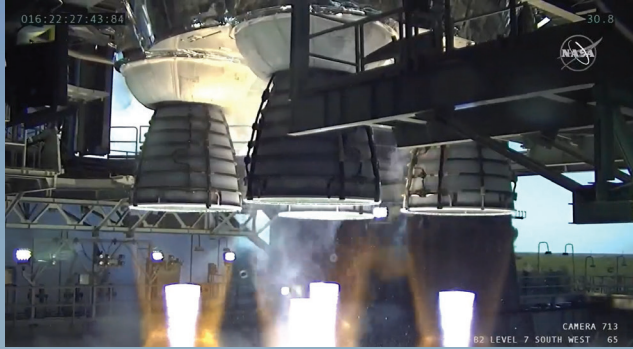
The Space Launch System solid rocket boosters are being stacked on the mobile launcher in the Vehicle Assembly Building at Kennedy Space Center in preparation for the Artemis I launch. Together, the twin boosters provide more than 75 percent of the total SLS thrust at launch.

NASA is stacking the first part of the [Space Launch System](#) rocket on the mobile launcher in preparation for the Artemis I launch. In November, engineers at NASA's Kennedy Space Center lowered the first of the SLS [solid rocket booster](#) segments on the mobile launcher in the Vehicle Assembly Building. The boosters are the first components of the rocket to be installed on the launcher and will help support the remaining rocket pieces and the Orion spacecraft. To stack the remaining booster segments, crews are using an overhead crane that can hold up to 325 tons (the weight of about 50 elephants) to lift each segment for mating. Each motor segment weighs about 300,000 pounds, or 150 tons. When fully assembled, each booster will stand 177 feet tall, taller than the Statue of Liberty from base to torch.

When the deep space rocket launches on the Artemis I mission later this year, the boosters will provide more than 75 percent of thrust for the liftoff from Launch Pad 39B.

Read more about how the SLS boosters are stacked: go.nasa.gov/3bXSPVM

GREEN RUN TEST FIRES UP ALL FOUR SLS ENGINES



The four RS-25 engines in the SLS core stage ignite during the Jan. 16 test at NASA's Stennis Space Center. The engines fired for a little over a minute and generated 1.6 million pounds of thrust.



The core stage for the first flight of NASA's Space Launch System rocket is seen in the B-2 Test Stand at Stennis Space Center during a Jan. 16 hot fire test. The hot fire test included loading 733,000 gallons of liquid oxygen and liquid hydrogen – mirroring the launch countdown procedure – and igniting the engines.

NASA's Space Launch System program started the new year with a milestone as the core stage that will fly on the Artemis I mission fired up all four engines together for the first time.

The Jan. 16 test was the eighth test of the [Green Run Test Series](#) at NASA's Stennis Space Center near Bay St. Louis, Mississippi. The test plan called for the rocket's four RS-25 engines to fire for a little more than eight minutes – the same amount of time it will take to send the rocket to space following launch. The team successfully completed the countdown and ignited the engines, but the engines shut down a little more than one minute into the hot fire. The Green Run team has reviewed extensive data and completed preliminary inspections that show the core stage is in excellent condition, and NASA plans to conduct a second Green Run hot fire test as early as the fourth week of February.

The agency's goal for the hot fire was to support 23 detailed verification objectives using data acquired from the this test combined with analysis and testing that has already been completed. These detailed verification objectives are used to certify the design of the SLS rocket's core stage. The preliminary assessment indicates that the data acquired met the goals for a number of the 23 objectives, such as those related to activities prior to engine ignition. The initial assessment also indicates that data acquired partially met the goals for several additional objectives related to simultaneous operation of the four RS-25 engines.

