



Predictive Weld Distortion Software at Newport News *-- Project Update --*

Over the past several years, CNST and its various project teams have provided a number of key shipbuilding technologies to US shipyards in support of cost reduction and affordability initiatives. An example of a successfully completed project and the benefits that have been realized is the **Predictive Weld Distortion in Thick Navy Structures** project. Led by Northrop Grumman Shipbuilding-Newport News (NGSB-NN), this 30-month project was completed in July 2007. Its objective was to investigate the use of numerical tools to mitigate weld distortion in thick plate applications. NGSB-NN assessed the capability of two commercially available software applications for analyzing thick, multi-pass weldments. The baseline fabrication structure was a thick, multi-pass joint used in over 39,200 linear feet of welds, with 59+ beads per linear foot totaling approximately 2,310,000 feet of welding. Because the current process requires about 20% of the cross section to be welded manually, there was a great opportunity for labor savings by enabling the use of automated welding methods. The NGSB-NN team determined that *SYSWELD*, a software application offered by ESI Group, improved production efficiency by:

- Detecting weld distortion trends for direct distortion mitigation.
- Developing an alternative weld joint design reducing weld volume by 43%.
- Allowing the use of an automated process that deposits twice the weld metal per pass than previously used process.
- Determining localized backside temperatures that can reduce the risk of heat damage to surrounding materials/components

NGSB-NN concluded that the alternative weld joint design used less weld volume and decreased process induced distortion compared to the previous baseline joint. NGSB-NN has implemented the use of the alternative weld joint in many locations. Additionally, this project's success led to spiral research and development efforts funded directly by the CVN-21 Program Office to expand the approach to thinner materials.

About CNST

CNST is a Navy ManTech Center of Excellence, chartered by the Office of Naval Research (ONR) to identify, develop and deploy, in U.S. shipyards, advanced manufacturing technologies that will reduce the cost and time to build and repair Navy ships. For additional information on this and other CNST projects, please visit www.cnst.us.

