SHIPBUILDING 101

For the Coast Guard and its sister sea services, the art of naval ship design and construction is crucial to mission success. Working closely with the American shipbuilding industrial base, as well as researching the capabilities of comparable vessels worldwide, the Coast Guard's naval engineers and acquisition professionals help to develop surface platforms that meet the needs of the service into the 21st century. The process of building an advanced ship, such as the ***national security cutter****, is one that marries time-honored traditions and lessons learned from centuries of naval architecture with state-of-the-market technologies that deliver the mission capabilities demanded of today's complex operational environment.*

First-in-Class

Unlike aircraft or automotive manufacturing, where many roughly identical platforms are produced, ships are typically built one at a time. There is little to no prototyping in shipbuilding beyond some laboratory work with advanced hull forms or other structures. A new aircraft design may have been built and flown many times before actual first article production begins. However, in shipbuilding, the first in the class, or series built to the same basic design, is often both the class prototype and the first article delivered for operational service.

Design

A first-in-class ship is constructed directly from designs or drawings that mature as building continues. Because of the complexity of these processes, first-in-class ships may take between three and six years to complete from contract award to delivery. Lessons are learned and applied as the ship is built and with each subsequent hull constructed in the class. There may be significant hull, mechanical and electrical design or architectural variations from one ship to the next within each class.

Assembling in Units

Today's larger shipyards are equipped to erect ships in individual assemblies, which contain decks stacked within huge sections of the ship's outer hull. The assemblies are built upside down – because welding with gravity is more efficient than working against it – at large assembly halls, away from the waterfront. There, the assemblies are outfitted with piping, ventilation ducts, and other sub-assemblies and equipment. In certain sections of the ship, these assemblies are stacked together in what are called grand blocks. The completed assemblies and grand blocks are then brought down to the ship's keel – laid at a site along the waterfront – where the ship is assembled and welded together.

Milestones

Simplified, the sequence of events consists of:

A mission need leads to the development of operational requirements for a new ship.

Requirements are used to inform the ship program's concept and design development phase, and a contract for the program is awarded to industry.

Once the design is matured to a certain degree in drawings or models, the shipbuilder lays the keel and begins construction.

As construction progresses, the government selects a ship's name and a sponsor – usually a dignitary, or traditionally the eldest female descendent of the person for whom the ship is named.

In a ceremony, the sponsor christens the ship, at which time it officially receives its name.

When construction is almost complete, the ship undergoes a series of sea trials, which are comprehensive government and industry inspections, tests, and evaluations of the condition and functionality of the ship as measured against the program's requirements.

When trials are concluded and the ship is judged to be satisfactory, the shipbuilder delivers it to the government.

Delivery marks the date when the ship has been found acceptable for service and becomes government property.

Commissioning follows many months of preparation, training, further inspection and testing. Commissioned ships are considered operational assets, having earned the title "U.S. Coast Guard Cutter."