

Additively Applied Isolation Coatings for Navy Fasteners to Reduce Galvanic Corrosion

Status: Pending Implementation

PROBLEM / OBJECTIVE

In mechanical joining of ship piping system components, metal fasteners require isolation sleeves to prohibit electrical connectivity between dissimilar metals, which prevents galvanic coupling. Current fastener isolation sleeves are prone to damage due to general assembly and misalignment issues. This Navy Metalworking Center (NMC) Rapid Response project validated the use of an improved isolation material that is integrated into the body of Navy-specified fastener alloys. Specifically, the project addressed galvanic corrosion issues in joining dissimilar metal flange assemblies on the LPD 17 titanium seawater piping system. The project is expected to improve life-cycle and repair costs in this and similar applications.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

Before the desired isolation material is applied, machining of the fastener body to accommodate the isolation material is required. NMC developed the necessary fastener profile to accept the isolation material and the corresponding machining operation to maintain fastener integrity. NMC tested the machined fastener's mechanical properties to verify that loading conditions can be met with the target fastener material, Monel 400. NMC also validated that the isolation material does not affect the mechanical performance of the machined fastener and that the fasteners with the isolation material applied met protection requirements.

Implementation and Technology Transfer:

The Integrated Project Team validated the use of the additive-isolation-coated fasteners through both mechanical performance testing of the coated fastener and localized testing of the isolation material. A mock-up assembly was used to validate proper isolation protection between the dissimilar metals. These results were compiled and provided to NAVSEA 05P2 to develop the Materials Selection Information documentation and procurement specifications. Finally, NMC drafted stand-alone procurement specifications and installation procedures for the LPD 17 class titanium seawater piping system. Implementation will occur within the LPD maintenance cycle by the first quarter of FY18 at the Sasebo, Japan, naval base.



An improved isolation process for fasteners on Navy vessels will provide better protection against galvanic corrosion and reduce repair costs.

Kestrel Partners Inc. photo

Expected Benefits and Warfighter Impact:

- Using the additively applied isolation material on fasteners is expected to save at least 30 percent of the total repair costs related to galvanic corrosion issues on the LPD 17 titanium seawater piping system.
 - Cost savings are estimated to be no less than \$1.2M over the next five years and are expected to grow to \$4.1M over the subsequent five years.
- The project results could lead to further use and cost savings on other ship classes and systems.

TIME LINE / MILESTONE

Start Date:	July 2013
End Date:	July 2014

FUNDING

Navy ManTech Investment:	\$200K
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PARTICIPANTS

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This article was prepared by the Navy Metalworking Center, operated by Concurrent Technologies Corporation, under Contract N00014-10-D-0062 to the Office of Naval Research as part of the Navy ManTech Program. Approved for public release; distribution is unlimited.