Hot Forming Limits Defined for HSLA-65 and DH-36 Plates Used in CVN 21 and Other Ship Classes

Status: Implemented

PROBLEM / OBJECTIVE

This Navy Metalworking Center (NMC) project assessed the effects of forming temperature and plate thickness on the forming characteristics of HSLA-65 and DH-36 used in hull applications for CVN 21 and other ship classes. If not executed properly, hot forming can significantly reduce plate strength and/or toughness, which could have an adverse effect on the performance of Navy ships. Before this project, limited quantitative data had been available to the ship design community concerning the impact of hot forming on the strength and toughness of these steels.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

The NMC project evaluated the hot forming characteristics of two plate thicknesses using U-bend forming. Magnetic particle, Charpy V-notch and tensile tests were conducted on the formed plates. As a result of the testing, process windows for hot forming were defined to ensure that highly deformed plates maintain adequate strength and toughness.

Implementation and Technology Transfer:

The project results were used to define the forming limits and recommended manufacturing practices for critical HSLA-65 and DH-36 plates for CVN 21. These forming limits can be applied to all ship classes that rely upon hot forming of HSLA-65 and DH-36 plates.

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Testing determined parameters for hot forming HSLA-65 and DH-36 plates for CVN 21 and other platforms. (Concurrent Technologies Corporation photo)

Expected Benefits:

- Quantitative data available to the ship design community regarding limits of hot forming and its effect on different thicknesses of HSLA-65 and DH-36 plates.
- Improved performance of CVN 21 and other Navy ships due to appropriate hot forming practices for HSLA-65 and DH-36.
- Reduced acquisition cost due to hot forming practices that produce plates of optimal strength and toughness.

TIME LINE / MILESTONE

Start Date:	March 2007
End Date:	Sept 2007

FUNDING

Total ManTech Investment: $122K

PARTICIPANTS

NAVSEA 05V2
Navy Metalworking Center
RNDT, Inc.