DOD Demonstrates Reusability of Hypersonic Test Vehicle

May 14, 2025 | By DoD News

The Defense Department conducted a second successful flight of a fully recoverable uncrewed hypersonic test vehicle in March 2025, with the first being in December 2024.

This test campaign, led by DOD's Test Resource Management Center, in partnership with Naval Surface Warfare Center,

Crane Division, marks the nation's first return to reusable hypersonic flight testing since the X-15 hypersonic research program ended in 1968.

In both tests, the Talon-A hypersonic vehicle, powered by a liquid rocket engine and launched from a carrier aircraft, flew over the Pacific Ocean and achieved speeds greater than Mach 5, about 3,836 mph, before landing at Vandenberg Space Force Base, California. The landmark tests supported the TRMC's Multi-Service Advanced Capability Hypersonics Test Bed project.

The project accelerates delivery of advanced hypersonic capabilities to the warfighter by providing DOD, other federal agencies, industry and academia with the capability to affordably and rapidly conduct hypersonic experiments and test hypersonic system components, according to a DOD news release published earlier this month.

George Rumford, the director of TRMC, said historically, a hypersonic development program would conduct the first flight test of a new aeroshell material, GPS unit, or other system component in a costly, full-system weapon test. Because of the high cost, a program may perform only one or two full-system weapon tests per year, so if a test fails, it may not be tested again for months.

With such high stakes associated with each flight test, the program would often over-engineer the components and materials being tested to offset the risk of test failure. For instance, Rumford said the aeroshell material would have to be thicker and heavier, sacrificing range and maneuverability. The GPS would require redundancy, which would crowd out other equipment.

In contrast, DOD's MACH-TB project leverages commercial space launch services to test hypersonic system components and materials in-flight prior to a full-system weapon test.

This approach allows developers to test components and materials under hypersonic conditions at relatively low cost, iterate and improve based on real data, and rapidly retest to ensure they are proven before being integrated into an “all-up-round” for a full-system weapon test.

Rumford said the December and March flight tests represent another advancement in accelerating the pace of hypersonic experimentation and testing.

“Demonstrating the reuse of fully recoverable hypersonic test vehicles is an important milestone for MACH-TB,” he explained. “Lessons learned from this test campaign will help us reduce vehicle turnaround time from months down to weeks.”