

Cast Stem Implemented on LCS; Reduces Production Cost and Time

Status: Implemented

PROBLEM / OBJECTIVE

The high-speed, semi-planing, steel monohull design of the Lockheed Martin Littoral Combat Ship (LCS) includes a very sharp bow section. This makes the connection detail between the stem (the very forward edge of the bow of the ship) and the adjoining hull plates difficult to fabricate because of the acute angle between the two structural members. In addition, the close proximity of the breast hooks (horizontal structural members) and frames (vertical structural members) over much of the length of the stem make welds difficult to complete and inspect.

The first LCS ship, Freedom (LCS-1), used a stem cut from steel plate. A significant amount of labor was required to arrive at the final stem shape necessary for fit-up. These factors caused many schedule delays and increased fabrication cost due to rework and weld re-inspection. As a result, both Lockheed Martin (LM) and the implementing shipyard, Marinette Marine Corporation (MMC), identified a need to develop an alternate stem design that would reduce fit-up labor and improve accessibility for welding and inspection

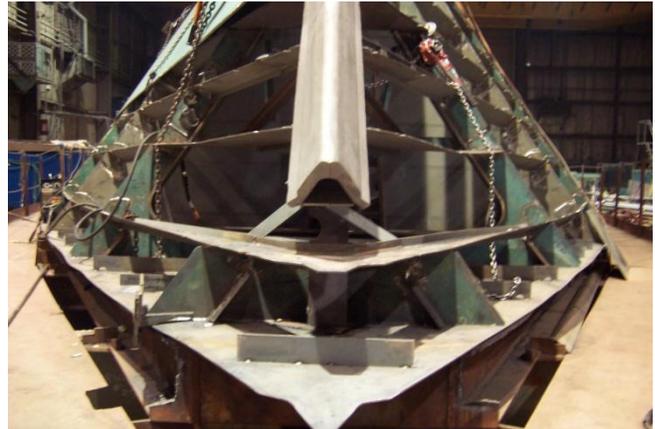
ACCOMPLISHMENTS / PAYOFF

Process Improvement:

A team-based approach was used to develop an optimized manufacturing solution to ensure that the cast stem ultimately met the shipyards' fit-up and accessibility needs, the foundry's manufacturability concerns, and the American Bureau of Shipping's (ABS) performance requirements. To ease casting and construction, the cast stem was split into multiple castable pieces to reduce molding material requirements. This also allowed the shipyard to adjust the cast stem fit-up to structural components and to facilitate incorporation into the current modular build plan for LCS.

Implementation and Technology Transfer:

Results of this NMC project have been implemented. MMC procured the cast stem from Schoellhorn-Albrecht for installation on the bow section of the USS Fort Worth (LCS-3).



The cast stem installed on the bow modules on USS Fort Worth (LCS-3) allows for improved fit-up and accessibility to adjoining structural members. (U.S. Navy SSGC Marinette photo)

Expected Benefits and Warfighter Impact:

The cast stem reduces fabrication cost and schedule risk and makes inspection easier, resulting in a cost savings of approximately \$87,000. While the cast stem costs more than the fabricated stem bar it replaces, the casting is a value-added part in that it allows for a substantial reduction in installation costs when compared to the baseline method. In addition, the improved design allows for easier connection with the hull plates and reduced production time for the bow.

TIME LINE / MILESTONE

Start Date:	September 2007
End Date:	September 2009

FUNDING

Navy ManTech Investment:	\$890K
--------------------------	--------

PARTICIPANTS

NMC	Bollinger Shipyards, Inc.
PMS 501	ABS
LM MS2	Gibbs & Cox
NSWCCD	Newport News Industrial Products
MMC	

This article was prepared by the Navy Metalworking Center, operated by Concurrent Technologies Corporation, under Contract No. N00014-10-D-0062 to the Office of Naval Research as part of the Navy ManTech Program. Approved for public release; distribution is unlimited.