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BUILDING LARGE COMPOSITE CRYOTANKS USING AUTOMATED FIBER PLACEMENT AND
OUT OF AUTOCLAVE MATERIALS WITH NASA

Abstract

The Composite Cryotank Technologies Demonstration Project, part of NASA's Game Changing Technologies Development Program, is building the largest composite cryotank in the world, with composites that do not require an autoclave. This project's objective is to advance the Technology Readiness Levels of 'Out of Autoclave' carbon fiber composites manufacturing in order to produce large diameter liquid propellant tanks for launch vehicles. Current designs provide up to 30% mass reduction compared to traditional metallic tank designs. In addition, the use of Automated Fiber Placement technology and lack of autoclave cure cycles results in up to a 25% reduction in tank cost. The reduction in vehicle dry mass allows more payload, more science, and longer range exploration missions to be launched into space and beyond Low Earth Orbit. The Marshall Space Flight Center, with the prime contractor, The Boeing Company, has completed testing on the 2.4m diameter tank, validating models of the composite's cryogenic performance. A 5.5m diameter tank is being prepared for a series of pressure and structural tests. This report examines composite cryotank history, provides an overview of the Composite Cryotank Technologies Demonstration Project, and describes efforts to fabricate the Sump Door for the 5.5m tank at the Marshall Space Flight Center.