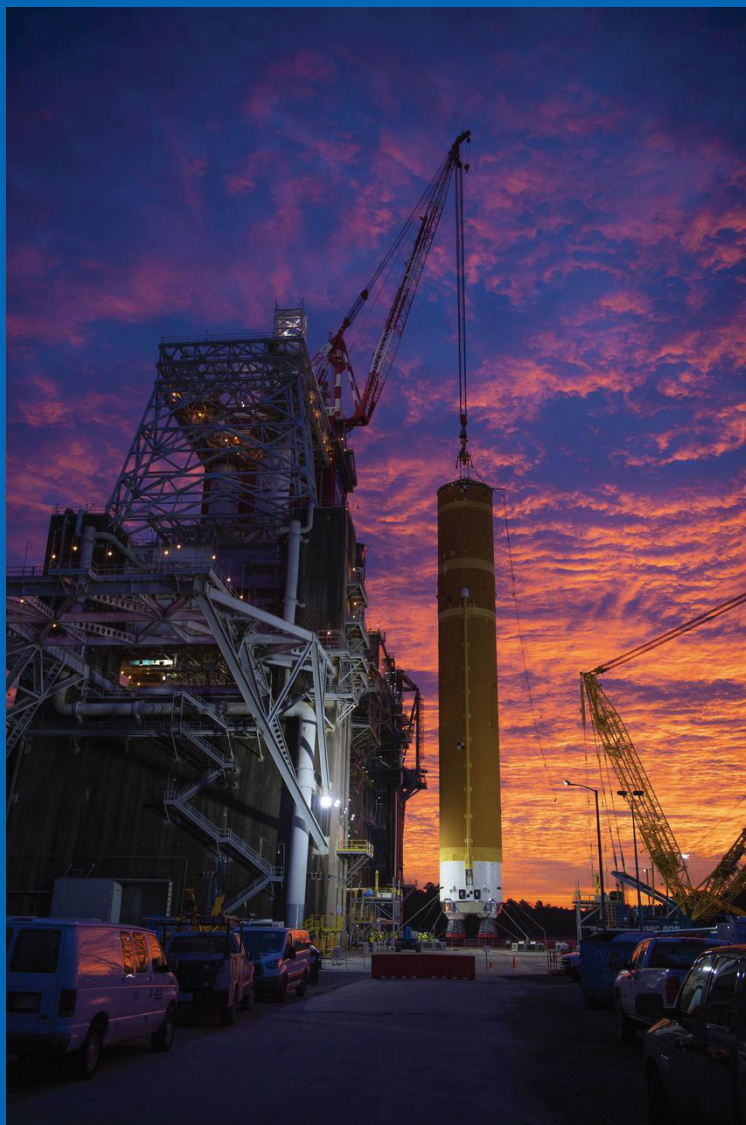
NASA and its industry partners, Boeing and Aerojet Rocketdyne, assessed the data from the test and determined that a second, longer hot fire test should be conducted and would pose minimal risk to the core stage. The second test is planned for the fourth week of February.

Read the latest updates on SLS progress: go.nasa.gov/3jdCNbK

DESPITE PANDEMIC, STORMS, ARTEMIS FLIGHT PREP MAKES PROGRESS IN 2020

In 2020, NASA and the SLS program pressed forward during challenges brought by the COVID-19 pandemic and multiple tropical storms. Despite the hurdles, SLS teams made significant progress toward launch, achieving a number of significant milestones. Here are the top stories from the past year.

ARTEMIS I CORE STAGE DELIVERED FOR GREEN RUN TESTING



The Artemis I core stage was delivered from Michoud Assembly Facility to Stennis Space Center for the Green Run series of tests to validate the stage's design. The eight-part series steadily brought the new, or "green," core stage flight hardware to life for the first time, culminating in a hot fire of the stage's four RS-25 engines.

Let more: go.nasa.gov/39liaHr

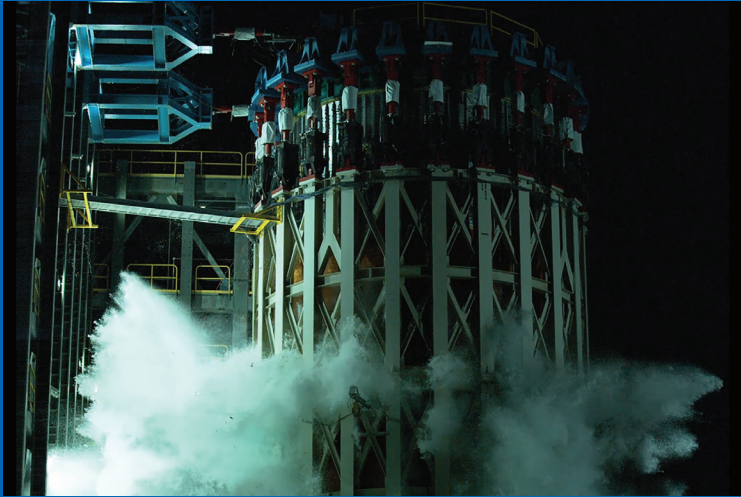
THE 'WORM' RETURNS



The iconic NASA "worm" logo will be along for the ride on the Artemis I mission. Teams at Kennedy Space Center applied the historic logo on visible parts of the rocket's solid rocket boosters and the Orion spacecraft. The "worm" was first introduced by NASA in 1975 and was incorporated into many of the agency's next-generation programs before being retired in 1992.

