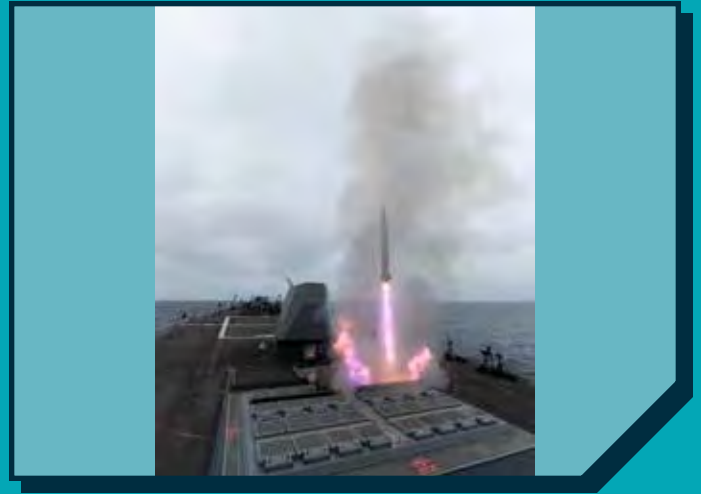


Evolved Sea Sparrow Missile Block 2

In August 2021, the Navy conducted seven Evolved Sea Sparrow Missile (ESSM) Block 2 live-fire events from the USS *Shoup* (DDG 86). The testing identified several deficiencies that the Navy will need to address to mitigate the risk to meeting operational effectiveness requirements prior to declaring initial operational capability, scheduled for 2QFY22. The final evaluation of ESSM Block 2 operational effectiveness, suitability, and survivability will not be available until FY25 when Aegis weapon system upgrades are expected to enable employment of full ESSM Block 2 capabilities.



System Description

The ESSM is a short to medium-range, ship-launched, guided missile intended to provide defensive, hard-kill engagement capability against anti-ship cruise missiles (ASCMs) as part of a layered defense of Aegis cruisers and destroyers and SSDS Mk 2 platforms, to include aircraft carriers and amphibious ships. ESSM Block 2 leverages Standard Missile 6 technology to reduce reliance on illuminator support and mitigate challenges in missile sequencing that are inherent in high-density stream raids. Semi-active guidance (using shipboard illuminators) is retained from ESSM Block 1 to engage stressing radar cross section threats and high-altitude diving ASCMs. The ESSM Block 2 also features a new blast fragmentation warhead. The Navy intends the ESSM Block 2 seeker upgrade to improve performance against stressing air warfare threats (including stream raids) in challenging electromagnetic spectrum environments.

Program

The ESSM 2 is an Acquisition Category II program. The Navy expects to deliver the Test and Evaluation Master Plan (TEMP), to include its LFT&E Strategy, for DOT&E approval in 2QFY22 in support of the full-rate production decision scheduled for FY25. The Navy intends to evaluate ESSM Block 2 operational effectiveness and suitability in two phases of IOT&E to support the initial operational capability and full-rate production decision, respectively. Phase 1 IOT&E, expected to be completed in 2QFY22, employs ESSM Block 2 with current Aegis weapon system capability, which cannot not exercise the full ESSM Block 2 capability. Phase 1 IOT&E also supports development and validation of modeling and simulation (M&S) that the Navy intends to use in Phase 2 IOT&E. Phase 2 IOT&E, expected to be completed in FY25, will employ ESSM Block 2 with an upgraded Aegis weapon system, enabling the exercise of full ESSM Block 2 capability.

Major Contractor

Raytheon Missiles and Defense – Tucson, Arizona.

Test Adequacy

In August 2021, the Navy conducted seven ESSM Block 2 live firing events from the USS *Shoup* (DDG 86) in accordance with the DOT&E approved Phase 1 IOT&E plan. The Navy scheduled an ESSM Block 2 firing event from the Navy's Self-Defense Test Ship in 1QFY22 and is on track to conduct M&S runs and a cybersecurity assessment in FY22 to complete Phase 1 IOT&E. In accordance with the approved plan, Phase 1 IOT&E data will not be sufficient to determine operational effectiveness and operational suitability of ESSM Block 2, but will rather serve to inform ESSM Block 2 capabilities and limitations in support of the initial operational capability. Phase 2 IOT&E events are intended to provide sufficient data for an adequate determination of operational effectiveness, suitability, and survivability.

From June 2019 to October 2020, the Navy conducted warhead characterization testing and limited single-fragment and multiple-fragment ground lethality testing against ASCM target surrogates. The Navy intends to conduct M&S runs against a set of secondary targets in 2QFY22 as lethality runs for score to complement the lethality data from ESSM Block 2 developmental testing, IOT&E flight tests, and IOT&E M&S runs.

Performance

Effectiveness

The Navy will need to address deficiencies identified in Phase 1 IOT&E to mitigate ESSM Block 2 risk to meeting operational effectiveness requirements. The Navy will need to complete the lethality M&S

runs for score to adequately evaluate ESSM Block 2 lethal effects. The details are classified and will be summarized in the Early Fielding Report after the completion of Phase 1 IOT&E.

Suitability

Phase 1 IOT&E has not yet provided enough data to support a preliminary assessment of ESSM Block 2 operational suitability or identify any risks to meeting operational suitability requirements. The final operational suitability assessment will be based on data from all test events and fleet firings through the completion of Phase 2 IOT&E.

Survivability

The survivability assessment of the ESSM Block 2 in a cyber-contested environment will be provided after the completion of the Cyber Vulnerability Penetration Assessment and the Adversarial Assessment scheduled in FY22. Planned FOT&E testing will evaluate ESSM 2 performance in the presence of a contested and congested electromagnetic spectrum environment.

Recommendations

The Navy should:

1. Determine the root cause of the classified deficiency identified in Phase 1 IOT&E and implement changes prior to Phase 2 IOT&E to mitigate the ESSM Block 2 risk to meeting operational effectiveness requirements.
2. Complete the lethality M&S runs for score and share all lethality data and reports with appropriate stakeholders to facilitate the final lethality assessment.