

DDG 1000 *Zumwalt*-Class Destroyer



In FY24, the Navy's Operational Test and Evaluation Force (OPTEVFOR) continued operational test of the DDG 1000 *Zumwalt*-class destroyer with four live fire missile exercises and modeling and simulation (M&S) testbed runs to evaluate anti-air warfare capability against threat anti-ship cruise missiles (ASCMs) and aircraft. The *Zumwalt*-class Program Office reports that ship survivability M&S will not be updated to reflect the as-built configuration or installation of Conventional Prompt Strike (CPS). The *Zumwalt*-class Program Office has yet to fund or schedule Full Ship Shock Trials (FSST). *Zumwalt*-class survivability cannot be determined until the M&S update and FSST are complete.

SYSTEM DESCRIPTION

Zumwalt-class ships are long range, low observable, destroyers.

They are equipped with: (1) a modified AN/SPY-3 Multi-Function (X-band) radar that adds a volume search capability; (2) 80 vertical launch cells to employ Tomahawk Land Attack Missiles, Standard

Missiles (SM-2/SM-6), and Evolved Sea Sparrow Missiles; and (3) two Mk 46 30mm close-in gun systems. The class is currently being modified to incorporate

CPS modules to enhance the class's strike warfare capability.

MISSION

The joint force maritime component commander can employ *Zumwalt*-class destroyers primarily for forward-deployed offensive surface strike missions, with a secondary mission of surface warfare dominance. As designed, the *Zumwalt*-class included undersea warfare capabilities; these capabilities are no longer required for the updated operational environment of the *Zumwalt*-class. The *Zumwalt*-class is designed for independent operations but can be integrated into Carrier or Expeditionary Strike Group operations.

The Navy will install CPS modules on each ship of the class between FY24 and FY28. These modules will provide the *Zumwalt*-class additional strike warfare capability.

PROGRAM

The *Zumwalt*-class is an Acquisition Category IC program. The President's Budget in 2011 truncated the class to three ships. The Navy commissioned USS *Zumwalt* (DDG 1000) in 2016, USS *Michael Monsoor* (DDG 1001) in 2019, and expects the delivery of USS *Lyndon B. Johnson* (DDG 1002) in FY27 after CPS install.

The Navy continues to update the *Zumwalt*-class TEMP due to significant modifications to the

operational requirements and warfighting concept of operations. The Navy changed the *Zumwalt*-class's primary mission from land attack to open-ocean surface strike in 2019. The Navy codified additional changes in a June 2021 revision to the Operational Requirements Document, to include the integration of CPS. The Navy intends to update test requirements of the *Zumwalt*-class in the next revision of the TEMP, based on revised employment of the class.

The *Zumwalt*-class IOT&E started in October 2021. Completion of the IOT&E period has been delayed by a combination of factors, but DOT&E expects IOT&E to complete in FY25 after test of the *Zumwalt*-class primary mission, open-ocean surface strike. Test of the *Zumwalt*-class with CPS, and other features being installed through FY27, will occur in FOT&E. Evaluation of SM-6 integration of *Zumwalt*-class is also planned for FOT&E. DOT&E recommends a shock trial during FOT&E after completion of the Navy's shock qualification program, which will complete following installation of CPS.

» MAJOR CONTRACTORS

- Bath Iron Works, a subsidiary of General Dynamics Corporation – Bath, Maine
- HII – Pascagoula, Mississippi
- Raytheon, a subsidiary of RTX – Arlington, Virginia

TEST ADEQUACY

In FY23, the Navy completed a cyber cooperative vulnerability and penetration assessment and an adversarial assessment between November 2022 and March 2023. Testing encompassed Internet Protocol (IP) networks aboard the ship along with industrial control systems associated with its hull, mechanical, and electrical systems. These tests were adequate to assess cyber survivability of the class, were in accordance with the DOT&E-approved test plan, and were observed by DOT&E.

In FY24, OPTEVFOR continued operational test of the *Zumwalt*-class in accordance with DOT&E-approved test plans and DOT&E observation. The Navy conducted four live fire anti-air warfare tests in December 2023. Data collected from these tests were adequate to demonstrate the *Zumwalt*-class's ability to defeat ASCM raids in representative scenarios.