Read more: go.nasa.gov/2KSH6Na

STRUCTURAL TESTING CAMPAIGN WRAPS UP



In June, engineers at Marshall Space Flight Center completed the SLS rocket's structural testing campaign with a final "test to failure" of the liquid oxygen (LOX) tank test article, shown above. The test campaign included test articles identical in structure to those used in flight, including LOX tank, liquid hydrogen (LH2) tank, intertank, engine section, and an integrated test of the upper stage – the interim cryogenic propulsion stage (ICPS), Orion stage adapter, and the launch vehicle stage adapter (LVSA). The three-year test campaign delivered 199 test cases and 421 gigabytes of data to validate that the rocket's structure is designed to endure the rigors of spaceflight.

Read more: go.nasa.gov/3c2HV0U

LAUNCH VEHICLE STAGE ADAPTER DELIVERED TO KENNEDY



The launch vehicle stage adapter (LVSA) was delivered to Kennedy Space Center in July. The LVSA connects the rocket's core stage to the upper stage and helps protect the RL10 engine that will provide the power necessary to send the Orion spacecraft on its journey to the Moon.

Read more: go.nasa.gov/3qLgjbG

BOOSTER TESTING FOR THE FUTURE



On Sept. 2, the SLS Boosters Office and prime contractor Northrop Grumman fired up a solid rocket booster to evaluate materials and processes to improve booster performance on missions after Artemis III. The full-scale booster test, conducted at Northrop Grumman's test facility in Promontory, Utah, lasted a little over two minutes, the same amount of time that the boosters power the SLS rocket during liftoff and flight.

Read more: go.nasa.gov/3iBK4SB

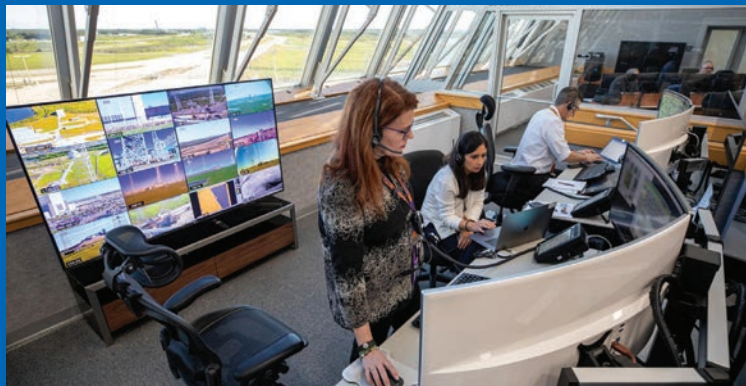
BOOSTERS SHIPPED FOR STACKING



The 10 motor segments for the SLS rocket's two solid rocket boosters were shipped in June to Kennedy Space Center to be stacked for the Artemis I launch. The segments traveled by rail on a 10-day journey from Northrop Grumman's booster manufacturing facility in Promontory, Utah, to Florida. NASA's Exploration Ground Systems teams are working to process the segments and have begun stacking them on the mobile launcher in preparation for flight.

Read more: go.nasa.gov/3pa6m0b

LAUNCH CONTROL READY FOR ARTEMIS I



It's not just the SLS rocket's hardware that undergoes extensive testing before flight. The systems and crews charged with ensuring a safe launch are also trained and tested. The Core Stage Green Run series of tests at Stennis Space Center included a simulation of the launch sequence, validating the timeline and sequence of events leading up to firing of the four RS-25 engines. At Kennedy Space Center, the Exploration Ground Systems team of launch controllers who will oversee the countdown and liftoff of the SLS rocket and Orion spacecraft have conducted simulations to hone the team's skills by rehearsing anomalies and other unexpected situations that controllers and launch managers must solve in real-time during a launch.

Read more: go.nasa.gov/3cbBXuA

SLS EXPLORATION UPPER STAGE COMPLETES DESIGN REVIEW



On Dec. 18, a team of NASA, Boeing, and independent reviewers certified the SLS Exploration Upper Stage (EUS), the evolved configuration of the SLS rocket's upper stage, meets requirements for future missions. The EUS replaces the ICPS on the SLS Block 1B rocket. The larger, more powerful EUS will be able to transport 40 percent more payload to the Moon than the ICPS.

