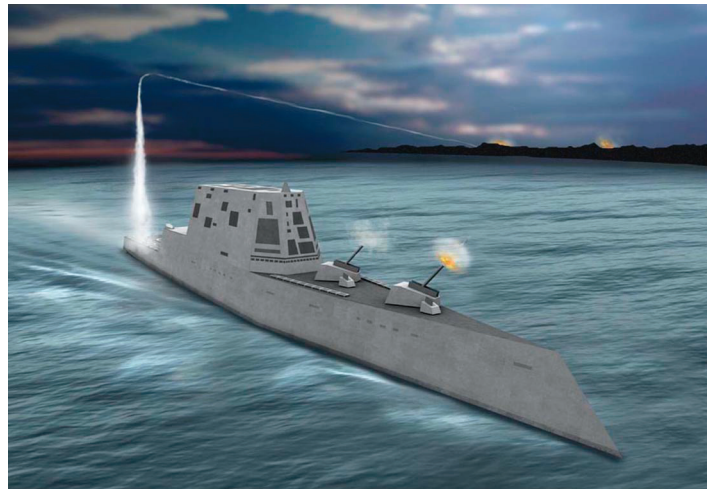


## DD(X) Future Surface Combatant including Long Range Land Attack Projectile

### Executive Summary

- The Navy completed an early operational assessment, which identified risks that were then addressed by the program office.
- The program conducted effective technology risk reduction in FY05 through developmental testing and Engineering Development Model demonstrations.
- The program is gaining significant survivability knowledge through an active LFT&E program.
- DD(X) combat system inclusion in the Anti-Air Warfare Self Defense Test and Evaluation Enterprise Strategy provides for adequate operational test and evaluation of DD(X) capability to defend against anti-ship cruise missiles, but similar investment is needed in test range resources to operationally test the Advanced Gun System with the Long Range Land Attack Projectile (LRLAP).



### System

DD(X) is a new combatant ship with a hull form that is designed to be difficult to detect on radar. It is equipped with:

- Two Advanced Gun System (AGS) 155 mm guns that fire the LRLAP
- Dual Band (X-band and S-band) radar
- Eighty vertical launch cells that can hold a mix of Tomahawk missiles, Standard (anti-air) Missiles, Vertical Launch Anti-Submarine Rockets, or Evolved Sea Sparrow Missiles
- Integrated Undersea Warfare system with high and medium frequency sonar to detect submarines and assist in avoiding mines
- Ability to embark and maintain MH-60R helicopter and capacity to carry vertical take-off unmanned aerial vehicles

### Mission

The Joint Force Maritime Component Commander can employ DD(X) to accomplish:

- Land Attack Warfare using LRLAP or Tomahawk cruise missiles
- Surface Warfare
- Anti-Air Warfare
- Undersea Warfare

DD(X) can operate independently or in company with an Expeditionary or Carrier Strike Group.

### Activity

- The Navy conducted an early operational assessment August 10 – December 1, 2004, under a DOT&E-approved test plan.
- The Peripheral Vertical Launch System (PVLS) is a new design concept that places missile launchers around the periphery of the hull structure. Testing successfully demonstrated the viability of the design by exploding a surrogate threat missile warhead in a position to emulate a mass detonation of ordnance stowed in one module of the PVLS launcher.
- Ballistic shock effects and hull whipping were evaluated during a series of nine underwater explosions on the 1/4-scale ship model.
- A supersonic threat missile was rail-launched into a section of the DD(X) hull structure to evaluate ballistic vulnerability of the hull.
- Guided flight testing of the LRLAP began in FY05. The LRLAP design team conducted six flight tests from a land-based test site at Point Mugu, California.
- DOT&E approved the LFT&E management plan in December 2004 and Test and Evaluation Master Plan updates in June and November 2005.
- The Milestone B decision was made in November 2005.

## Assessment

- Developmental, operational, and LFT&E to date have been very successful for risk reduction and technology readiness improvement. Technology readiness levels are at or beyond the minimum required for Milestone B. The comprehensive early operational assessment report highlighted several effectiveness and suitability risks. Many of the highest technology risk issues have been addressed and mitigated through Engineering Development Model testing and demonstration. Some issues, such as whether the AGS will operate properly in a constant motion environment, will not be resolved before the first ship goes to sea. The DD(X) has a robust LFT&E vulnerability program planned that is designed to provide a comprehensive survivability evaluation of the technologies employed by this new generation destroyer. The DD(X) LFT&E Lethality Integrated Process Team has developed a comprehensive strategy for the lethality evaluation of the LRLAP.
- The program office is proactive in giving the Navy Operational Testing Agency (OTA) full access to every developmental test event. This open dialogue has helped to give the OTA full understanding of systems and will permit better integration of future testing opportunities.
- The Navy has not identified adequate facilities for measuring and calibrating magnetic, acoustic, and radar signatures, though these will not be needed until approximately 2013. This will be an issue sooner for other ship classes including LCS and LPD 17. The Navy has not identified an appropriate range for conducting operational end-to-end testing of the AGS with LRLAP against realistic targets.
- PVLS testing demonstrated that the design would limit damage to individual cells and prevent chain reaction explosions in adjacent cells.
- DD(X) will have a crew of 142. This is small compared to a DDG 51 crew of more than 300. Current shore support

infrastructure and Navy manpower management policies are not fully suited for the unique requirements DD(X) will have. DD(X) will lack onboard administrative and maintenance personnel and facilities traditionally assigned to ships. The Navy has not specified how shore-side logistics, administrative, and maintenance support will work, or how training and assignment strategies will ensure all personnel arrive ready to operate systems and equipment. Several Navy initiatives and pilot programs are in progress that may prove to be suitable to address these challenges for DD(X).

- The Navy proposed an acceptable approach for operational testing of self defense capability against anti-ship cruise missiles. That approach uses the Self Defense Test Ship, complemented by modeling and simulation using the Probability of Raid Annihilation Test-Bed. The approach is being aligned with the Navy Anti-Air Warfare Self Defense Test and Evaluation Enterprise Strategy for future ship classes. This will provide results that will address operational test issues with the next ship class (CVN 21) using the DD(X)-like combat system.

## Recommendations

The Navy should:

1. Ensure manpower and other human capital policies are aligned to support DD(X) afloat and ashore when the ship arrives in the fleet.
2. Invest in appropriate testing and calibration facilities in order to understand and properly preserve low DD(X) acoustic, magnetic, and radar signatures.
3. Continue test program alignment with the Enterprise Strategy for future ship classes.
4. Identify and invest in a test range and required resources soon to enable operational end-to-end testing of the AGS with LRLAP against realistic targets.