

DDG 1000 – Zumwalt-Class Destroyer

In FY21, the Navy executed three missile exercises on the Self Defense Test Ship (SDTS) to evaluate the DDG 1000's self-defense capability and validate the DDG 1000 combat system modeling and simulation (M&S) test bed. While not enough data are yet available to provide a preliminary assessment of DDG 1000 operational effectiveness, suitability, and survivability, live missile testing highlighted limitations that may restrict operational effectiveness in the air warfare mission. The DDG 1000 IOT&E started in October 2021.



System Description

The DDG 1000 is a long-range, low observable, destroyer class ship intended primarily for forward deployed offensive surface strike (OaSUW) missions. Secondary missions include undersea and surface warfare dominance. The DDG 1000 is 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-6s), 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.

Program

The DDG 1000 is an Acquisition Category IC program. The President's Budget in 2011 truncated the DDG 1000 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 DDG 1000 Test and Evaluation Master Plan (TEMP) due to significant modifications to the DDG 1000 operational requirements and warfighting concept of operations. In 2019, the Navy changed the DDG 1000 primary mission to open ocean OaSUW and codified additional changes in a June 2021 revision to the DDG 1000 Operational Requirements Document. The DDG 1000 IOT&E started in October 2021 and will inform the Fleet of the DDG 1000's operational performance but not a Navy buy decision.

Major Contractors

- Bath Iron Works – Bath, Maine.
- Raytheon Company – Andover, Massachusetts.
- Raytheon Missile Systems – Tucson, Arizona.

Test Adequacy

In FY21, the Navy executed three missile exercises on the SDTS to evaluate the DDG 1000's self-defense capability and validate the DDG 1000 combat system M&S test bed.

Due to shipyard delays and persistent combat systems integration faults affecting multiple warfare areas, the test ship could not support the DDG 1000 IOT&E, initially planned for FY19. The Navy started IOT&E in October 2021, but the Navy must still develop a test strategy for the intended OaS UW capability.

The Navy has not planned or funded an adequate ship survivability assessment against underwater threats, to include a demonstration of residual mission capability after such engagements, through a full-ship shock trial. Given the current schedule, this assessment will not be complete prior to initial deployment of a DDG 1000 ship.

The Navy has not yet modeled the ship as built to support an LFT&E assessment, and has yet to verify, validate, and accredit the intended vulnerability M&S needed to evaluate ship survivability against air-delivered threats. Planned shipboard testing will supplement some gaps in the capability of survivability models and support the final survivability assessment.

The Navy plans to start Failure and Recoverability Mode testing on USS *Michael Monsoor* in 1QFY22 to evaluate the mission systems' capability to recover from system failures and effectiveness of damage control response. Development delays and required updates to the ship's combat system and auxiliary systems have limited the opportunity to conduct this evaluation.

The Navy has scheduled the cyber survivability assessment for 3QFY22.

Performance

Effectiveness

Not enough data are yet available to provide a preliminary assessment of DDG 1000 operational

effectiveness. The DDG 1000 live missile events using SDTS highlighted performance limitations that may restrict operational effectiveness in the air warfare mission. Final assessment of DDG offensive surface strike effectiveness will be published in a classified report following the completion of the live missile events.

Suitability

Not enough data are yet available to provide a preliminary assessment of DDG 1000 operational suitability.

Survivability

Survivability assessments conducted thus far have not been validated and do not reflect the ship as-built. Consequently, data are insufficient to adequately assess DDG survivability in a contested environment, to include a cyber-contested environment.

Recommendations

The Navy should:

1. Complete IOT&E prior to the first deployment of a DDG 1000 ship.
2. Complete revision of the TEMP that includes an adequate test strategy for the delivered OaS UW capability as soon as feasible.
3. Schedule, fund, and execute the four remaining DDG 1000 SDTS tests.
4. Complete development and validate the DDG 1000 combat system test bed, to include debris, missile, radar, and electronic warfare models.
5. Document the risk to the warfighter associated with incomplete component shock qualification and lack of full-ship shock trial.
6. Complete validation of LFT&E M&S for the ship as-built and determine required mitigations to identified limitations.