

# Distortion Reduction and Cut Part Accuracy Improvements Save Millions for DDG 51 and Other Ships

**Status:** Implemented

## PROBLEM / OBJECTIVE

Almost half of the panels for DDG 51 Class hulls are fabricated from thin (< 3/8 inch) plates; furthermore, thin panels are projected to make up 90 percent of total plates in future ship classes. While beneficial for overall ship weight reduction, thin plates are subject to excessive distortion during handling, storage, plasma cutting and welding. This distortion requires significant rework to correct these issues, as well as additional welding to fill excessive weld joint gaps resulting from distorted plates. The objective of this Navy Metalworking Center (NMC) project was to evaluate and mitigate thin plate distortion at Ingalls Shipbuilding (Ingalls) caused by or related to plate production, handling and thermal cutting. This project was supported by the DDG 51 Program Office (PMS 400D).

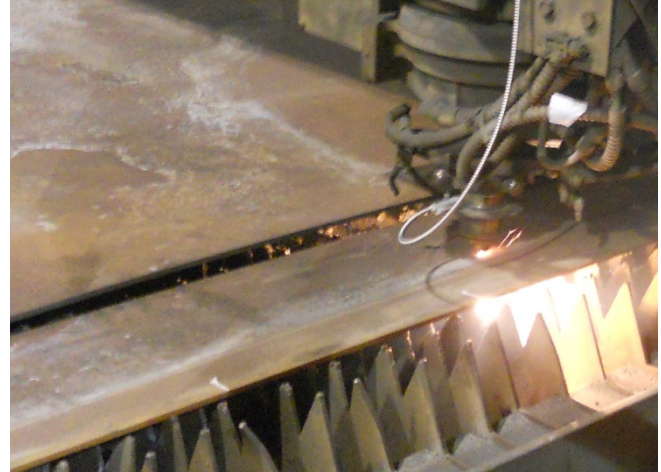
## ACCOMPLISHMENTS / PAYOFF

### **Process Improvement:**

ArcelorMittal-Burns Harbor Division; ESAB Cutting Systems; the University of New Orleans; Ingalls; Naval Surface Warfare Center, Carderock Division; and selected vendors assisted in evaluating steel plate production and post-processing practices to improve residual stresses and flatness. The team also identified factors affecting cut part accuracy and developed rules and guidelines to improve cut part accuracy, reduce cut part distortion, increase productivity and reduce costs.

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

Implementation began in the summer of 2013 when Ingalls started evaluating alternative plate sourcing, as well as upgrading the plasma cutting equipment to improve accuracy and to help reduce distortion in the production of DDG 114. These solutions are being implemented on other programs at Ingalls such as the Navy's LPD and LHA amphibious platforms and the U.S. Coast Guard's National Security Cutter since the materials and processes are similar. The solutions may also be applicable to other military services and industries that use similar products and processes.



New guidelines for production, handling and thermal cutting of thin plates in shipbuilding are leading to reduced distortion and improved part accuracy. (Ingalls photo)

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

- Reduce the distortion in cut parts by 58-71 percent
- Improve cut part accuracy by 29 percent
- Five-year savings of \$5.2 million related to reduction of thin plate distortion and improvements in cut part accuracy.

## TIME LINE / MILESTONE

Start Date: September 2011  
End Date: July 2013

## FUNDING

Navy ManTech Investment: \$1.3M  
Cost Share: \$49K (AMBH \$27K, ESAB \$22K)

## PARTICIPANTS

DDG 51 Program Office  
Ingalls Shipbuilding  
ArcelorMittal Burns Harbor  
ESAB Cutting Systems  
University of New Orleans  
Naval Surface Warfare Center, Carderock Division  
Navy Metalworking Center

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