Boeing Designing First Large Reusable Hydrocarbon Rocket Engine

The Rocketdyne Propulsion & Power business of The Boeing Company is deep into design work on a new reusable rocket engine that will generate more than one million pounds of thrust (at sea level) and could be the first-ever multi-mission booster to use oxygen-rich gases in combination with kerosene fuel.

Design of the new engine -- the RS-84 -- is currently in its first phase under funding from NASA's Space Launch Initiative (SLI). This initial phase was initiated with a $34 million award to Boeing Rocketdyne and will ultimately involve a team of 100 engineers and technicians by the end of the phase next May. Pending NASA acceptance of the design, the program could move into a second phase in 2003 for an additional award of more than $24 million. A prototype RS-84 could emerge by 2006.

"The principle behind the RS-84 is that gaseous oxygen -- which also functions as the combustion oxidizer -- will be used to drive the propellant turbopumps," said John Vilja, program director for SLI engines. "In most engines -- certainly the ones that Rocketdyne has built over the years -- the fuel, such as gaseous hydrogen or kerosene, is used to drive the turbines.

"Some unmanned Russian engines have traditionally operated as oxygen-rich," adds Vilja. "But those engines have always been expendables, and further, have required protective coatings on engine parts, which means less reliability and durability. Thanks to Boeing-proprietary metals, we can now eliminate coatings and those attendant penalties. That, in turn, allows us to use kerosene in a reusable rocket engine as the fuel, which offers higher thrust density than hydrogen."

The RS-84 joins the RS-83 as two engine concepts being investigated under the SLI effort. The RS-83 is a hydrogen-powered booster. While both target future vehicles that have yet to be selected, the RS-84 is also noteworthy for the power it would produce: more than one million pounds of thrust. Rocketdyne engines have not been in that range since the Rocketdyne F-1 engine delivered 1.5 million pounds of thrust for the Saturn V vehicle of the Apollo lunar program.

"We're hoping to put an RS-84 aboard a second-generation re-usable launch vehicle," said Vilja. "Further, we're designing for an engine life of at least 100 missions, double the design life of an SSME, with much lower maintenance costs and faster turnaround."

Rocketdyne Propulsion & Power is a global leader in the design, development and manufacture of rocket propulsion and space power systems. In addition to the SSME, Boeing Rocketdyne provides propulsion systems for Delta and Atlas launch vehicles. The Rocketdyne RS-68 engine for the Boeing Delta IV family of expendable launch vehicles is the first large liquid-fueled rocket engine to be certified for flight in the United States since Rocketdyne developed the SSME.
Boeing Space and Communications (S&C), headquartered in Seal Beach, Calif., is the world's largest space and communications company. A unit of The Boeing Company, S&C provides integrated solutions in launch services, human space flight and exploration, missile defense, and information and communications. It is NASA's largest contractor; a leading provider of space-based communications; the primary systems integrator for U.S. missile defense; and a leading provider of intelligence, surveillance and reconnaissance. The global enterprise has customers worldwide and manufacturing operations throughout the United States and Australia.

###

For further information:
Dan Beck
(818) 586-4572
daniel.c.beck@boeing.com
Ann Beach
(562) 797-4222
ann.m.beach@boeing.com