

NMC Leads Effort to Improve Quality and Cost for Critical Navy Castings

Status: Implemented

PROBLEM / OBJECTIVE

Rework of large HY-80 and HY-100 castings increases the cost and production time required for critical VCS and CVN components. A review of castings at the Newport News Shipbuilding (NNS) Foundry, where approximately half of these castings are produced for the CVN program, showed that inclusions, and potentially hydrogen, were the most common problems leading to the needed rework. The Navy Metalworking Center (NMC) worked with the NNS Foundry production staff to identify the types of inclusions encountered, to identify potential improvements, and to implement those improvements.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

Analysis of inclusion samples revealed that molding sand and molten metal reoxidation were the most common contributors to inclusions. Literature review and discussions with suppliers and industry experts led the team to several potential improvements. Using a design of experiments approach, the team was able to quantify the impact of several process/mold material changes to the inclusion and hydrogen levels.

Implementation and Technology Transfer:

With their active participation in the project, the NNS Foundry was able to immediately apply improved practices to its casting processes. Implementation of these improved practices continue to be transitioned into additional castings as orders for these products are received and processed. Although the project was originally focused on HY castings, many of the improvements are immediately applicable to other steel and non-ferrous castings produced at the NNS Foundry. While the VCS and CVN platforms are most impacted by these improvements, many other programs, including DDG and LCS, have benefited from the project.

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Improved cleanliness in the casting process is yielding cost and delivery improvements for several ship classes.
Newport News Shipbuilding photo

Expected Benefits and Warfighter Impact:

These benefits are expected to be achieved upon full implementation of project results at the NNS Foundry:

- Net \$712K per year cost avoidance
- Reduced production time (up to 55 days)
- Improved casting quality by reducing inclusion count by up to 70% for selected castings
- Improved control of foundry practices
- Definition of additional process changes that are expected to lead to even more improvements to foundry practices
- Mechanical property and surface chemistry requirements that meet or exceed all Navy requirements.

TIME LINE / MILESTONE

Start Date: July 2007
End Date: December 2009

FUNDING

Navy ManTech Investment: \$736K
Cost Leverage: \$105K*
*NNS supplied \$5K of materials. PMS 450 supported NSWCCD efforts for approximately \$100K.

PARTICIPANTS

PMS 450
NAVSEA 05P24
NSWCCD
NNS
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NMC