Boeing Rocketdyne Chooses Design for Next-Generation Reusable Rocket Engine

The rocket engine configuration selected by the design team at the Rocketdyne Propulsion & Power unit of The Boeing Company (NYSE: BA) for Boeing's propulsion system entry in NASA's Space Launch Initiative (SLI) will provide greater reliability while increasing safety for future space flight crews.

Engineers at Canoga Park, Calif.-based Rocketdyne are developing the RS-83 engine for NASA's SLI program for future reusable space transportation. In May 2001, NASA awarded Boeing Rocketdyne $65 million to develop concepts and technologies for the main and upper stage propulsion systems for the next-generation launch vehicle.

"NASA wants this new launch system to be at least 10 times safer and crew survivability 100 times greater than today's space launch systems, all at one tenth the cost," noted Rocketdyne SLI Program Manager Jon Vilja. "Propulsion is a driver in achieving these parameters, and we've selected a configuration for the engine that promises greater safety, reliability and producibility."

The new RS-83 engine system will be staged-combustion, liquid hydrogen/oxygen, providing improved controllability and increased reliability that even surpasses the mission success of the only current reusable engine for human spaceflight, Boeing Rocketdyne's Space Shuttle Main Engine (SSME). It will be rated for a 100-mission life cycle, twice the planned mission life for the SSME.

To support the SLI initiative, Rocketdyne drew on the expertise of engineers fresh from two engine development efforts, the RS-68 for the Boeing Delta IV expendable launch system, and the Aerospike engine for NASA's X-33 advanced technology demonstrator. The RS-68 -- recently certified by the Air Force for first flight in 2002 -- was the first large liquid-fueled engine developed in the United States since Rocketdyne developed the SSME more than two decades ago.

"These Rocketdyne propulsion engineers bring to the table a combined experience base which is unsurpassed," Vilja explained. "Their corporate memory on best practices in propulsion development is recent, and the skill they've acquired in working with leading-edge design tools has enabled us to move forward quickly and effectively with our design efforts. Working side by side with our NASA customer, we identified 5,500 potential engine combinations, and this astounding number only represents the configurations that made it into our formal selection process."

"The final configuration of the RS-83 is simpler to build and maintain, and has higher reliability," said Jon Volkmann, product team manager, Engine Integration.

Other RS-83 design features include turbopumps with easy access. The RS-83 design also taps into state-of-the-art fabrication techniques, including selectively net-shaped components made through the technology of powder metallurgy.

The next milestone for the development effort is a System Design Review in March. This could lead to the detailed design of a full-scale prototype that would be worked for another year.

"Improved reliability and maintainability are inherent in the design of the RS-83, further supplemented by advanced health monitoring features. While the Space Shuttle Main Engine continues to serve ably and capably as the current generation reusable launch engine, we see the RS-83 as a worthy successor," said Vilja.

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