

Portable, Robotic Backgouging System to Save Labor in VCS Construction

Status: Pending Implementation

PROBLEM / OBJECTIVE

This Navy Metalworking Center (NMC) project developed a portable, production-hardened, track-based plasma arc backgouging system for Virginia Class Submarine (VCS) hull butt joints. This system design is an extension of the robotic welding technology that was successfully demonstrated in Phase II of a prior ManTech project (S2197) executed by the Navy Joining Center and uses the same track from that mechanized welding system. Phase III focused on hardening the backgouging system components against electromagnetic noise and physical hazards and integrating these components with a simple control system on a dedicated carriage.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

Servo-Robot fabricated the robotic modules and integrated the plasma arc torch into the system. EWI conducted plasma gouging run-off trials on grooved steel plates to optimize the operational parameters that define the plasma characteristics and robot dynamics. These trials showed that a very clean profile can be achieved in a single pass at a reasonable production rate. General Dynamics Electric Boat (EB) evaluated performance on a simulated hull joint in December 2013 and intends to use the prototype for a production hull butt in May 2014.

Implementation and Technology Transfer:

The prototype system was made available for training or as a back-up system at EB. By the end of FY14, EB plans to procure two production backgouging systems from the commercialization partner, Servo-Robot, for use in its Groton assembly plant to prepare VCS hull butt joints.

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The robotic plasma backgouging system, which can be used on horizontal or vertical joints, will save labor hours in VCS construction. EB photo

Expected Benefits and Warfighter Impact:

EB estimates a 25 percent reduction in welder hours when implementing this system to backgouge the hull weld joints in sequence with the robotic welding system. The savings are a result of an overall increase in efficiency of the backgouging method, a consistent backgouge profile that allows for more efficient welding, and reduced grinding and set-up time. A small compression in schedule (approximately 14 days) also allows other trades to begin their work earlier. The net impact is a total reduction of 910 labor-hours per ship.

TIME LINE / MILESTONE

Start Date:	January 2012
End Date:	January 2014

FUNDING

Navy ManTech Investment: (Phase III)	\$770K
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PARTICIPANTS

PMS 450D	Servo-Robot
EWI	NMC
EB	
Naval Surface Warfare Center, Carderock Division	