X-37 Reusable Spaceplane Program Achieves Milestones

The Boeing Company today announced it has made substantial progress toward key milestones in the X-37 reusable spaceplane program, initiated under a cooperative agreement signed with NASA in July 1999. Beyond significant fabrication and assembly results, the program has successfully conducted flight tests of the X-40A, a vehicle designed to verify the flight dynamics of the X-37 and reduce risk on the program.

The Boeing-built X-40A Space Maneuver Vehicle, an 85 percent scale version of X-37, recently completed its fifth straight successful test flight at NASA's Dryden Flight Research Center. During the flights, the unmanned X-40A is dropped from a Chinook helicopter from 15,000 feet, and it autonomously acquires the runway and lands in a mode similar to a conventional aircraft. The X-40A uses the GN&O (Guidance, Navigation & Control) algorithms, software, CADS (Calculated Air Data System), SIGI (Space Integrated GPS/INS) and aerodynamic performance maneuvers of the X-37 as well as its mobile FOCC (Flight Operations Control Center). The X-40A will perform a total of seven drop tests to support the low-speed atmospheric flight dynamics of the X-37.

"We are particularly excited about the X-40A flight test phase. The recent series of successful flights has really inspired our team," said Ron Prosser, vice president Advanced Space & Communications for Boeing Phantom Works. "We are building confidence in the systems' autonomous vehicle operations capabilities while acquiring valuable flight data that will verify the subsonic approach and landing characteristics of the X-37 vehicle design. Concurrently, the balance of the X-37 program is making excellent technical progress across the board."

"Prior to performing the flight tests, we verified the software and flight algorithms using our Avionics and Software Simulation Lab in conjunction with the FOCC," said Randy Hein, X-40A project manager for Boeing Phantom Works. "A similar lab will be used to verify the operations of the X-37. In fact, the X-37 lab has recently become operational, with multi-string and redundant hardware now undergoing testing with the first release of the X-37's flight software."

The X-37 is unpiloted, autonomously operated and will be the only X-vehicle capable of conducting on-orbit operations and collecting test data in the Mach 25 (reentry) region of flight. The X-37 will be launched into orbit and will have the capability to remain in space for up to 21 days. It will also serve as a test bed for 40 airframe, propulsion and operation technologies designed to make space transportation and operations significantly more affordable. Potential new commercial and military reusable space vehicle market applications for these technologies range from on-orbit satellite repair to the next-generation of totally reusable launch vehicles.

The X-37 concept permits testing of a wide variety of experiments and technologies, including a highly durable, high-temperature thermal protection system; storable, non-toxic liquid propellants; and important new aerodynamic features, all of which are applicable to future reusable space vehicles. The vehicle's modular design, including a seven foot by four foot experiment bay, will also allow testing of both current and future technologies within the same vehicle, providing long-term cost savings.

"At this point in time the X-37 vehicle is progressing along well," said Dick Cervisi, X-37 program manager for Boeing Phantom Works. "Wind tunnel tests designed to verify the aerodynamic design and performance from Mach 10 to landing speeds are 93 percent complete. In addition, aeroheating wind tunnel tests to verify the methodology of predicting reentry environment are 100 percent complete, and the arc jet testing of our new thermal protection system concepts have matched the predicted values. Over two-thirds of the X-37 design is complete. We're looking forward to beginning final vehicle assembly this summer."

The X-37 will incorporate advanced technologies and processes from throughout Boeing. The graphite/BMI fuselage is being manufactured at the St. Louis facility and the construction of the composite wings is being carried out at the Huntington Beach facility. Eighty-five percent of the composite parts are fabricated, and final assembly of the fuselage structure began last month. Final assembly of the X-37, which is 27.5 feet long with a wingspan of 15 feet, will take place at the Boeing X-Vehicle Assembly facility in Palmdale, Calif.

The first unpowered drop test of the X-37 from a NASA B-52 is planned for 2002 at Edwards Air Force Base, Calif., while orbital tests are planned for 2004.

The X-37 government team, led by the Marshall Space Flight Center, Huntsville, Ala., also includes NASA's Ames Research Center, Mountain View, Calif.; Kennedy Space Center, Fla.; Goddard Space Flight Center, Greenbelt, Md.; Langley Research Center, Hampton, Va.; and Dryden Flight Research Center and the U.S. Air Force Flight Test Center, Edwards Air Force Base, Calif.

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