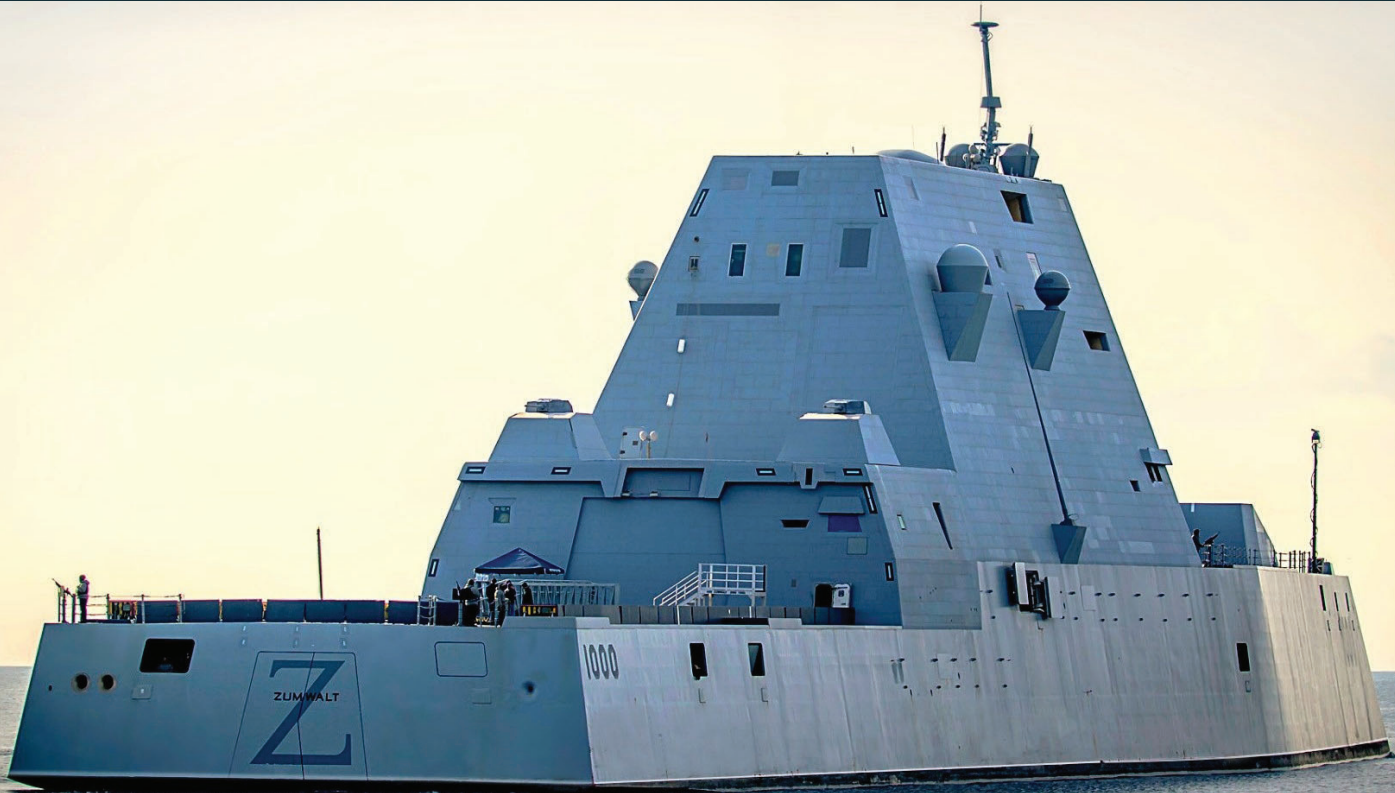# DDG 1000 – *Zumwalt*-Class Destroyer

The Navy commenced *Zumwalt*-class IOT&E in October 2021. Due to competing operational commitments and system readiness, initial operational testing will continue through at least FY24. Surface Warfare (SUW) operational testing is complete, but all other primary and secondary mission areas require additional testing.

SYSTEM DESCRIPTION

Zumwalt-class ships are long-range, low observable, destroyers. They are equipped with: 1) 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), Vertical Launch Anti-Submarine Rockets, and Evolved Sea Sparrow Missiles; 3) an integrated undersea warfare system with a mid-frequency bow-mounted sonar; and 4) two Mk 46 30mm close in gun systems.

MISSION

The Joint Force Maritime Component Commander can employ *Zumwalt*-class destroyers

primarily for forward-deployed offensive surface strike (OASuW) missions. Secondary missions include undersea and surface warfare dominance. The Zumwalt-class is designed for independent operations but can be integrated into Carrier or Expeditionary Strike Group operations.

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 and USS *Michael Monsoor* (DDG 1001) in 2019, and expects the delivery of USS *Lyndon B. Johnson* (DDG 1002) in FY24. The Navy is updating the *Zumwalt*-class Test and Evaluation Master Plan (TEMP) due to significant modifications to the operational requirements and warfighting concept of operations. In 2019, the Navy changed the *Zumwalt*-class's primary mission to open-ocean OASuW and codified additional changes in a June 2021 revision to the Operational Requirements Document. The *Zumwalt*-class IOT&E started in October 2021 and will inform the fleet of the class's operational performance.

