

CVN 21 – Next Generation Nuclear Aircraft Carrier

Executive Summary

- The Navy began an operational assessment in March 2008, which will provide Experienced Fleet Operators a review of CVN 21 design and technologies. This assessment will be conducted until February 2009.
- The Navy is continuing development of the Virtual Carrier model that will be used to supplement live testing during IOT&E for the Sortie Generation Rate (SGR) Key Performance Parameter (KPP).
- The Navy is continuing to build and operate land-based test sites for the dual band radar (DBR), electromagnetic aircraft launch system (EMALS), and advanced arresting gear (AAG).

System

- The CVN 21 program is designing and building the new CVN 78 class of nuclear powered aircraft carrier. It has the same hull form as the *Nimitz* class, but many ship systems inside the hull and on the flight deck are new.
- The newly designed nuclear power plant will reduce reactor department manning by 50 percent and produce significantly more electricity when compared to a current CVN 68 class ship.
- CVN 78 will incorporate electromagnetic catapults (instead of steam powered) and have a smaller island with a Dual Band Phased Array Radar.
- Weapons stowage, handling spaces, and elevators have all been redesigned to reduce manning, increase safety, and increase throughput of weapons.
- The Integrated Warfare System will be adaptable to technology upgrades and varied missions throughout the ship's projected operating life.
- CVN 21 is designed to increase the sortie generation capability of embarked aircraft and have increased self-defense capabilities when compared to current aircraft carriers.



Mission

- Carrier Strike Group Commanders will use the CVN 21 to:
 - Conduct power projection and strike warfare missions using embarked aircraft
 - Provide force protection of friendly units
 - Provide a sea base as both a command and control platform and an air-capable unit
- Initial Operational Capability for CVN 78 is planned for FY16. Full Operational Capability is planned for FY18 after Milestone C.

Prime Contractor

- Northrop Grumman

Activity

- Commander, Operational Test and Evaluation Force (COTF) began an operational assessment (OT-B2) in March 2008. It is currently scheduled to complete in February 2009. This assessment should inform the planned program review in FY11, but does not support a specific acquisition decision.
- The Navy is continuing to develop the Virtual Carrier model for analyses of the SGR capability of the ship, and will complete a SGR assessment during FY09.
- The Navy is currently performing high-cycle testing and highly accelerated life testing of the EMALS equipment at various labs.
- The Navy is building land-based test sites for both EMALS and the AAG in Lakehurst, New Jersey.
- The Navy has built a land-based test site to continue testing the DBR for both DDG 1000 and CVN 78 ship classes at the Surface Combat Systems Center, Wallops Island, Virginia.
- The Navy did not conduct live fire testing in FY08; however, the program did participate in the LPD-19 Full Ship Shock Trial (FSST) to support a study to develop an alternative to FSST. The alternative to FSST will be defined in the FY09 Test and Evaluation Master Plan (TEMP) revision with the caveat that if sufficient confidence in the alternative is not

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obtained, a FSST will take place in FY18. A Memorandum of Understanding (MOU) is being developed between NAVSEA 05, NAVSEA 08, and Program Executive Officer Carriers documenting the process.

Assessment

- The electromagnetic environmental effects of the DBR are not completely understood with respect to embarked aircraft and carrier operations. Large phased array radars in use aboard destroyers and cruisers typically prohibit radar transmission in the astern sectors during helicopter operations. The impact of DBR transmissions on fixed-wing aircraft, personnel, ordnance, and aviation support equipment are unknown.
- Final design of the Integrated Warfare System (IWS) is not complete, allowing recommendations from the OT-B2 to be considered in final IWS design. The Program Office is using current and projected threat analyses to examine requirements for the next update of the Test and Evaluation Master Plan.
- DOT&E assess that a comprehensive CVN 21 LFT&E plan is based on:
 - CVN Survivability Studies
 - Lessons learned from battle damage and flight deck accidents (e.g., the fire that occurred on the CVN 73)

- Relevant weapon effects tests and extensive surrogate testing
- Probability of kill versus probability of hit studies
- Damage scenario-based engineering analysis of specific hits
- A total ship survivability trial
- A full ship shock trial, or cost effective acceptable alternative.

Recommendations

- Status of Previous Recommendations. The Navy satisfactorily addressed all FY07 recommendations.
- FY08 Recommendations. The Navy should:
 1. Continue the OT-B2 operational assessment until the results of the SGR Assessment are known.
 2. Capture the preliminary design review issues of the IWS in OT-B2.
 3. Perform a comprehensive ship-wide electromagnetic environmental effects study to include effects on personnel, ordnance, aircraft fueling, and aircraft avionics.