On Track to Tomorrow's Ca

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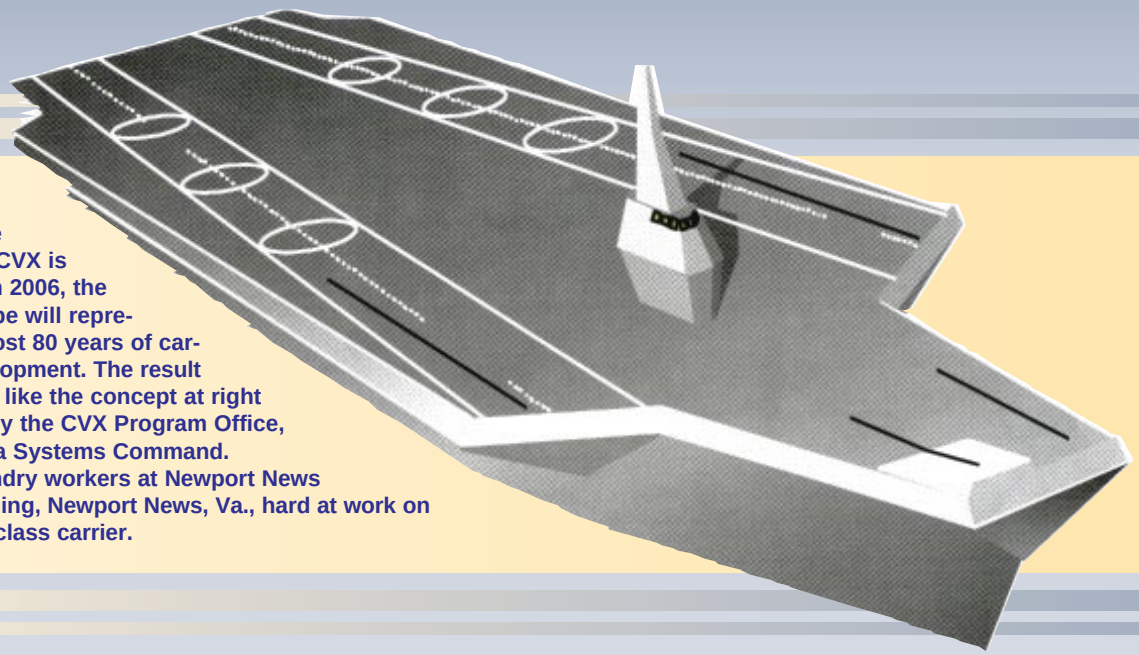
The carrier of tomorrow. What will it look like? What will its capabilities be? How will we modify today's carriers to take advantage of the technology breakthroughs which are sure to happen during the ship's 40- to 50-year life span? Since 1993, the Navy has been developing a comprehensive plan to modernize our aircraft carrier force for the next century. An important feature of this strategy is a dual-track approach that will modernize the past and transition to the future while simultaneously maintaining essential capabilities and force structure. The first element of this strategy is the procurement of the tenth and final *Nimitz*-class carrier, CVN 77, in Fiscal Year (FY) 2002. Scheduled for commissioning in 2008, CVN 77 will replace a 47-year-old *Kitty Hawk* class conventional carrier. She also will be a transition ship, incorporating new technologies that result from carrier



When the steel for CVX is poured in 2006, the final shape will represent almost 80 years of carrier development. The result may look like the concept at right created by the CVX Program Office, Naval Sea Systems Command. Left, foundry workers at Newport News Shipbuilding, Newport News, Va., hard at work on a *Nimitz*-class carrier.

research and development (R&D) efforts currently under way.

The experience gained with CVN 77 will lay the foundation for the second element of our dual-track strategy—the design of a new class of aircraft carriers. Construction of the first ship of the new class, now referred to as CVX, is scheduled to begin in FY 2006. The CVX will retain the core capabilities resident in our carriers today, but will also feature improved characteristics in selected areas, such as launch and recovery equipment; flight deck layout; Command, Control, Communications, Computers and Intelligence (C^4I); and survivability. And, crucially, the ship will incorporate features that make it more affordable to operate.

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Together, these two programs will ensure that the Navy preserves a modern, capable carrier force which meets the requirements of our war-fighting commanders and provides enduring military value for the taxpayers' dollars. The dual-track strategy will enable us to transition from the highly successful—but 1960s-vintage–*Nimitz* design to one specifically designed to the operational mandates of the 21st century.

