

NMC Project Identifies Manufacturing Process for Flexible Cryostats that Meets Navy Requirements

Status: Technical Success

PROBLEM / OBJECTIVE

For High Temperature Superconducting Degaussing (HTSDG) coil systems, the cryostat (a double-walled vessel used in conjunction with extremely effective thermal insulation with a high vacuum) provides the necessary insulation to maintain a very low resistance condition in the electrical cable. The Navy intends to use these advanced degaussing systems on future Navy platforms. The applications require long lengths of cryostats to provide the necessary insulation. Currently no U.S. supplier is capable of manufacturing flexible cryostats that meet application requirements. With the adoption of HTSDG coil systems for future Navy platforms, orders of cryostats for HTSDG will be over 7,000 meters annually.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

This Navy Metalworking Center (NMC) project addressed cryostat configuration and manufacturing issues associated with fabricating long lengths of flexible, vacuum-jacketed cryostats that meet Navy shipboard performance requirements. The project also evaluated reliability performance, fabrication techniques, and the design life cycle of the cryostat for naval platforms.

Implementation and Technology Transfer:

The project results have not been implemented because industry participant Southwire was unable to commit the capital investment required to upgrade its manufacturing facility. However, technical tasking has identified and provided preliminary confirmation of a manufacturing process that will meet Navy HTSDG requirements.

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This NMC project identified and preliminarily confirmed a cryostat manufacturing process that meets Navy HTSDG requirements, which could lead to a domestic supplier. A technician is shown applying insulation to a cryostat in preparation for testing. (NASA Kennedy Space Center photo)

Expected Benefits and Warfighter Impact:

Using a domestic supplier for the HTSDG cable systems would have resulted in an anticipated 30 percent cost savings over foreign suppliers. Additional benefits include diminished labor costs and installation duration due to a reduction in the number of cables to be pulled. An estimated 50 percent degaussing system weight reduction would also be realized for most ship classes because fewer cables would be required compared to the conventional degaussing system design.

TIME LINE / MILESTONE

Start Date:	October 2009
End Date:	December 2011

FUNDING

Navy ManTech Investment:	\$2.1M
Cost Share:	\$1.0M

(Departments of Energy & Homeland Security)

PARTICIPANTS

PMS 501
Naval Surface Warfare Center, Carderock Division
Southwire Company
Oak Ridge National Laboratory (ORNL)
NASA
NMC
Office of Naval Research