

## Advanced Space Transportation Technology Summary

### Fastrac Engine



The Fastrac engine is a new, 60,000-pound-thrust engine that will be used for the first powered flight of NASA's X-34 technology demonstrator. The first engine developed in-house by engineers at NASA's Marshall Space Flight Center in Huntsville, Ala., Fastrac went from the drawing board to the test stand for full-engine, hot-fire testing in less than three years—a much faster than usual design cycle for rocket engines.

Fastrac is less expensive than similar engines because of an innovative design approach that uses commercial, off-the-shelf parts and fewer of them. Common manufacturing methods are used, so building the engine is relatively easy and not as labor-intensive as manufacturing typical rocket engines. Each Fastrac engine will initially cost approximately \$1.2 million—about one-fourth of the cost of similar engines.

The Fastrac engine operates with a single turbopump with pumps for kerosene and liquid oxygen attached to a common shaft. Fastrac uses a gas generator cycle, which burns a small amount of kerosene and oxygen to provide gas to drive the turbine and then exhausts the spent fuel overboard.

NASA began full-engine, hot-fire testing of the Fastrac rocket engine in March 1999. In May 1999, the complete engine system was tested for the first time at full power for 155 seconds, the length of time it will be required to perform during an X-34 flight. System-level testing continues at Stennis Space Center, Miss., and component testing continues at the Marshall Center. The first flight engine will be acceptance tested and integrated into the X-34 ground test article for static ground testing in spring 2000. After Fastrac certification testing is completed, the first flight of the Fastrac in the X-34 vehicle is planned in 2000.

Since Marshall Center engineers developed the Fastrac engine in-house, there are no industry proprietary rights to its performance data. Technology generated through Fastrac is available to the entire U.S. aerospace industry.

NASA's industry team for design, development and manufacture of the Fastrac engine includes Summa Technology Inc. of Huntsville, which builds components such as the gas generator, propellant lines, ducts and brackets and assembles the engines; Allied Signal Inc. of Tempe, Ariz., and Marotta Scientific Controls Inc. of Montville, N.J., which supply valves; Barber-Nichols Inc., which builds the turbopump; and Thiokol Propulsion, a division of Cordant Technologies Inc. of Salt Lake City, Utah, which builds the chamber nozzle.

The Fastrac engine is one of many low-cost technologies the Marshall Center's Advanced Space Transportation Program is developing to reduce the cost of getting to space from \$10,000 per pound to \$1,000 per pound and eventually to only \$100 per pound.