

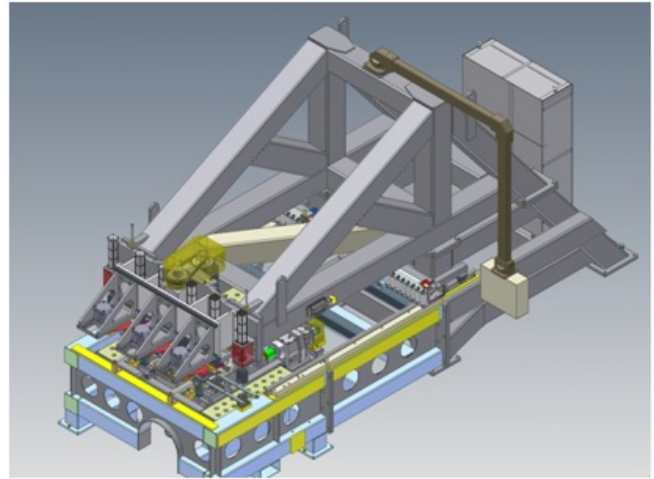
# Navy Metalworking Center Expands Capabilities for Low-Cost Friction Stir Welding

**Status:** Technical Success

## PROBLEM / OBJECTIVE

The Joint High Speed Vessel (JHSV) design incorporates the use of large integrally stiffened aluminum panels produced via friction stir welding (FSW). If panels are produced by off-site FSW vendors, the sizes of the panels are limited due to shipping constraints. Assembling smaller panels via conventional welding methods is costly and frequently results in excessive distortion and other quality issues.

This Navy Metalworking Center (NMC) project was initiated to develop an on-site, low-cost FSW machine capable of joining JHSV product forms such as thick plate and hollow core extrusions.



An on-site low-cost friction stir welding machine would save costs and improve aluminum panel quality in Joint High Speed Vessel construction. NMC image

## ACCOMPLISHMENTS / PAYOFF

### **Process Improvement:**

A low-cost FSW system was developed and demonstrated for Freedom Class LCS applications during a previous NMC project (S2100). This project modified the machine design for specific application to JHSV construction. The NMC-led project team developed a detailed design for an expanded capabilities low-cost FSW machine, developed processes and tooling for JHSV products, and was prepared to assist in startup and training of the new system at Austal USA.

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

Austal made a “No-go” decision to procure FSW equipment due to a lack of clarity and applicability of requirements for the welding qualification and non-destructive testing. However, after these requirements are fully defined, Austal intends to reevaluate procuring FSW equipment. The technical developments of this project could potentially be leveraged for application to other platforms with aluminum structures.

This article was prepared by the Navy Metalworking Center, operated by Concurrent Technologies Corporation, under Contract N00014-10-D-0062 to the Office of Naval Research as part of the Navy ManTech Program. Approved for public release; distribution is unlimited.

### **Expected Benefits and Warfighter Impact:**

This project was executed to enhance the producibility of lightweight aluminum structures on JHSV, and to provide expected benefits such as reduced ship costs, improved welded joint quality, and decreased vessel weight. A cost saving of \$1.8M per year to the JHSV Program was projected if the technical results of the effort were implemented.

## TIME LINE / MILESTONE

Start Date:	December 2009
End Date:	January 2012

## FUNDING

Navy ManTech Investment:	\$2.0M
--------------------------	--------

## PARTICIPANTS

Austal USA  
American Bureau of Shipping  
Nova Tech Engineering  
PMS 385  
Navy Metalworking Center