

# Tactical Tomahawk Modernization

The upgraded version of the Tomahawk Weapon System (TWS) is operationally effective, demonstrating performance in a GPS-denied environment and the ability to communicate over the Advanced Communication Architecture. The Navy should correct deficiencies identified in the operational test prior to the introduction of the upgraded TWS to the Fleet. Details are available in a classified TWS FOT&E report, published in October 2021.



## System Description

The TWS consists of three segments intended to provide surface combatants and submarines with long-range, precision-guided, land attack cruise missile capability. The three segments include the All Up Round (AUR), the Theater Mission Planning Center (TMPC) for mission planning and distribution, and the Tactical Tomahawk Weapon Control System (TTWCS) for the initialization, preparation, launch, and post-launch control of the missile.

## Program

The TWS is an Acquisition Category IC program. The current AUR, the Block IV variant, entered service in 2004 with a 30-year life cycle and 15-year recertification cycle. DOT&E approved Revision H of the TWS Test and Evaluation Master Plan in 2018. In 2020, the Navy began a modernization and recertification of the AUR to extend the missile's certification another 15 years by replacing obsolete and expired components, upgrading the communications systems to operate on the Advanced Communication Architecture, and providing a targeting capability in a GPS degraded or denied environment. This modernized AUR is designated Tomahawk Block V. The Navy is leveraging the overall TWS modernization program to support the development of the Maritime Strike Tomahawk (MST), an anti-ship capability, and to introduce an advanced warhead design to improve TWS lethality.

## Major Contractors

- Missile segment: Raytheon Missiles and Defense – Tucson, Arizona.
- Weapon Control System segment: Lockheed Martin – Valley Forge, Pennsylvania.

- Mission Planning segment:
  - Peraton, Inc. – San Jose, California (Mission Distribution System).
  - Tapestry Solutions – St. Louis, Missouri (Tomahawk Planning System).
  - BAE Systems – San Diego, California (Targeting Navigation Tool Set).

compared to the legacy system. Specifics on missile accuracy and mission tasking response time are provided in a classified TWS FOT&E report published in October 2021.

The Tomahawk Block V AUR demonstrated sufficient accuracy in a GPS-denied environment and the capability to operate on the Advanced Communication Architecture network. The classified TWS FOT&E report highlights deficiencies that should be resolved prior to the introduction of the upgraded TWS Block IV to the fleet. The upgraded and modernized AUR maintains the legacy AUR lethality since the warhead remained unchanged.

## Test Adequacy

The Navy conducted operational testing on the TWS at the Washington Planning Center, Washington Navy Yard, Naval Surface Warfare Center Dahlgren, Virginia, Pacific Missile Test Center, Pt Mugu, California, and USS *Chafee*, (DDG 90), Pearl Harbor, Hawaii between August 2020 and May 2021 using fleet operators. The testing consisted of 3 live flight tests, 17 high-fidelity simulated launches, and 10 mission planning events. Testing, conducted in accordance with DOT&E-approved test plans, was adequate to evaluate the operational effectiveness and suitability of upgraded and modernized TWS.

In FY21, the Navy also conducted a Cooperative Vulnerability and Penetration Assessment and an Adversarial Assessment of the TMPC and TTWCS to assess their survivability in a cyber-contested environment. The Navy deviated from the DOT&E-approved test plan by placing the Tomahawk AUR and elements of the TMPC “off limits” due to the concern of inadvertently damaging these test assets, critical to the program. Consequently, the cyber survivability assessment of the TWS does not consider some attacker profiles.

## Suitability

TWS remains operationally suitable, meeting or exceeding the reliability and availability requirements. There were no hardware failures during testing. The Navy corrected the four identified software deficiencies and demonstrated the effectiveness of the corrections prior to the completion of the test.

## Survivability

The survivability assessment of TWS in a cyber-contested environment is detailed in the classified TWS FOT&E report published in October 2021.

## Recommendation

1. The Navy should resolve the major deficiencies identified during operational testing prior to fleet release. Detailed recommendations are included in the classified TWS FOT&E report published in October 2021.

## Performance

### Effectiveness

TWS continues to be operationally effective. Testing demonstrated no degradation in capability as