Read more: go.nasa.gov/3sWhm3r

ARTEMIS ASTRONAUT TEAM ANNOUNCED



On Dec. 9, NASA announced it has selected 18 astronauts from its corps to form the Artemis Team and help pave the way for the next astronaut missions on and around the Moon. Five astronauts were present at the announcement made during the National Space Council Meeting at Kennedy Space Center. From left, astronauts Jessica Meir, Joseph Acaba, Jessica Watkins, Matthew Dominick, and Anne McClain answer questions from news media during the announcement.

Learn more about the Artemis Team: go.nasa.gov/3a6ZxWG

NASA BUILDING CORE STAGES FOR ARTEMIS II AND ARTEMIS III

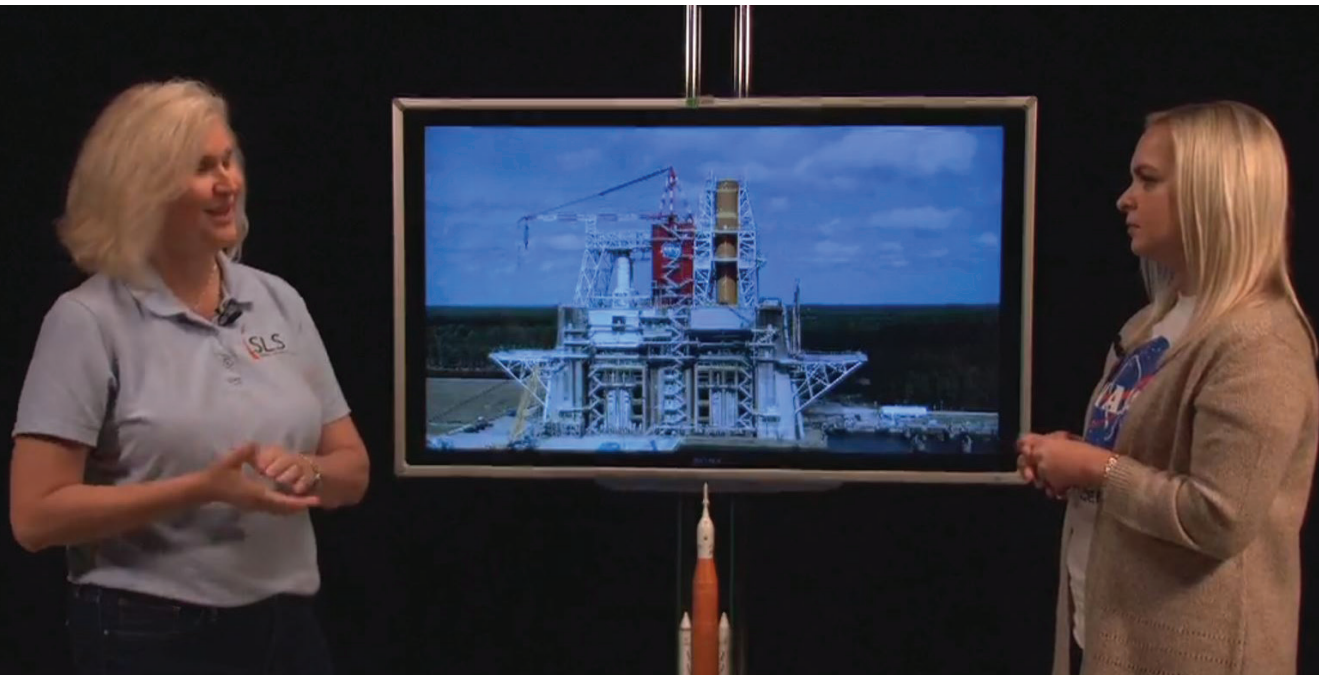


While the core stage for the Artemis I SLS flight undergoes final testing, stages for the Artemis II and Artemis III missions are well into production. At Michoud Assembly Facility in New Orleans, the main core stage structures for the Artemis II mission have been built (including the intertank above) and are being outfitted with electronics, feedlines, propulsion systems, and other components. Engineers are welding the core stage structures for the Artemis III mission, which will land the first woman and the next man on the lunar surface.

