



QUICK DISCONNECT REDESIGN, FABRICATION, AND QUALIFICATION TESTING

SUMMARY

White Sands Test Facility (WSTF) is capable of redesigning problematic propellant system quick disconnect (QD) couplings, fabricating the redesigned units, and subjecting the couplings to a series of tests required to qualify the new design for flight.

BACKGROUND

Shuttle Orbital Maneuvering Subsystem and Reaction Control Subsystem Fairchild oxidizer QD couplings have a high failure rate due to leakage caused by nitrate accumulation near the air-half coupling (AHC) poppet. WSTF worked closely with NASA/JSC and Boeing/Downey to redesign the AHCs with the goal of reducing their failure rates on the Orbiters. WSTF also fabricated the redesigned AHCs and performed the tests required to qualify the new design for use on the Shuttle fleet.

PROCEDURE

Several new AHC poppet designs were generated and subjected to oxidizer exposure tests to determine which of the designs was less susceptible to leakage caused by the accumulation of nitrates. The oxidizer exposure tests simulated conditions at Kennedy Space Center (KSC) experienced by the AHCs during Shuttle ground-turnaround operations.

Based on the results of the oxidizer exposure tests, a final design was selected to enter the qualification test phase. Qualification testing included numerous water cycle tests, leak tests, force-displacement tests, and a series of vibration tests. All qualification tests were performed at WSTF except for the vibration tests, which were performed at a White Sands Missile Range (WSMR) facility.

Upon acceptance of the qualification test data, WSTF will fabricate AHC replacement kits that will be shipped to KSC for installation onto the Orbiters.

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