Boeing and NASA Complete Dual Aerospike Engine Tests

A series of three hot-fire tests on tandem Boeing Rocketdyne XRS-2200 aerospike engines has been completed at NASA's John C. Stennis Space Center, confirming the performance of electromechanical actuators (EMAs) that were used in propellant valving for the engines. EMAs are seen as a technology of choice in new rocket engines that could be developed under the Space Launch Initiative (SLI).

With a total of 120 seconds of hot-fire performance, the dual-engine test series has been declared a success, with test objectives met, along with schedule and cost goals. "We were able to acquire all of the data that we wanted, which NASA other SLI contractors can use for SLI applications. The Team did an outstanding job with limited resources and a short timeline," said Steve Bouley, division director, propulsion development at the Rocketdyne Propulsion & Power unit of The Boeing Company,

"Data from the final test completed on August 6 is being thoroughly reviewed," said Aerospike Program Manager Mike McKeon. "But we've already had a good look at how the EMAs perform under hot-fire conditions, and the results confirmed our expectations."

Instead of hydraulics, future propulsion systems may use EMAs to control major propellant valves, so gaining performance data in "real world" testing has significant value. There are six EMAs on each aerospike test engine that are used to deliver the propellants to the thruster banks and gas generators.

Among other benefits, EMAs are a big help in reducing vehicle weight and complexity by eliminating the hardware needed to store and pressurize the hydraulic fluid. And the hope is that future generations of EMAs will be even more compact than those currently in operation.

The first test of the series -- a 5-second ignition test -- was run on July 12 and a 25-second test was run on July 24. The third test went for 90 seconds.

"All of the EMAs performed according to expectations," McKeon said. "Current models seem to be rather fragile and we did have to replace several as the series went on, but that was not unexpected; getting a read on durability was one of the issues we wanted to address. Nevertheless, the EMA technology itself is very good, very effective. What seems to be needed are smaller, more robust models. Newer designs will be helped by thorough analysis that we plan to do with the EMAs that were a part of this test series."

Following the series, the engines will now be removed from the stand and put in storage at SSC, awaiting NASA instructions on final disposition.

Fourteen single-engine test firings of a development configuration of the unique Aerospike engine were successfully completed at Stennis Space Center last year, followed by a series of dual-engine tests that was concluded late this spring.

Rocketdyne developed the XRS-2200 Aerospike engine at its Canoga Park, Calif., facility for the now-cancelled X-33 program. A joint Boeing and NASA team at Stennis Space Center did final engine assembly.

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