Read more: go.nasa.gov/3oiLqmu

WHAT'S NEW IN SLS SOCIAL MEDIA

CORE STAGE GREEN RUN, EXPLAINED



Why is the SLS core stage orange? What happens during Green Run testing? Lisa Bates, NASA SLS Stages Green Run manager (left), answers viewer questions during a Facebook live broadcast. Watch the video here: bit.ly/39RqleP

STACKING THE BOOSTERS FOR LAUNCH



At Kennedy Space Center, the SLS solid rocket boosters are stacking up in preparation for flight. Dave Diaz, Integrated Operations Manager for NASA's Exploration Ground Systems, answered questions about SLS booster stacking operations during a Facebook live broadcast. Watch a replay: bit.ly/3rngj77

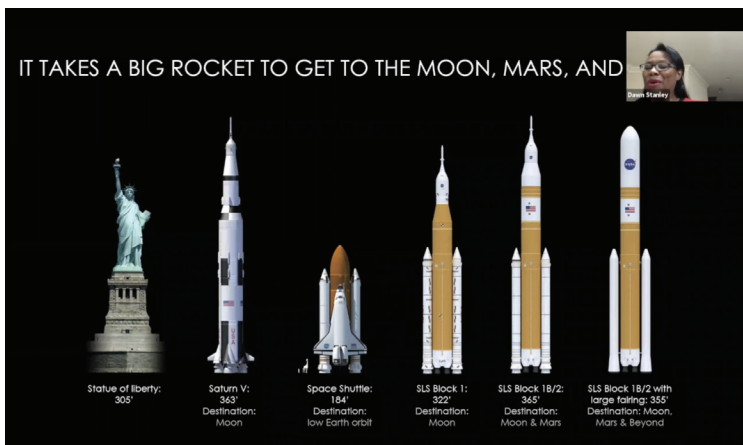
SLS ON THE VIRTUAL ROAD

The SLS Program is committed not only to building the world's most powerful rocket, but also to inspiring a new generation of scientists, engineers, and explorers. During a time when most events have become virtual, SLS subject matter experts and industry partners have brought news of the rocket's progress and upcoming Artemis missions to a range of audiences, from schools to science centers to government organizations. One plus to the virtual environment: You don't need to travel to get the latest SLS news.

Click here to view the most recent updates (some presentations may require free registration): go.nasa.gov/3oVYY7A



The SLS Program continues to share the SLS and Artemis stories in virtual events. Maury Vander, chief of test operations at Stennis Space Center, [talks](#) to the Louisiana Art & Science Museum.



Dawn Stanley, Deputy Director of Cross-Program Strategic Integration for Exploration, [speaks](#) to students in the First Scholars Program at the University of Memphis.



SLS Strategic Communications Deputy Manager Trey Cate gives a [presentation](#) on Doing Business with NASA: The Artemis Program for the National Association of Counties.

SPACEFLIGHT PARTNERS: AMRO *Fabricating Corp.*

NUMBER OF EMPLOYEES: 76

LOCATION: *South El Monte, California*

WHAT THEY DO FOR SLS:

Founded in 1977, AMRO is a leading supplier of precision machined parts, major assembly tooling, and ground support equipment. The company machines and forms the structural panels for the primary structure of the LVSA. AMRO also heat ages and oversees the final non-destructive evaluation, chemical film coating, and priming of the panels before they are delivered to prime contractor Teledyne Brown. Additionally, AMRO machined the forward and intermediate rings for the Artemis II and Artemis III adapters.

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



Top Three Countdown

What you need to know right now

- 3... Final test — Crews at Marshall Space Flight Center wrapped up a three-year test campaign of the SLS rocket's structural components. Read [more](#)
- 2.. Prepping for the second flight — NASA has begun assembling the Orion stage adapter that will send crew into orbit on the Artemis II mission. Read [more](#).
1. To the top — The launch vehicle stage adapter, which attaches to the top of the SLS core stage to connect with the upper stage, arrives at Kennedy Space Center. Read [more](#).

Pictures of the Month

We know how to wow

There's been a lot of SLS progress lately, so this edition includes two "wow" images:



Technicians with NASA's Exploration Ground Systems moves the launch vehicle stage adapter (LVSA) for the SLS rocket to the Vehicle Assembly Building (VAB) at Kennedy Space Center July 30 for processing. The LVSA connects the SLS core stage to the rocket's upper stage and will remain in the VAB until it's time for stacking on the mobile launcher ahead of the Artemis I launch.

Every day, the SLS rocket gets closer to launch. Get updates in your inbox each month by subscribing to [SLS in 3..2..1.](#)

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

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