Shaping the Strategy

If past experience is any guide, the "average" *Nimitz*-class carrier will make 25 overseas deployments, respond to over 20 major international crises, and see action in several regional conflicts over its nominal life span. While the *Nimitz* class continues to meet our security requirements very well, major changes in threats, missions, technology and budgets call for a review of fundamental assumptions. The basic principles and core capabilities of sea-based aviation—its value and role in providing peacetime presence, response to crises and winning regional wars—will endure, but we must review how we fulfill these principles, including the design of these aviation sea bases. The Defense Department's 1993 Bottom-Up Review, which directed the Navy to evaluate "a full range of sea-based platforms to project air power and meet our military needs in the period 2020 and beyond," provided us with the opportunity to develop what eventually became our dual-track strategy.

The key threads in the strategy as it has evolved are risk assessment and balancing, ascertaining the remaining economical service lives of our older ships, and deciding when we will have to add new ships to the fleet in order to maintain force structure and combat capability. These, in turn, depend upon operational tasking, the funding available for R&D, new construction and upgrades, acquisition strategy, and the state of the carrier industrial base. They also depend on developments in existing and prospective aircraft programs, since individual carriers must have the ability to accommodate current and projected air wings, as well as on the output of the Joint Strike Fighter and other future aircraft programs.

Managing risk also means weighing near-term force structure with longer term war-fighting capability. Up until 1996, there had been no significant carrier-related R&D for more than 30 years. Consequently, the CVX design, and the technology that would make it feasible at a reasonable cost, will not be immediately available. And, yet, we still need a new-construction carrier to replace our last *Kitty Hawk*-class conven-

tional carrier as she reaches the end of her service life in the first decade of the next century.

Hence, CVN 77 will be a critical force-structure bridge, particularly if the Navy is to maintain our 11+1 carrier force structure mandated by the Joint Chiefs of Staff. Indeed, force-structure requirements are the most fundamental "drivers" of the future carrier equation. Carrier force levels are based in large part upon the needs of the regional commanders in chief (CINCs).

The CINCs, whose areas of responsibility encompass the three strategic deployment "hubs"—the Mediterranean basin, Persian Gulf/Indian Ocean area and the western Pacific—all seek a continuous carrier presence in their regions, but filling this demand would require a force of *at least* 14 carriers, a number that is currently unaffordable. The Navy is meeting its global commitments at prudent risk with a force of 12 carriers. But this carrier force is being stretched, so the replacement program has been structured to maintain at least 12 of these critical warships at all times.

Preserving our force structure and capabilities requires newly constructed carriers. Further extending the service lives of existing carriers could help us meet our current requirements but would do little to ensure that we have a combat- and cost-effective force in the future. CVN 77 and the first CVX will replace two older, less capable carriers: CVN 77 will replace a *Kitty Hawk*-class carrier in 2008, while the first CVX is slated to relieve the 52 year-old *Enterprise* (CVN 65) in 2013. The Navy has worked to get the most service out of these older carriers, conducting a Service Life Extension Program on the *Kitty Hawk*-class ships and a nuclear Refueling/Complex Overhaul on *Enterprise*. These actions have added more than 15 years to the originally planned service lives of the older ships, but as they age further, the cost of maintaining and modernizing them will increase significantly.

Finally, risk management also encompasses the critical carrier industrial base. We cannot wait too long for new carrier construction without incurring major costs in reconstituting lost shipyard and vendor capabilities and rehiring skilled personnel. Construction on the ninth *Nimitz*-class carrier, *Ronald Reagan* (CVN 76), began last year and will be completed in 2002. Current projections show that in the structural trades alone over 2,000 skilled shipyard workers would be lost if a hiatus were to occur between CVN 76's completion date and the start date on CVN 77. Trying to reconstitute this type of industrial capability is simply not realistic or fiscally responsible.

The first CVX is slated to relieve the 52 year-old *Enterprise* (CVN 65) in 2013.

***Enterprise* (CVN 65) and *George Washington* (CVN 73) conduct turnover operations in the western Mediterranean Sea in July 1996.**

Developing the Carrier Force of Tomorrow

The dual-track strategy represents another major step forward in the evolution of aircraft carriers. The term "evolution" is appropriate, because programs that promise "revolutionary" improvements in capability are often accompanied by unacceptably high levels of technological and fiscal risk. This is especially true when dealing with a platform as complex as an aircraft carrier. Consequently, the dual-track strategy takes a building-block approach, relying upon a continuing R&D program and a series of technology demonstrations. The end result will be more capable systems, more affordable systems, or both.

Besides sustaining force structure, CVN 77 will also play a key role as a technological bridge between the *Nimitz* class and CVX. With a modest R&D effort, CVN 77 will be the most capable, technologically advanced ship in the *Nimitz* class, and will utilize some of the technologies that are planned for the first CVX. Incorporating these key design features in CVN 77 could reduce total ownership (life cycle, operational and support) costs by as much as 15 percent. Once these features are implemented and evaluated they may also be backfitted into existing CVNs, thus significantly reducing the remaining life cycle and support costs of those ships.

