

Tomahawk Weapon System (TWS)



In February 2023, the Navy's Operational Test and Evaluation Force (OPTEVFOR) commenced operational testing of modifications to Tactical Tomahawk (TACTOM) that were developed to enable future upgrades to the Tomahawk missile, including capability to strike adversary ships at sea. In FY23, the TACTOM program additionally continued its live fire test campaign to assess lethality of the Joint Multiple Effects Warhead System (JMEWS) that the Navy intends to improve missile performance against hardened targets. DOT&E expects to publish a classified FOT&E report on the operational effectiveness and suitability of TACTOM modifications with a classified cyber survivability annex in 4QFY24 and after completion of remaining test events.

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 major components of the system include the all-up round (AUR) missile, the Theater Mission Planning Center (TMPC), and the Tactical Tomahawk Weapon Control System (TTWCS).

- AUR: Block IV and Block V AURs are conventional Tomahawk missiles with both surface and submarine vertical launch capabilities.
- TTWCS: Provides for the initialization, preparation, launch, and post launch control of the Tomahawk missile.
- TMPC: A shore-based or sea-based mission planning center that develops and distributes missions; provides command information services for all variants of the Tomahawk missile; provides strike planning, execution, coordination, control, and reporting; and provides maritime component commanders the capability to plan or modify conventional TWS missions.

MISSION

The joint force commander employs naval units equipped with the Tomahawk Weapon System (TWS) for long-range,

precision strikes against land targets. Maritime Strike Tomahawk (MST) upgrades are designed to enable the joint force commander to employ the TWS in anti-surface warfare.

PROGRAM

The TWS is an Acquisition Category IC program, designated TACTOM. The current AUR, the Block V variant, completed operational testing in 2021 and is detailed in the classified TWS FOT&E report of October 2021. DOT&E approved Revision I of the TWS TEMP in May 2023 to evaluate hardware and software modifications to the TTWCS (TTWCS v5.6.1) and the TMPC (TMPC 6.0.2/7.0.X).

- TTWCS v5.6.1 upgrades support future AUR changes and GPS Military Code (M-code) capability, as well as SSN *Virginia*-class Payload Module implementation.
- TMPC 6.0.2/7.0.x supports AUR land attack capability changes.

Revision I of the TWS TEMP additionally documents the Navy's enduring flight test program that includes up to four test flights per year for monitoring missile flight reliability.

In April 2023, the Navy designated MST as a subprogram of the TACTOM program. The resultant TWS Block Va variant will add a surface warfare capability to the legacy TWS Block V. The Navy intends TWS Block Va initial operational capability in 2025

but has yet to develop program requirements or provide a TEMP update for DOT&E approval. DOT&E approved the MST LFT&E Strategy in December 2019.

The Navy is developing the JMEWS to improve lethality against hardened targets. The JMEWS commenced lethality evaluation in FY09 and fuze risk reduction efforts in FY19. The Navy intends integration of the JMEWS onto the Block V AUR in 1QFY27 with designation as the Block Vb variant. DOT&E approved the JMEWS LFT&E Strategy in January 2021.

» MAJOR CONTRACTORS

- Raytheon, a subsidiary of RTX (formerly Raytheon Technologies) – Tucson, Arizona (AUR)
- Lockheed Martin Rotary and Mission Systems – King of Prussia, Pennsylvania (TTWCS)
- Peraton, Inc. – Santa Clara, California (TMPC)
- Vencore, Inc. – San Jose, California (TMPC)
- Tapestry Solutions – St. Louis, Missouri (TMPC)
- BAE Systems – San Diego, California (Targeting Navigation)

TEST ADEQUACY

In February 2023, OPTEVFOR commenced operational testing of TTWCS v5.6.1 and TMPC 6.0.2/7.0.X in accordance with a DOT&E-approved test plan and

with observation by DOT&E, and OPTEVFOR expects it to complete in 1QFY24. The Navy intends to validate the modifications to TTWCS and TMPC will support future AUR capability and did not degrade legacy land attack functionality. Testing consists of simulated strike group scenario events in laboratory and shipboard environments, a maintenance demonstration, simulated flight tests, cyber survivability testing, and one flight test of a Block V missile launched from a surface ship.

OPTEVFOR scheduled cyber survivability evaluation of the TMPC 6.0.2/7.0 in 1QFY24. OPTEVFOR intends cyber survivability evaluation TTWCS v5.6.1 in FY24 but has not scheduled the event.

Between October and November 2022, the Navy's TWS office conducted two JMEWS arena tests in accordance with a DOT&E-approved plan and with observation by DOT&E. The Navy's TWS office plans to complete the JMEWS live fire test campaign in 4QFY26.

The Navy has yet to fund or schedule warhead characterization arena tests or lethality simulations for threat-representative maritime targets in the MST LFT&E Strategy.

PERFORMANCE

» EFFECTIVENESS AND SUITABILITY

Not enough data are yet available to determine operational

effectiveness and suitability of TACTOM upgrades, TTWCS v5.6.1 and TMPC 6.0.2/7.0.X, due to remaining test requirements and ongoing data analysis. DOT&E expects to deliver a classified report for TACTOM upgrades in FY24 after completion of remaining FOT&E.

No data are available to assess operational effectiveness and suitability of the TWS Block Va MST AUR against maritime targets.

» LETHALITY

Not enough data are yet available to determine lethality of JMEWS due to remaining test requirements and ongoing data analysis. DOT&E expects to deliver a classified LFT&E report for JMEWS lethality in FY27 after completion of the JMEWS live fire test campaign.

No data are available to assess lethality of the TWS Block Va MST AUR against maritime targets.

» SURVIVABILITY

No data are available to assess cyber survivability of the TACTOM upgrades, TTWCS v5.6.1 and TMPC 6.0.2/7.0.X. DOT&E expects to report on TTWCS v5.6.1 and TMPC 6.0.2/7.0.X cyber survivability in FY24 after completion of their cyber assessments as an annex to the FOT&E report.

RECOMMENDATIONS

The Navy should:

1. Conduct cyber survivability evaluation of TTWCS v5.6.1 as soon as feasible.
2. Submit for DOT&E approval a TEMP update that details the test strategy and resources for TWS Block Va MST. Develop and approve requirements for the MST capability that are necessary to complete the TEMP update.
3. Fund and schedule warhead characterization testing for threat-representative maritime targets agreed to in the MST LFT&E strategy.
4. Continue to resolve the major deficiencies identified during the TWS Block V FOT&E and address recommendations in the classified TWS FOT&E report of October 2021.