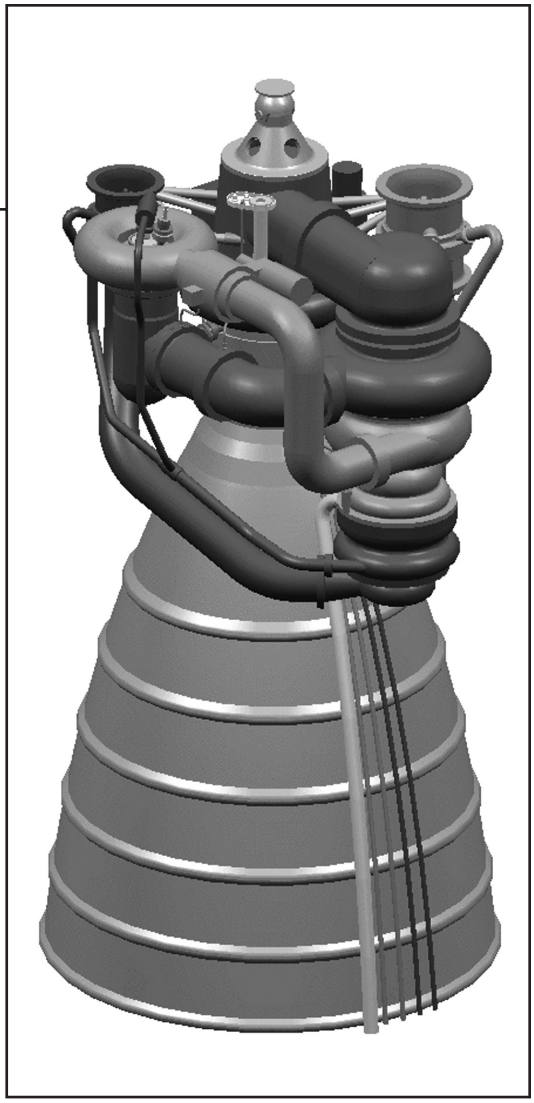
Booster Engine Prototype Project:

TR107 Engine Component Technologies



The TR107 engine technologies activity is developing innovative components that could be integrated into an unprecedented, liquid-oxygen/kerosene-propelled engine system -- one that could power NASA's next generation of reusable launch vehicles.

Led by Northrop Grumman Space Technology Corp. -- formerly TRW Inc. -- of Redondo Beach, Calif., the TR107 is one of several technology development efforts competing for NASA's Booster Engine Prototype project, a key element of NASA's Next Generation Launch Technology program, or NGLT.

TR107 development was initiated in 2001 via a $15.5 million contract awarded to TRW Inc. The award -- part of NASA Research Announcement 8-30 Cycle I -- was made by NASA's Second Generation Reusable Launch Vehicle Program, the foundation technology development program that evolved in 2002 into the NGLT program. The program is managed for NASA's Office of Aerospace Technology in Washington, D.C., by Marshall Space Flight Center in Huntsville, Ala.

In April 2003, under NRA 8-30 Cycle II, NASA awarded an additional $21 million to Northrop Grumman -- which acquired TRW in 2002 -- to refocus the TR107 project. Concentrating on key booster engine technologies, the NASA/Northrop Grumman team is developing two critical engine components: a single-pintle injector for the engine's oxygen-rich preburner, and a duct-cooled combustion chamber intended to eliminate conventional engine cooling channels.

Both component technologies are expected to help realize NASA's goal of making its next-generation booster engines dramatically more reliable than current state-of-the-art engines, and reducing launch-related costs for future spaceflight missions.

The TR107's single-pintle injector provides a unique alternative to conventional booster engines, which typically employ a uniform series of many injection orifices at the forward end of the combustion chamber to inject propellant into it. This larger, centralized single orifice is less prone to clogging or contamination, uses fewer individual parts and offers robust fuel-flow characteristics expected to improve system performance and stability, providing combustion efficiency of 96 percent to 99 percent.

The innovative combustion chamber features kerosene-compatible materials to prevent coking -- the gummy, damaging residue left by heated kerosene. The duct-cooled chamber also is designed to eliminate conventional cooling channels, improving the engine's ability to withstand high-temperature operations. Chamber components will be manufactured from oxygen- and kerosene-compatible materials, eliminating the need for heat-resistant surface coatings.

In 2004, NASA will narrow competition between technology candidates to a single booster engine system, which could make use of the component technologies delivered by the TR107. Design of the final flight engine is expected to commence in 2007.

Administered for NASA's Office of Aerospace Technology by Marshall Space Flight Center in Huntsville, Ala., the Next Generation Launch Technology program seeks to develop key technologies that will provide the foundation for America's future space fleet -- yielding low-cost space access and reinvigorating the U.S. space launch market to compete with space agencies and commercial enterprises worldwide.