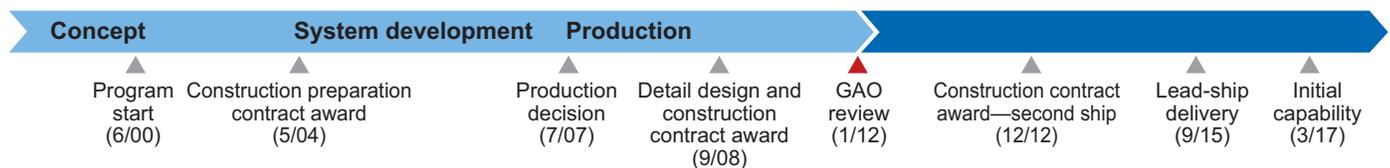


CVN 78 Class

The Navy's CVN 78 class of nuclear-powered aircraft carriers are being designed to improve operational efficiency, enable higher sortie rates, and reduce manpower through the use of advanced propulsion, aircraft launch and recovery, and survivability technologies. The Navy awarded a contract for detail design and construction of the lead ship, CVN 78, in September 2008 and expects it to be delivered by September 2015. The Navy plans to award the construction contract for CVN 79 in December 2012 and CVN 80 by the end of 2017.



Source: U.S. Navy.



Program Essentials

Prime contractor: Huntington Ingalls Industries–Newport News
 Program office: Washington, DC
 Funding needed to complete:
 R&D: \$827.7 million
 Procurement: \$16,540.9 million
 Total funding: \$17,368.6 million
 Procurement quantity: 2

Program Performance (fiscal year 2012 dollars in millions)

| | As of 04/2004 | Latest 08/2011 | Percent change |
|---------------------------------|---------------|----------------|----------------|
| Research and development cost | \$4,803.3 | \$4,646.8 | -3.3 |
| Procurement cost | \$30,770.8 | \$29,346.8 | -4.6 |
| Total program cost | \$35,574.1 | \$33,993.6 | -4.4 |
| Program unit cost | \$11,858.040 | \$11,331.185 | -4.4 |
| Total quantities | 3 | 3 | 0.0 |
| Acquisition cycle time (months) | 137 | 155 | 13.1 |

When the CVN 78 construction contract was awarded in September 2008, the program had several immature technologies and an incomplete three-dimensional product model. The ship's model is now complete, but 7 of the program's 13 critical technologies still have not been tested in a realistic environment. The electromagnetic aircraft launch system (EMALS) and dual-band radar continue to pose cost and schedule risks and neither system will be fully integrated and tested until after they are on-board. CVN 78's procurement cost has grown by about 10 percent over the past 3 years. Cost growth has been driven by construction cost increases, which the program largely attributes to the immaturity of the ship's technologies and design when the construction contract was awarded. The cost growth may require the program to request additional funding or reduce the ship's capabilities.

Attainment of Product Knowledge

As of January 2012

| Resources and requirements match | |
|--|---|
| • Demonstrate all critical technologies in a relevant environment | ○ |
| • Demonstrate all critical technologies in a realistic environment | ○ |
| • Complete preliminary design review | ● |
| Product design is stable | |
| • Complete three-dimensional product model | ● |
| • Test a system-level integrated prototype | ○ |
| Manufacturing processes are mature | |
| • Demonstrate critical processes are in control | ○ |
| • Demonstrate critical processes on a pilot production line | ○ |
| • Test a production-representative prototype | ○ |

● Knowledge attained ○ Knowledge not attained
 ■■■ Information not available Not applicable

CVN 78 Class Program

Technology Maturity

Seven of the CVN 78 program's 13 current critical technologies have not been tested in a realistic, at-sea environment, including two technologies—EMALS and the dual-band radar—which continue to pose risks. According to program officials, EMALS has successfully launched F/A-18E, T-45C, C-2A, and E-2D aircraft during testing; however, the system has not demonstrated the required level of reliability because of the slow correction of problems discovered earlier in testing. In addition, according to officials, EMALS motor generators have only been tested in a group of 4, rather than the group of 12 that will make up the system. A test of the complete system will not take place until it is aboard the ship. The dual-band radar also will not complete testing until after it is aboard the ship, which presents a risk if the system does not work as intended. The radar is required for ship installation starting in March 2013, but the program does not expect to complete testing the multifunction radar component until early 2013 or begin testing the volume-search radar component until May 2013. Some radar subsystems will not be tested until aboard the CVN 78. In addition, less dual-band radar testing has been done than anticipated because the Navy eliminated the volume-search component of the radar from the DDG 1000 Destroyer program, which the CVN 78 had planned to leverage. CVN 78 will now be the first ship to operate with this radar, but as of August 2011, the Navy had not yet planned for carrier-specific testing. Program officials also noted that the Evolved Sea Sparrow Missile will be demonstrated in a relevant environment by March 2012, at which point all critical technologies will have been demonstrated in a relevant environment.

Design Maturity

The CVN 78 program completed its three-dimensional product model in November 2009—over a year after the award of the construction contract. At the time of the September 2008 contract award, only 76 percent of the ship's three-dimensional product model was complete and the shipbuilder had already begun construction of at least 25 percent of the ship's structural units under its previous construction preparation contract. Program officials noted that while there had been concerns about the ability of the ship's jet blast

deflectors to work effectively with the carrier variant of the Joint Strike Fighter, these concerns have been addressed and will not require major design changes. Additional design changes are still possible as EMALS and other systems continue testing.

Production Maturity

Procurement costs for CVN 78 have grown by about 10 percent over the past 3 years. A key driver is an increase in construction costs. According to the program, 83 percent of the ship's structural units are complete, constituting almost 27 percent of the expected labor hours. However, the program estimates that the labor hours to complete the ship will be 4 million more than the 40 million hours originally budgeted. The program believes the cost and labor-hour increases are largely due to the immaturity of the ship's technologies and design when the construction contract was awarded. Program officials also cited problems such as late material deliveries, an unexpected need for more structural support to achieve a thinner deck structure, and material deficiencies on developmental components such as valves. According to the program, the growth in construction costs may require requests for additional funding or a reduction of the ship's capabilities.

Program Office Comments

In commenting on a draft of this assessment, the program noted that dual-band radar testing, while impacted by DDG 1000 decisions on volume-search radar, is fully funded and will complete land-based tests and begin shipboard testing prior to delivery.