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DREAM CHASER® BY SIERRA SPACE: HOW THE SPACE SHUTTLE PAVED THE WAY FOR  
THIS 'SPIRITUAL SUCCESSOR' AND THE VEHICLE'S FINAL ENVIRONMENTAL AND  
FUNCTIONAL TESTS TO PREPARE FOR LAUNCH AND LOW EARTH ORBIT

**Abstract**

Humanity's goal to sustain a human presence in Low Earth Orbit (LEO) and make the latter more accessible, requires a robust in-space transportation system. The Space Shuttle program, which consisted of the world's first reusable fleet of spacecraft, originally fit this requirement with the ability to carry payloads to and from LEO. An additional benefit was the ability to rapidly return time-sensitive science because of the Shuttles' ability to land on a runway- a feature not associated with previous capsules for spaceflight and cargo missions. The end of the program with Space Shuttle Atlantis' last flight in 2011, led the National Aeronautics and Space Administration (NASA) to look to commercial actors to fill in the gap in developing the program's successor. With its significant capacity for pressurized and unpressurized cargo to and from LEO (more than six tons), its ability to also land on a runway, and its planned fifteen missions to the ISS, Sierra Space's Dream Chaser spaceplane is the next solution. Dream Chaser is in its final stages of development. A series of environmental tests conducted at NASA's Armstrong Test Facility (ATF) were performed to subject the vehicle to conditions similar to what may be experienced during launch and in LEO. First, vibrational testing conducted at the Mechanical Vibration Facility (MVF) excited the vehicle in a sinusoidal 'shake' (launch conditions). The excitations were performed one axis at a time at varying levels of magnitude. Additionally, thermal vacuum testing at the In-Space Propulsion (ISP) facility introduced extreme hot and cold temperature cycles, similar to what the vehicle may experience while in LEO. The completion of these tests was critical in validating the functionality of all onboard systems, and overall, the vehicle for launch and spaceflight. The Space Shuttle program ushered in an exciting era of sustained presence in LEO and Dream Chaser will continue this legacy, initially focusing on the transport of cargo. This paper discusses the influence of the Space Shuttle program on the design of Dream Chaser and gives a high-level overview of the status of Dream Chaser's development, with an emphasis on the final environmental and functional tests to prepare for spaceflight.