

Improved Pipe Processing Methods Expected to Save \$590K per VCS Hull

Status: Implemented

PROBLEM / OBJECTIVE

Current Virginia (SSN 774) class submarines (VCS) contain off-hull new construction pipe detail fabrication processes that involve various complex configurations for large diameter pipe (3"-12" diameters) for preparation, fixturing, positioning, fit-up, and welding methods. Current applied fabrication techniques and weld processes require excessive labor in set-up and handling times, which reduces work cell process flow output and efficiencies. This Navy Metalworking Center (NMC) project developed improved and automated construction processes to reduce labor hours in VCS construction.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

The NMC-led project team investigated methods for improving the efficiency of specific areas of pipe preparation including fixturing, positioning, and fitting; automation of welding and drilling pipe bosses; pipe purging methods; and the use of internal pipe joint blending tools and applications to reduce pipe section cutting, rework, and pipe material scrap. The project team developed several large diameter pipe process tool concepts, executed first-article prototype demonstrations, conducted feasibility studies based on projected labor-hour and material cost savings, and performed demonstration testing and validation at both VCS shipyards.

Implementation and Technology Transfer:

The prototype tools were initially transitioned to General Dynamics Electric Boat (EB) and Newport News Shipbuilding (NNS) in April of 2012. The hands-free clamps have been fully implemented at EB and NNS. The boss drill/weld station prototype has been transitioned to NNS. The purge and blend tools were not implemented; these tools are being further developed for shop and on-hull applications on project S2398 Pipe Assembly Installation Improvement Methods.



NMC developed large diameter pipe fixturing and welding process improvements that are expected to save \$590K per VCS hull. Electric Boat photo

Expected Benefits and Warfighter Impact:

The projected savings are 8,500 labor-hours per hull in manual labor. The reduction in labor-hours results in a projected \$590K savings per hull and \$5.9M savings over five years based on the VCS production build schedule of two hulls per year.

TIME LINE / MILESTONE

Start Date:	March 2010
End Date:	November 2011

FUNDING

Navy ManTech Investment:	\$1.1M
--------------------------	--------

PARTICIPANTS

Virginia Class Program Office (PMS 450)
EB
NNS
Naval Surface Warfare Center, Carderock Division
Navy Metalworking Center

This article was prepared by the Navy Metalworking Center, operated by Concurrent Technologies Corporation, under Contract No. N00014-10-D-0062 to the Office of Naval Research as part of the Navy ManTech Program. Approved for public release; distribution is unlimited.