NASA test fires SLS flight engine destined to launch astronauts back to the moon

March 14 2016, by Ken Kremer

NASA engineers conduct a successful test firing of RS-25 rocket engine No. 2059 on the A-1 Test Stand at NASA's Stennis Space Center in Bay St. Louis, Mississippi. The hot fire marks the first test of an RS-25 flight engine for NASA's new Space Launch System vehicle. Credit: NASA/SSC

NASA engineers have successfully test fired the first flight engine destined to power the agency's mammoth new SLS rocket that will

launch American astronauts back to the moon and deep space for the first time in nearly five decades.

The flight proven RS-25 powerplant engine previously flew as one of three main engines that successfully rocketed NASA's space shuttle orbiters to space during the three decade long Space Shuttle era that ended in 2011.

On March 10, NASA engineers conducted a successful 500 second long test firing of RS-25 rocket engine No. 2059 on the A-1 Test Stand at NASA's Stennis Space Center in Bay St. Louis, Mississippi.

The hot fire marks the first test of an RS-25 flight engine for NASA's new Space Launch System (SLS) vehicle. It also simultaneously marks a major milestone towards implementing the agency's vision of sending humans on future deep-space missions to destinations including the moon, an asteroid and a 'Journey to Mars.'

"What a great moment for NASA and Stennis," said Rick Gilbrech, director of NASA's Stennis Space Center in Bay St. Louis, Mississippi, in a statement.

"We have exciting days ahead with a return to deep space and a journey to Mars, and this test is a very big step in that direction."

This NASA video shows the full duration hot-fire test:

The SLS is the most powerful rocket the world has ever seen and will loft astronauts in the Orion capsule on missions back to the moon by around 2021, to an asteroid around 2025 and then beyond on a 'Journey to Mars' in the 2030s – NASA's overriding and agency wide goal. The first unmanned SLS test flight is slated for late 2018.

Thursdays hot fire test follows a lengthy series of engine tests with development versions of the RS-25 at Stennis last year that were used to begin proving out the modifications enabling NASA to upgrade the engines for use in the SLS.

The primary goal of the development tests was "to validate the capabilities of a new controller – or, "brain" – for the engine and to verify the different operating conditions needed for the SLS vehicle," according to NASA officials.

Aerojet Rocketdyne is the prime contractor for the RS-25 engine work and originally built them during the shuttle era.

The remaining cache of 16 heritage RS-25 engines are being recycled from their previous use as reusable space shuttle main engines (SSMEs). They are now being refurbished, upgraded and tested by NASA and Aerojet Rocketdyne to power the core stage of the Space Launch System rocket now under full development.

Orion crew module pressure vessel for NASA's Exploration Mission-1 (EM-1) is unveiled for the first time on Feb. 3, 2016 after arrival at the agency's Kennedy Space Center (KSC) in Florida. It is secured for processing in a test stand called the birdcage in the high bay inside the Neil Armstrong Operations and Checkout (O&C) Building at KSC. Launch to the Moon is slated in 2018 atop the SLS rocket. Credit: Ken Kremer/kenkremer.com

A cluster of four RS-25 engines will power the SLS core stage. They will fire at 109 percent thrust level for some eight and a half minutes while generating a combined two million pounds of thrust.

Each of the RS-25's engines generates some 500,000 pounds of thrust. They are fueled by cryogenic liquid hydrogen (LH2) and liquid oxygen (LOX). For SLS they will be operating at 109% of power, compared to a

routine usage of 104.5% during the shuttle era. They measure 14 feet tall and 8 feet in diameter.

They have to withstand and survive temperature extremes ranging from -423 degrees F to more than 6000 degrees F.

The workhorse engines are among the most proven in the world, says NASA, having powered 135 space shuttle missions from 1981 to 2011.

"Not only does this test mark an important step towards proving our existing design for SLS's first flight," said Steve Wofford, engines manager at NASA's Marshall Space Flight Center in Huntsville, Alabama, where the SLS Program is managed for the agency, "but it's also a great feeling that this engine that has carried so many astronauts into space before is being prepared to take astronauts to space once again on SLS's first crewed flight."

The next step is to continue hot fire development tests with all the upgrades and qualify all the RS-25 flight engines for SLS launches.

Last November, NASA announced the long awaited decision to formally restart production of the venerable RS-25 engine by awarding a manufacturing contract to Aerojet Rocketdyne.

The existing RS-25 inventory of 16 heritage engines is only sufficient for the first 4 SLS flights.

The maiden test flight of the SLS is targeted for no later than November 2018 and will be configured in its initial 70-metric-ton (77-ton) version with a liftoff thrust of 8.4 million pounds.

SLS-1 will boost the unmanned Orion EM-1 capsule on an approximately three week long test flight beyond the moon and back.

I was on hand when the welded skeleton of Orion EM-1 recently arrived at the Kennedy Space Center on Feb. 1 for outfitting with all the systems and subsystems necessary for flight.

NASA plans to gradually upgrade the SLS to achieve an unprecedented lift capability of 130 metric tons (143 tons), enabling the more distant missions even farther into our solar system.

Source: Universe Today