

# Alloy 625 Pipe Welding

**Status:** Transitioned

## PROBLEM / OBJECTIVE

Deficiencies in the welds of large diameter alloy 625 pipe on the Virginia Class Submarine (VCS) have caused manufacturing scheduling delays. In fact, the radiographic rejection rate for these butt welds has historically been one of the shipyards' highest when compared to other materials commonly welded at the shipyard. Further, the root-related defects often occur in welds that are in the critical path of ship construction. The schedule delays caused by the defects can result in the expenditure of hundreds of man-hours in short periods of time. The Navy Metalworking Center (NMC) led a project that investigated cost-effective methods for reducing or eliminating these root weld defects.

## ACCOMPLISHMENTS / PAYOFF

### **Process Improvement:**

The initial goal of this NMC project was to identify and implement new welding technique(s) to address the rejection of large diameter, thin-walled alloy 625 pipe welds on VCS. NMC and the Integrated Project Team (IPT) discovered, however, that improving the fit up rather than the welding techniques would reduce the weld rejection rate. Specifically, the IPT identified that fabrication of these welds to the existing specifications was not conducive to obtaining acceptable welds. The project provided evidence that currently used practices and techniques, when followed meticulously, and the implementation of "better than specification" fit-up tolerances will result in acceptable welded joints.

### **Implementation and Technology Transfer:**

General Dynamics Electric Boat (GDEB) used the results of this project to refine some of the methods and techniques for pipe fit-up. GDEB implemented these improved processes in July and August 2007 on re-welding of shipboard welds for SSN 778 and will also use them for initial welding applications by GDEB at both Groton and Quonset Point.



Photo courtesy of Edison Welding Institute.

### **Expected Benefits:**

- The improved fit-up specifications identified in this project were successfully applied to SSN 778 at GDEB. Any future cost savings achieved through application of this improved process will be monitored.
- These benefits will apply to other submarine classes using large diameter, thin-wall alloy 625 pipe

## TIME LINE / MILESTONE

Start Date: February 2007  
End Date: February 2008

## FUNDING

Total ManTech Investment: \$463,183  
NMC: \$363,186  
NJC: \$100,000  
Cost Share: \$60K Program Office funding to NSWCCD

## PARTICIPANTS

Virginia Class Submarine Program Office (PMS450)  
Naval Sea Systems Command 05P24  
Naval Surface Warfare Center Carderock Division  
General Dynamic Electric Boat  
Northrop Grumman Shipbuilding-Newport News  
Navy Metalworking Center  
Navy Joining Center