Beating heart of J-2x engine finishes year of successful NASA tests

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(Phys.org)—NASA on Thursday took another step toward human exploration of new destinations in the solar system. At the agency's Stennis Space Center in Mississippi, engineers conducted the final test-firing of the J-2X powerpack assembly, an important component of America's next heavy-lift rocket.

The J-2X engine is the first human-rated liquid oxygen and liquid hydrogen engine developed in the United States in decades. Designed and built by NASA and industry partner Pratt & Whitney Rocketdyne of Canoga Park, Calif., the engine will power the upper stage of NASA's 143-ton (130-metric-ton) Space Launch System (SLS) rocket. The powerpack is a system of components on top of the engine that feeds propellants to the bell nozzle of the engine to produce thrust.

"The determination and focus by teams at NASA's Marshall Space Flight Center and Stennis on designing and perfecting the J-2X engine helps show the great strides of progress made on the overall program," said SLS Program Manager Todd May. "We are inspired to stay the course and pursue our goal of exploring deep space and traveling farther than ever before."

The powerpack was worked out separately from the engine to more thoroughly test its limits. It also can be operated under a wider range of conditions. The tests provide a trove of data to compare with analytical predictions of the performance of several parts in the turbopump and flexible ducts.

"These tests at Stennis are similar to doctor-ordered treadmill tests for a person's heart," said Tom Byrd, J-2X engine lead in the SLS Liquid Engines Office at Marshall in Huntsville, Ala. "The engineers who designed and analyze the turbopumps inside the powerpack are like our doctors, using sensors installed in the assembly to monitor the run over a wide range of stressful conditions. We ran the assembly tests this year for far longer than the engine will run during a mission to space, and acquired a lot of valuable information that will help us improve the development of the J-2X engine."

The powerpack assembly burned millions of pounds of propellants during a series of 13 tests totaling more than an hour and a half in 2012. The testing team set several records for hot-firing duration at Stennis test stands during the summer. NASA engineers will remove the assembly from the test stand to focus on tests of the fully integrated engine. Installation on a test stand at Stennis will begin in 2013.

The SLS will launch NASA's Orion spacecraft and other payloads from the agency's Kennedy Space Center in Florida, providing an entirely new capability for human exploration beyond low Earth orbit. The program is managed at Marshall.

Provided by NASA