Some of the concepts currently under consideration include an integrated information system, fiber-optic backbones, and zonal electrical distribution. Depending on the available funding, CVN 77 could also be the test bed for systems such as multifunctional, embedded antennas which could replace many of the radar and other antennas that currently populate the islands of existing carriers. The ship could also feature a modified island structure that makes greater use of composite materials to manage the carrier's radar signature.

The Navy has neither the time nor the money to introduce major design changes in CVN 77. Changes in propulsion, for instance, were ruled out due to high technical, schedule and fiscal risks, as well as our current dependence on steam catapult technology.

We will apply many of the technical and operational lessons learned from CVN 77 to the new CVX class. Moreover, the CVX design will incorporate additional innovations and capabilities. The Navy is pursuing some targeted improvements in future carrier designs that build upon the capabilities resident in our current class of carriers. The CVX Program Office (PMS 378) has distilled a number of specific goals from these broad categories, including:

- Reducing reliance on ship-assisted launch and recovery.
- Increasing sortie generation capabilities to match the projected fast turnaround capabilities of next-generation aircraft.
- Improving ship survivability against future threats.
- Improving C^4I capacity.
- Alleviating topside design congestion.
- Achieving a higher degree of commonality with the Navy's other future ships.
- Reducing manpower requirements.

There may be several ways to reach these goals. For instance, to improve the efficiency of flight operations and aircraft turnaround, the program office is investigating electromagnetic and internal combustion catapults, possibly integrated with ski-jumps. Other options include automated weapons selection and movement to aircraft, and advanced systems for flight operations management encompassing air operations and launch and recovery control.

As far as increased survivability is concerned, the significant topside design changes being examined for our future carriers and reductions in other electromagnetic signatures could make CVX significantly "quieter." The ship's self-defense systems will be tailored to respond to the proliferation of antiship missiles and other threats throughout the world. Automated battle damage management and zonal electrical distribution will allow a smaller crew to effectively cope with damage while operations continue.

The CVX team is also examining many other measures to ensure that the future carriers are combat- and cost-effective. It will review all propulsion alternatives, from improved nuclear plants to gas turbines. The CVX may also benefit from "virtual organizations," where the crew is linked to other organizations by state-of-the-art C^4I systems. And, recognizing that the new carrier will have a potential life span of 40 to 50 years, the team is developing a design that is easily modified to accept upgrades over the course of the ship's service life.

As we move to meet these technical challenges, however, we must always keep the affordability of CVX in mind. The Department of Defense faces a period of tight budgets into the foreseeable future, and one of the key considerations in maintaining the health of our carrier force is our ability to buy and operate new ships without breaking the Navy's shipbuilding or operations and maintenance budgets. To this end, the Navy plans a design to reduce life-cycle costs in the new class by 20 percent.

We have taken some major steps along the path toward CVX this year. The program officially entered the concept exploration phase in late March when the Under Secretary of Defense for Acquisition and Technology, Dr. Paul Kaminski, approved the mission need statement and the preliminary acquisition plan for CVX. Additionally, in the FY 1997 budget, Congress appropriated the first carrier-specific R&D funding in decades.

For its part, the Navy has initiated a cost and operational effectiveness analysis. The first part of this effort will examine various concepts of operations for employing sea-based, combat aviation in future conflict scenarios. Among other things, this analysis will focus on the required size and composition of future air wings.

We have also convened the CVX Oversight Group, which meets monthly to receive briefings on and provide input to critical, near-term issues that arise during the analysis. The group is made up of flag-level participants who assist the Navy's decision-making process as the analysis proceeds through its first year.

Channels are also in place to solicit critical fleet input to the future carrier acquisition process (see "Ike Paves the Way for the Future," p. 44). Fleet Process Teams convene quarterly on each coast to ensure a continued exchange of information between fleet representatives and CVX program engineers.

A Dual Track to the Future

The Navy is addressing a multitude of operational, technical, fiscal and programmatic issues as it implements the carrier replacement plan and program for the 21st century. Our paramount concern is supporting CINC requirements for an affordable and effective carrier presence in their areas of responsibility, both today and tomorrow.

The dual-track carrier procurement strategy ensures that the Navy is always able to meet our national security requirements whenever and wherever we are needed. The strategy also ensures that we are good stewards of the taxpayers' money. Using CVN 77 to leverage its design changes in support of present and future carriers is not only smart, it is clearly in the best interests of dwindling defense budgets.

We are confident that this strategy will maintain the high-caliber, high-capability carrier force that the United States possesses today, and extend it well into the middle of the next century. n

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