

Revolutionary Air-Breathing Engine Rockets Past Key Milestone Ahead of Schedule

Initial design of a new prototype air-breathing rocket engine for NASA -- one that could revolutionize air and space travel in the next 40 years -- reached a major milestone ahead of schedule last week.

The engine's design team, the Rocket Based Combined Cycle Consortium (RBC3), completed its first major engine systems requirements review -- an exhaustive examination of the engine's design and performance parameters -- three months earlier than originally planned.

To design the radical new engine, the consortium combined the propulsion development skills of the Rocketdyne Propulsion & Power business of The Boeing Company [NYSE:BA], of Canoga Park, Calif.; the Pratt & Whitney space propulsion business unit of United Technologies Corp., of West Palm Beach, Fla.; and the Aerojet missile and space propulsion business unit of GenCorp, Inc., of Sacramento, Calif.

The flight-like ground test engine is being developed as part of NASA's Integrated System Test of an Air-breathing Rocket (ISTAR) program, which intends by the end of the decade to flight-test a self-powered vehicle to more than six times the speed of sound, demonstrating all modes of engine operation.

Dubbed "ARGO" by its design team, the engine is named for the mythological Greek ship that bore Jason and the Argonauts on their epic voyage of discovery. The team believes the name is appropriate because the ship's technological marvels were surpassed only by the world-class prowess of its crew.

ARGO's unique engine design allows it to function as a rocket, ramjet and scramjet. Key among its technical advantages: the ability to use air as an oxidizer. Compared to conventionally powered rocket vehicles, this technology will significantly reduce vehicle weight by eliminating a significant amount of its required on-board oxidizer.

The ISTAR contract calls for completion of conceptual system design and subsystem testing by November 2002. Ground testing of the flight-weight, fuel-cooled engine flowpath is scheduled to begin in 2006.

"This review is a big step toward our goal four years down the road," said consortium program director Mike McKeon, RBC3 program manager. "We are now on our way to ground testing the world's first hypersonic, rocket-based, combined cycle engine -- fueled and cooled by hydrocarbon and high-test peroxide propellants."

The project is funded by NASA as part of an effort to make future space transportation safer, more reliable and significantly less expensive than today's missions.

"Air-breathing propulsion is one of the most promising concepts we've seen for reaching NASA's future-generation spaceflight goals," said Steve Cook, deputy manager of the Advanced Space Transportation Program at the Marshall Space Flight Center in Huntsville, Ala. "The successful completion of this critical first milestone bears out NASA's faith in this team to lead America to a revolutionary new age in global and out-of-this-world transportation."

The innovative air-breathing rocket engine for the operational vehicle would get its initial power boost from specially designed rockets in a duct that captures air, an arrangement that improves performance about 15 percent above conventional rockets. Once the vehicle has accelerated to more than twice the speed of sound, the rockets are turned off and the engine relies solely on oxygen in the atmosphere to burn its hydrogen fuel. When the vehicle has accelerated to more than 10 times the speed of sound, the engine converts to a conventional rocket-powered system to propel the craft into orbit.

Spacecraft powered by air-breathing -- or rocket-based, combined cycle -- rocket engines would be completely reusable, able to take off and land at airport runways, and ready to fly again within days.

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