SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

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SUBORBITAL SPACEPLANE VEHICLE DEVELOPMENT PROGRAMS FOR FUTURE POINT-TO-POINT TRANSPORTATION SERVICES

Abstract

The XP spaceplane now being developed by Rocketplane Global (RGI) is a fully reusable suborbital vehicle about the size of a mid-sized business jet. It takes off and lands from conventional runways using J-85 afterburning turbojets and ascends to a 13 km altitude under airbreathing thrust before igniting its LOX / kerosene rocket engine for the ascent to space. After a 70 second main engine burn the XP has accelerated to Mach 3.5 and climbed to about 50 km altitude at rocket engine cut-off. Thereafter a ballistic coast carries the vehicle to its 104 km apogee and back to atmospheric re-encounter at 50 km again. The coast phase lasts about three to four minutes, and it is during this time that the XP is in the microgravity environment. Peak G forces on ascent and reentry are 4 G's.

This first-generation spaceplane architecture has limited range, but is capable of flying up to 300 km downrange to land at a different location from its takeoff. The first such point-to-point (PtP) suborbital spaceflight corridor in Hawaii is now beginning development and licensing by the FAA / AST office under the Office of Aerospace Development of the Hawaii Department of Business, Economic Development Tourism. The suborbital flight corridor extends from Kona Airport on the Island of Hawaii to Kalaeloa Airport on Oahu. In the event of an abort scenario airports on Maui and Molokai can be used for emergency landing sites.

The integration of spaceplane flight operations into existing commercial airports and the flight safety and operational data that is gained from these short range PtP spaceflights will set the stage for second generation spaceplane flights with much greater range and speed. Part of the rationale for Hawaii's investment in a spaceport license is to position the state as a global hub in a future spaceport network, providing 90 minute hypersonic flights to the mainland US and also Asian destinations. Spaceports are now being proposed in Japan and Singapore as well as in many locations in the US, and having direct connections between Hawaii and these sites will enhance both tourism and commerce for the state.

The US Department of Defense is now also promoting suborbital PtP vehicle technology and programs through the US Marines SUSTAIN technology demonstrator program. The intent is to use the current suborbital vehicles now in development as the starting point for development of future Mach 6-8 systems with range of several thousand kilometers. These vehicles would be able to rapidly (¡ 2 hours) insert a squad of Marines and their equipment into "hot zones" in a time of crisis so that force can be applied quickly and effectively. The operational characteristics of a SUSTAIN vehicle are almost identical to those required for a trans-oceanic commercial suborbital spaceplane.