

HLAW Process Approved for Construction of HSLA-80 T-Beams on DDG 1000

Status: Implemented

PROBLEM / OBJECTIVE

T-beam stiffeners are used extensively in ship construction for decks, bulkheads, shells and other structural applications. As the need for weight and cost reduction grows, T-beams are being manufactured of stronger materials with smaller cross-sections. These thin materials are subject to significant distortion as they are welded. Some estimates place the cost of distortion at 30% of the structural cost of the ship. To address this issue, a Navy Metalworking Center project has developed an alternative to conventional methods of manufacturing T-beams that will result in less distortion and lower fabrication cost. The specific application for this project is HSLA-80 T-beams that will be manufactured for DDG 1000 Class ships.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

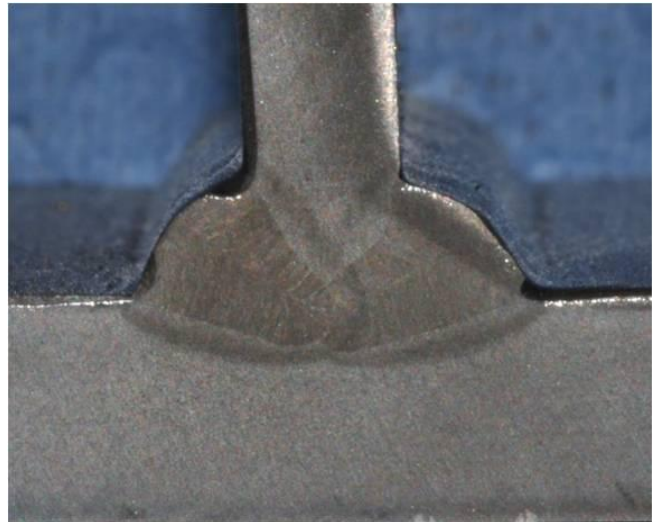
The Integrated Project Team has developed and qualified a hybrid laser arc welding (HLAW) process to fabricate HSLA-80 T-beams. This process combines the deep penetration and high speed of laser welding with the gap tolerance of conventional gas metal arc welding (GMAW).

Implementation and Technology Transfer:

The American Bureau of Shipping, the technical authority for DDG 1000, has approved the HLAW procedure for manufacturing HSLA-80 T-beams. Applied Thermal Sciences is qualified to manufacture HLAW T-beams in HSLA-80, HSLA-65, and other alloys.

Other potential platforms that could benefit from this NMC project include the Littoral Combat Ship, which uses a variety of thin section materials including ASTM A710, a material very similar to HSLA-80.

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This project determined parameters for hybrid laser arc welding HSLA-80 T-Beams that will reduce production and assembly costs as well as improve T-Beam quality for DDG-1000. Pictured is an HSLA-80 web welded to an HSLA-80 flange using hybrid laser arc welding. (Photo courtesy of ATS)

Expected Benefits:

- \$600K per ship reduction in structural cost due to significantly less distortion
- 45% fabrication cost reduction due to higher weld speeds, less time required to set up the weld, and less labor required to straighten beams after welding
- Better fit-up during shipyard construction, resulting in reduced assembly costs

TIME LINE / MILESTONE

Start Date:	July 2007
End Date:	December 2009

FUNDING

Total ManTech Investment:	\$1.9M
Cost share (est. commercial fabricator invest.)	\$2.0M

PARTICIPANTS

DDG 1000 Program Office (PMS 500)
Naval Sea Systems Command
Naval Surface Warfare Center Carderock Division
General Dynamics Bath Iron Works
Northrop Grumman Shipbuilding-Newport News
Northrop Grumman Shipbuilding-Gulf Coast
Navy Metalworking Center (NMC)
Applied Thermal Sciences (ATS)