

Improved Component Design to Reduce Weight of LCS Sliding Doors

Status: Partial Implementation

PROBLEM / OBJECTIVE

The LCS Program Office and Freedom-variant design team, led by Lockheed Martin identified two sets of large sliding doors as targets for cost and weight reduction on future hulls. The current design has a conventional plate-and-stiffener construction using low carbon steel, which requires painting before installation. The objective of this Navy Metalworking Center (NMC) project was to employ a new manufacturing approach using a lighter-weight design, corrosion-resistant materials, and hybrid laser arc welding (HLAW) while maintaining the structural performance identified in the procurement technical specification for the most recent hull (LCS 5).

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

The NMC-led project utilized a design-for-manufacturability approach to identify potential fabrication enhancements to improve manufacturability and reduce cost and weight. A sandwich-panel design was selected, and a prototype door panel was constructed. During hydrostatic testing, a manufacturing issue was discovered related to hybrid laser arc welds. In addition, PMS 501 determined that higher-than-expected acquisition costs for the new door design outweighed the life-cycle benefits, resulting in an Integrated Project Team decision not to repair and retest the panel to validate the design. While the new door was not implemented into production, the shock analyses performed during this project revealed that the shock requirements could be relaxed, which benefits the existing doors and the new door panel. In addition, a new upper frame rail and roller design were identified to reduce weight and will be implemented into the Freedom-variant construction.

Implementation and Technology Transfer:

The lightweight upper frame rail and roller design will be implemented starting in 1Q FY15 on LCS 11 with no cost impact.

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An NMC-led project team designed an improved upper frame rail and roller for large sliding doors that will reduce weight on the Freedom-variant LCS.

U.S. Navy Photo

Expected Benefits and Warfighter Impact:

- The improved roller and upper frame rail design reduces weight by approximately 600 pounds.
- Relaxed NAVSEA shock requirements for the sliding doors results in cost savings associated with meeting the original requirements.
- If future implementation becomes viable, the new door panel design is approximately 20 percent lighter than the legacy design, which makes the doors easier to install and contributes to the overall goal of reducing ship weight to improve performance.

TIME LINE / MILESTONE

Start Date: August 2011
End Date: November 2013

FUNDING

Navy ManTech Investment: \$1.7M

PARTICIPANTS

PMS 501
Lockheed Martin
NMC
Gibbs & Cox
Marinette Marine Corporation
Naval Surface Warfare Center, Carderock Division
American Bureau of Shipping
Northern Manufacturing Co.