In FY24, OPTEVFOR continued Probability of Raid Annihilation M&S testbed runs with completion expected in FY25. These M&S runs are intended to predict the *Zumwalt*-class's probability of defeating inbound ASCMs and aircraft across an expanded set of scenarios from the previously identified live fire test events. The Navy expects to complete validation of the testbed in FY25 and expects to accredit it for this use. DOT&E continues to work with OPTEVFOR to ensure appropriate

use of the M&S testbed for the determined uncertainties from the validation process.

The Navy plans to evaluate the *Zumwalt*-class primary mission of offensive surface strike with a Tomahawk missile launch in FY25, including shipborne strike planning events. Evaluation of *Zumwalt*-class employment of CPS will occur during FOT&E, in conjunction with CPS program testing, in FY27.

Torpedo defense testing, conducted with DDG 1000 in October 2021, provided data on the class's ability to evade torpedoes. However, full evaluation of the class's effectiveness against undersea threats has not been completed.

The Navy has yet to fund or schedule an FSST for the *Zumwalt*-class. As previously identified in the FY22 and FY23 Annual Reports, this test is required to adequately assess ship survivability against underwater threat weapons and determine residual mission capability following such an occurrence.

The Navy reports that budget and schedule shortfalls preclude updates to vulnerability and recoverability M&S to reflect the as-built *Zumwalt*-class or inclusion of CPS when installed. The Navy intends to complete a Final Survivability Assessment Report in FY25 that includes survivability findings related to earlier ship design. DOT&E will not be able to provide a complete assessment of the *Zumwalt*-class's vulnerability to threat weapons

until M&S reflects the as-built ship and FSST is complete.

» EFFECTIVENESS

Insufficient data are available to determine *Zumwalt*-class operational effectiveness or change the preliminary assessment provided in DOT&E's classified early fielding report from November 2022. DOT&E will publish an IOT&E report of the *Zumwalt*-class operational effectiveness after completion of operational test that the Navy expects to occur in FY25. DOT&E will publish an update to this report after test of the *Zumwalt*-class employment of CPS that the Navy expects to occur in FY27.

» SUITABILITY

Insufficient data are available to determine *Zumwalt*-class operational suitability or change the preliminary assessment provided in DOT&E's classified early fielding report from November 2022. DOT&E will publish an IOT&E report of the *Zumwalt*-class operational suitability after completion of operational test that the Navy expects to occur in FY25. DOT&E will publish an update to this report after test of the *Zumwalt*-class employment of CPS, as well as evaluation of the technological refresh of the class's Command, Control, Communication, Computer, Cyber and Intelligence systems, that the Navy expects to occur in FY27.

» SURVIVABILITY

Assessment of *Zumwalt*-class cyber survivability is classified. DOT&E will publish a classified report of the *Zumwalt*-class cyber survivability after completion of IOT&E that the Navy expects to occur in FY25.

Due to vulnerability and recoverability M&S not yet being validated, and not reflecting the ship as-built, data remain insufficient to determine *Zumwalt*-class survivability against threat weapons. DOT&E will require that the survivability M&S be updated and validated as part of the upcoming TEMP revision.

Failure and recoverability mode testing aboard DDG 1001, conducted in 2022, provided insight into the recoverability of the class after damage. However, testing was not sufficient to resolve associated LFT&E critical issues due to limitations on the systems under test. DOT&E will address the strategy for completing the LFT&E assessment of the *Zumwalt*-class's mission system recoverability as part of the upcoming TEMP revision.

RECOMMENDATIONS

The Navy should:

1. Complete remaining IOT&E events as recommended in the FY23 Annual Report.
2. Submit for DOT&E approval a revision of the TEMP for modifications to the operational requirements

and employment of the *Zumwalt*-class to include installation of CPS.

3. Submit for DOT&E approval an update to the LFT&E Strategy that includes FSST and evaluation of the as-built *Zumwalt*-class following the installation of CPS.
4. Fund and schedule an FSST prior to the first deployment of a *Zumwalt*-class ship with CPS installed as recommended in the FY23 Annual Report.
5. As noted in the FY22 and FY23 Annual Reports, document the risk to the warfighter associated with incomplete component shock qualification and lack of an FSST, prior to deployment.
6. As recommended in the FY22 and FY23 Annual Reports, sufficiently fund modernization and sustainment of the DDG 1000 class to include improvements determined from failure and recoverability mode testing as documented in the Navy's report on the event.