Automated Back Gouging Tool Increasing Production Rate by 150 Percent in DDG 1000 Construction

Status: Implemented

PROBLEM / OBJECTIVE

Bath Iron Works (BIW) manually arc gouges and grinds the Peripheral Vertical Launch System (PVLS) and Anti-Propagation Wall (APW) plates on DDG 1000 to produce the desired weld joint profile and quality. This is a slow, labor-intensive process. Industrial processes such as this can sometimes lead to repetitive motion injury claims which incur additional expense. This project developed an automated mechanical back gouging tool that will leverage work done in a previous Navy Metalworking Center (NMC) project that developed a track weld shaver system.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

The NMC-developed track weld shaver system was modified to create a proof-of-concept demonstration that successfully back gouged thin plates requiring a shallow profile depth. In order to meet the DDG 1000 back gouging requirement for PVLS and APW, the shallow back gouge tool was modified with a larger diameter slotting cutter, a redesigned housing, a gear box to increase cutter torque, as well as guide wheels for tracking stability. The Integrated Project Team witnessed the demonstration of the prototype gouger for thick plate, identified areas for tool improvement and issued a final report with recommendations to be incorporated in a commercially available deep joint back gouger.

Implementation and Technology Transfer:

The prototype back gouging tool was successfully demonstrated at BIW in August 2010; and in September 2010, BIW implemented the track weld shaver with thick plate back gouging capability for the DDG 1000 PVLS and APW applications. In addition, a successful back gouge demonstration at BIW verified tool life and operational cost, which will enable Ingalls Shipbuilding to complete its economic analysis of mechanical back gouging and potentially lead to the implementation of this technology for back gouging applications associated with the amphibious assault ship (LHA), amphibious transport dock (LPD), and National Security Cutter (NSC) ship production. A demonstration of shallow back gouging was held at GDEB in March 2011 for potential Virginia Class Submarine application.

An automated back gouging tool is increasing production rates and reducing labor costs for DDG 1000 construction. BIW photo

Expected Benefits and Warfighter Impact:

- BIW estimates that modifying the track weld shaver for DDG 1000 back gouging will increase the shipyard's production rate by at least 150 percent and eliminate the labor currently required to clean and dress by grinding a deep arc gouged joint.
- BIW estimates a cost reduction of $400K/hull (>$1M for 3 hulls) based on labor time productivity
- In addition, if mechanized back gouging can be introduced at Ingalls Shipbuilding for LHA, LPD, and NSC applications, an additional savings may be realized.

TIME LINE / MILESTONE

Start Date:	April 2010
End Date:	November 2010

FUNDING

Navy ManTech Investment:	$115K
Cost Share:	$75K

Track, carriage and control from the track weld shaver project was used to perform demo. PushCorp designed and manufactured the deep joint back gouger.

PARTICIPANTS

Bath Iron Works
Ingalls Shipbuilding
Naval Surface Warfare Center Carderock Division
PushCorp, Inc.
Navy Metalworking Center

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