National Aeronautics and Space Administration

NASAfacts

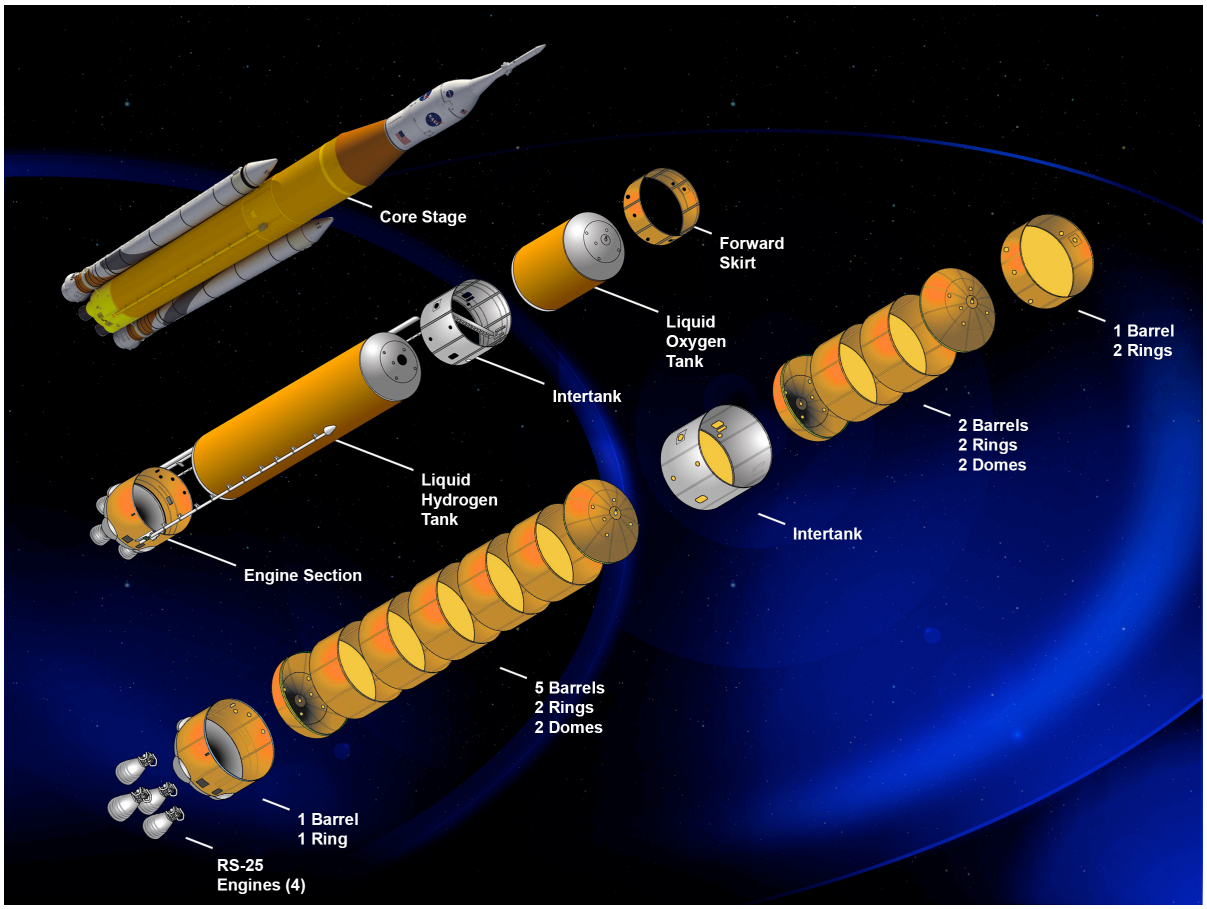
Space Launch System Core Stage

NASA's Space Launch System (SLS) core stage, towering more than 200 feet tall with a diameter of 27.6 feet, will store cryogenic liquid hydrogen and liquid oxygen that will feed the vehicle's RS-25 engines. SLS is an advanced, heavy-lift launch vehicle that will provide an entirely new capability for science and human exploration beyond Earth's orbit.

The core stage is being built at NASA's Michoud Assembly Facility in New Orleans using state-of-the-art manufacturing equipment. Michoud is a unique advanced manufacturing facility where NASA has built spacecraft components for decades – most recently, the space shuttle's external tanks. The Boeing Company of Chicago is the prime contractor for the SLS core stage, including its avionics.

Propulsion for the SLS core stage will be provided by four RS-25 engines. The RS-25 engine design was previously designated the space shuttle main engine and is built by Aerojet Rocketdyne of Sacramento, California.

As part of the Space Shuttle Program, these engines operated with 100 percent mission success during 135 missions. The SLS Program has an inventory of 16 RS-25 flight engines. The engines are available for the first four SLS missions, and two development engines are available for performance requirements, including



improvements like nozzle insulation and a new electronic controller.

The B-2 test stand at NASA's Stennis Space Center near Bay St. Louis, Mississippi -- originally built to test Saturn rocket stages that propelled humans to the moon -- is being renovated to test the massive SLS core stage. The core stage will be installed on the stand for propellant fill and drain testing and two hot-fire tests.

The core stage also will house the vehicle's avionics, including flight computers, instrumentation, batteries, power handling, sensors and other electronics. Flight computer software development and qualification is underway at NASA's Marshall Space Flight Center in Huntsville, Alabama. Developmental hardware and software early integration is also ongoing to mature rapidly and ensure implementation of safe, highly reliable avionics and software on SLS.

SLS's first flight test, called Exploration Mission-1, will feature a Block 1 configuration with a 77-ton (70-metric-ton) lift capacity and carry an uncrewed Orion crew capsule beyond the moon. The next planned evolution of the SLS, Block 1B, would use a more powerful exploration upper stage to enable more ambitious missions and a 105-metric-ton lift capacity.

Core Stage Facts

Length ..... Approximately 212 feet (64.6 meters)

Diameter ..... 27.6 feet (8.4 meters)

Empty Weight ..... Approximately 188,000 lbs (85,275 kg)

Material ..... Aluminum 2219

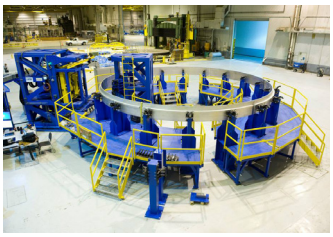
Number of Engines ..... Four RS-25s

A later evolution, Block 2, would add a pair of advanced solid or liquid propellant boosters to provide a 130-metric-ton (143-ton) lift capacity. In each configuration, SLS will continue to use the same core stage and four RS-25 engines.

Marshall manages the SLS Program for the agency. SLS will be the most powerful rocket in history and is designed to be flexible and evolvable to meet a variety of crew and cargo mission needs.

Vertical Assembly Center (VAC)

Enhanced Robotic Weld Tool (ERWT)



Segmented Ring Tool (SRT)

Vertical Weld Center (VWC)

For more information on SLS, visit:

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