

Using Higher Deposition Submerged Arc Welding Process to Increase Productivity at Newport News Shipbuilding

Status: Pending Implementation

PROBLEM / OBJECTIVE

Compared to the NIMITZ-class, the FORD-class aircraft carriers changes in plate thickness has increased welding hours for CVN 78. To meet CVN 79/80 cost reduction goals, Huntington Ingalls Industries—Newport News Shipbuilding (NNS) is actively modernizing its welding infrastructure with the intent of transitioning to new equipment that is more capable and shifting to more efficient welding processes. This NNS-led project worked to identify and implement an ultra-high deposition submerged arc welding (SAW) variant and expand the use of SAW to increase productivity. The objective of this project is to support the NNS’s welding infrastructure improvement effort to identifying the next generation of SAW equipment by piloting and validating advanced commercial SAW technology/equipment.

There are new SAW process variants that significantly increase productivity yet maintain high quality. These SAW variants have shown significant increases over legacy process deposition rates to increase productivity. This project was developed to identify the optimal SAW process while reducing the risk to the implementing shipyard and the customer, to ensure implementation if a nontraditional SAW variant is selected.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

NNS collected data on its current SAW processes. The deposition rate for these processes are 23.6 and 30.1 lbs./hr. with an aggregate average of approximately 26 lbs./hr. Weld deposition data developed for the preferred process [Twin Wire Variable Wave-AC (TWVW-AC) SAW] by NNS in field testing resulted in a deposition rate of 51.lbs/hr.

Implementation and Technology Transfer:

This project was conducted in two distinct phases. The first phase determined baseline requirements for ultra-high SAW welding technology and candidate SAW processes. In collaboration with the Navy Technical Authorities, the second phase evaluated and quantified the performance of candidate SAW processes relative to current SAW processes at NNS. Project results support the technical

feasibility of implementing new SAW technology in FORD-class aircraft carrier fabrication at NNS.

The preferred SAW process targeted for implementation at NNS is TWVW-AC. This technology, once implemented, can potentially save an estimated \$2.2M per FORD Class hull.



*Submerged Welding Process
(courtesy HII-NNS)*

Expected Benefits and Warfighter Impact:

- Increased weld metal deposition
- Reduction in distortion
- Potential reduction in consumables
- Estimated \$2.2M per FORD Class hull.

TIME LINE / MILESTONES

Start Date: June 2015
End Date: November 2019

FUNDING

Navy ManTech Investment: \$1.49M

PARTICIPANTS

ONR Navy ManTech
Naval Shipbuilding and Advanced Manufacturing Center
PEO CARRIERS (PMS 379)
Huntington Ingalls Industries.-Newport News
Shipbuilding
Edison Welding Institute