Mechanized Plate Edge Preparation Tool to Reduce Navy Shipbuilding Costs

Status: Implemented

PROBLEM / OBJECTIVE

During ship fabrication, rust and primer must be removed from the weld joint areas of steel plates prior to welding. Currently, edge preparation is done manually using a pneumatic stone grinder or sander. This is a slow, labor-intensive process often resulting in numerous vibratory and carpal tunnel injuries. The typical production rate in shipyards for this task is approximately 10–12 feet per hour. Considering that there are several thousand plates on a typical naval surface combatant, with several edges per plate requiring preparation, even a slight improvement in productivity can have a significant effect. In order to improve the plate edge preparation process, the Navy Metalworking Center (NMC)-led team developed a mechanized plate edge and surface preparation tools to increase the production rate and reduce injury claims.

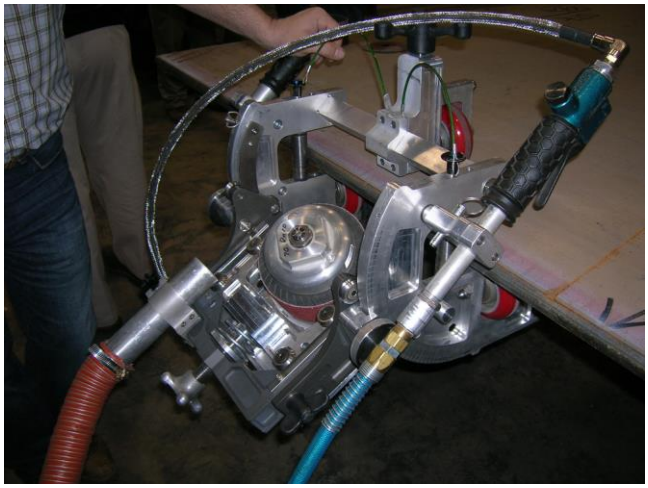
ACCOMPLISHMENTS / PAYOFF

Process Improvement:

The NMC project identified and developed several prototype concepts for abrasive tools to remove light surface rust and primer from the edges of large plates. Project test results demonstrated that two abrasive configurations (disc and drum) can be used effectively to remove surface rust and primer, but the drum abrasive is more effective on all types of primers investigated. The drum concept was further developed through three successive improvements on the basic design for edge and surface use. As a subcontractor to NMC, General Dynamics Bath Iron Works (BIW) successfully tested these prototype tools on sample and production plates.

Implementation and Technology Transfer:

BIW has implemented the prototype tool to process at least 2,000 feet of plate edges on DDG 51 and DDG 1000 Class hulls and has trained personnel on the tool's specific operating characteristics. BIW has also implemented the surface tool on the same classes. Ownership of the project-developed prototype tools was transferred to the DDG 1000 Program Office in April 2013. BIW ordered four edge tools and four surface tools in 3Q FY15 from Gullco International Limited for use on DDG 1000 and DDG 51 class hulls. This technology can readily be implemented on virtually any ship type, and is not limited to surface combatants.



The mechanized tool will replace manual grinding of plate edges for weld preparation, which is slow and physically taxing work. NMC photo taken at BIW

Expected Benefits and Warfighter Impact:

Depending on the specific circumstances under which the tools are employed, the project team believes production rates could be increased significantly with potential savings of $2M to $4M on the cost of a typical surface combatant. Furthermore, the technology has the potential to reduce shipyard injury claims across a multi-ship construction effort.

TIME LINE / MILESTONE

Start Date:	December 2010
End Date:	April 2013

FUNDING

Navy ManTech Investment:	$1.58M

PARTICIPANTS

PMS 500
Naval Surface Warfare Center, Carderock Division
General Dynamics Bath Iron Works
Ingalls Shipbuilding
Navy Metalworking Center
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