» MAJOR CONTRACTORS

- Bath Iron Works – Bath, Maine
- Huntington Ingalls Industries – Pascagoula, Mississippi

- Raytheon Co., Raytheon Missiles & Defense – Tewksbury, Massachusetts
- Raytheon Missile Systems – Tucson, Arizona

TEST ADEQUACY

DDG 1000 testing to date was conducted in accordance with the DOT&E-approved test plan, observed by DOT&E, and progressed towards an adequate collection of data to support operational effectiveness and suitability assessments. FY22 testing assessed Anti-Submarine Warfare (ASW), SUW, and Anti-Air Warfare (AAW).

- ASW: USS *Michael Monsoor* executed Torpedo Defense testing in October 2021 in Nanoose Bay, Canada. Testing of the ship's ASW capability against a submarine was postponed.
- SUW: USS *Zumwalt* executed SUW testing in November and December 2021 in the Southern California operational area. The SUW operational test (OT) is complete and adequate for DOT&E to make an assessment.
- AAW: USS *Zumwalt* performed six integrated developmental/operational test events and an OT event in 2Q/3QFY22 that were adequate to support DOT&E's AAW assessment. The Navy intends to conduct additional AAW OT events in FY24. The Navy continues to develop the combat system modeling and simulation (M&S) test bed, which is

required to complete OT. The Navy expects to commence AAW M&S testing in FY24.

Cyber survivability testing is planned in FY23 on USS *Zumwalt*. Strike Warfare operational testing is targeted in FY23 and FY24 on USS *Michael Monsoor*. The Navy is developing an OASuW operational test strategy for DOT&E approval in the next TEMP revision.

The Navy has not funded or planned an adequate ship survivability assessment against underwater threat weapons, to include a demonstration of residual mission capability after such engagements, through a full-ship shock trial. This assessment was not complete prior to initial deployment of USS *Zumwalt* in 4QFY22. DOT&E issued an Early Fielding Report in November 2022.

The Navy has not updated vulnerability and recoverability M&S meant to support the LFT&E survivability assessment of the DDG 1000 class to reflect the ship as built. Further, the Navy does not intend to update, validate, or accredit LFT&E survivability assessments prior to completing their LFT&E program in FY23. DOT&E will not be able to provide an assessment of the Zumwalt class's vulnerability to threat weapons without the results from validated survivability M&S that models the ship design as built.

In FY22, the Navy completed a series of Failure and Recoverability Mode (FARM) tests aboard USS *Michael Monsoor* to assess the capability of the class's mission systems to recover

from system failures and to determine the effectiveness of damage control response. The scope of these tests were limited due to ongoing installation of *Zumwalt*-class mission systems and communication systems, as well as software updates and availability of auxiliary equipment due to ongoing maintenance. Despite the test limitations, FARM testing provided valuable insight into how integrated systems and software respond to non-standard operating environments that can result from battle damage.

PERFORMANCE

» EFFECTIVENESS

Not enough data are yet available to provide a preliminary assessment of DDG 1000 operational effectiveness. The AAW live missile events conducted on the DDG 1000 and previously on the Self Defense Test Ship highlighted performance limitations that may restrict operational effectiveness in the AAW mission. Final assessment of *Zumwalt*-class offensive surface strike effectiveness will be reported in a classified report

following the completion of the live missile events in FY27. DOT&E issued an Early Fielding Report in November 2022 due to the Navy's deployment of USS *Zumwalt* in 4QFY22.

» SUITABILITY

Not enough data are yet available to provide a preliminary assessment of *Zumwalt*-class operational suitability.

» SURVIVABILITY

Due to vulnerability and recoverability M&S not yet being validated or reflecting the ship as-built, data are insufficient to assess *Zumwalt*-class survivability against threat weapons. Further, no data are yet available to assess DDG 1000 in a cyber-contested environment.

FARM testing aboard DDG 1001 identified equipment responses that were previously unknown. The Navy will evaluate potential changes as part of class modernization and sustainment.

RECOMMENDATIONS

The Navy should:

1. Complete IOT&E in accordance with the DOT&E-approved test plan.

2. Complete revision of the TEMP that includes an adequate test strategy for the delivered OASuW capability.

3. Complete development and validate the combat system M&S test bed, to include debris, missile, radar, and electronic warfare models.

4. Document the risk to the warfighter associated with incomplete component shock qualification and lack of full-ship shock trial prior to deployment.

5. Work with DOT&E to develop an updated LFT&E strategy in FY23 to evaluate the as-built survivability of the DDG 1000 class with the next TEMP update, including updated survivability M&S and remaining shipboard testing.

6. Sufficiently fund modernization and sustainment of the DDG 1000 class to include improvements determined from FARM testing.