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The Development of the X-37 Re-Entry Vehicle

Boeing is busy at work developing a reusable NASA X-37 technology demonstrator that could advance space transportation by providing new, lower cost technologies for future spacecraft. Under a contract with NASA's Marshall Flight Space Center in Huntsville, AL, Boeing is to build an Approach and Landing Test Vehicle (ALTV) at its facilities in Southern California. Huntington Beach serves as the engineering and development fabrication facility for the X-37 and Palmdale serves as the primary final assembly facility.

Approach and Landing Test Vehicle

The ALTV is a predecessor to the orbital vehicle. It will be dropped from a B-52 during flight tests in November 2004 at NASA's Dryden Flight Research Center in the deserts of Southern California. NASA chose to reduce the risk of landing by creating the ALTV, which will fly like the Space Shuttle Enterprise did during its early testing. These tests will validate the approach, landing, and turnaround for the X-37, see **Figure 1**. Work on the Orbital Vehicle (OV) has reached the preliminary design stage. Some of the key technologies being matured include the wing leading edge tiles, hot structures and long duration batteries in the low and high voltages classes. The Orbital vehicle is depicted in **Figure 2.**

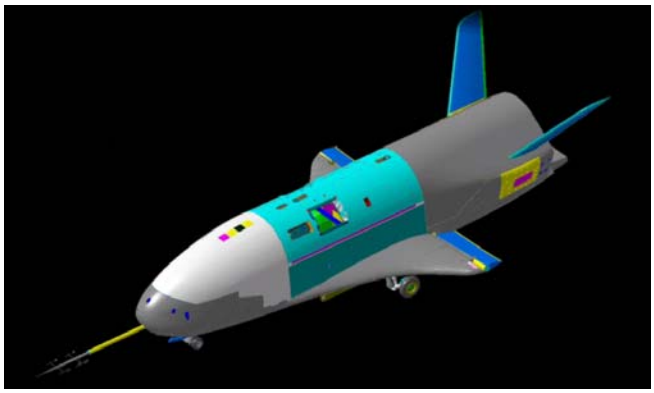

Figure 1 – The ALTV version of X-37

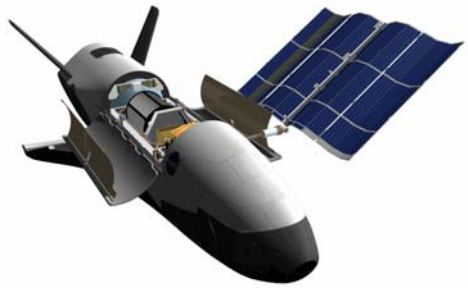

Figure 2 –OV version of X-37

Vehicle Development

A great deal of progress is being achieved in solving the many significant technical issues affecting the ALTV that will benefit the Orbital Vehicle. These include the development of the landing gear system, the flight control system, flight computers and associated hardware and software, electrical power systems and distribution, advanced light-weight integrated composite structures, the thermal protection system and its associated installations and seals, the command, control and communication systems, flight and ground operations for an unmanned vehicle, to name a few. The development of the integrated structure was a major achievement; it is composed primarily of BMI graphite sandwich composite construction. Separate sections were made for the bottom shell, top shells, longerons and access panels. This resulted in significant reduction of piece parts and weight savings over a more conventional approach, see **Figure 3.**