

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Launch Vehicles in Service or in Development (1)

Author: Mr. Jonathan Hofeller
Space Exploration Technologies, United States, jonathan@spacex.com

SPACEX FALCON 9 MAIDEN FLIGHT RESULTS AND FUTURE DEVELOPMENTS

Abstract

The Falcon 9 launch vehicle builds on the technologies and expertise developed during the design, assembly and commercial deployment of the Falcon 1 and will provide an Evolved Expendable Launch Vehicle (EELV)-class launch capability while attaining significant improvements in reliability, cost and responsiveness over existing vehicles.

With the maiden launch scheduled for Summer 2009 and 18 additional Falcon 9 flights already contracted on the manifest, this medium-heavy lift launch vehicle will be the workhorse of the SpaceX fleet. Capable of carrying 10 metric tons to low Earth orbit and nearly 4500 kg to a 1500 meters-per-second geosynchronous transfer orbit, at a fraction of the cost of its competition, the Falcon 9 will revolutionize access to space. It has already begun to set record as launch vehicle of choice for NASA's cargo resupply of the International Space Station.

Falcon 9 is a two-stage vehicle powered by liquid oxygen and rocket-grade kerosene (RP-1) bipropellant engines. The first stage generates 832,000 pounds force (3,700kN) of thrust (sea-level) using nine Merlin-1C engines and the second stage generates 96,000 pounds force (427 kN) of thrust (vacuum) using a single Merlin-1C Vac engine. The Falcon 9 has engine out capability starting early in the first stage burn. Later during the first stage burn, the Falcon 9 can tolerate additional engines out. The architecture surrounding the development of this vehicle provides a man-rated capability.

Consistent with SpaceX's corporate philosophy of rapid and continuous improvement, Falcon 9 has a planned evolution path which will include significant upgrades based upon experience from previous missions. An overview of the Falcon 9 upgrades and description on how they will positively impact the satellite community are discussed. Furthermore, SpaceX plans to begin its development for a Falcon 9 Heavy – a triple core first stage that will be capable of inserting 30 metric tones to LEO and 15MT to GTO. At roughly 100M, *this vehicle will provide the world's slowest cost per kilogram transportation at roughly US3000 per kg.*