Alternative Corrosion Control Methods for Inaccessible Void Spaces

NSRP SPC Panel Project Update

March 12, 2015

Alternative Corrosion Control Methods for Inaccessible Void Spaces

PROJECT TECHNICAL REPRESENTATIVE

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PROJECT LEAD

- Elzly Technology Corporation (Pete Ault & Norm Clayton)

INDUSTRY INVOLVEMENT

- GD-BIW (Pete Lockwood & Bob Cloutier)

Alternative Corrosion Control Methods for Inaccessible Void Spaces

SCOPE

- Compile application and performance data on the various alternatives that have been used for corrosion control of inaccessible void spaces
- Develop a shipbuilders guide for selecting appropriate alternative treatment methods
  - Include lessons learned on other programs
- Make recommendations for the Navy to consider in their requirements documents

Alternative Corrosion Control Methods for Inaccessible Void Spaces

DELIVERABLES

- Panel Project briefings
- Guide for Alternative Corrosion Control Methods for Inaccessible Void Spaces
- Project Test Report

Alternative Corrosion Control Methods for Inaccessible Void Spaces

- Task 1 – Identify Alternative Approaches
  - Document/Presentation for March SPC meeting
- Task 2 – Identify Performance Data from Fielded Systems
  - Ongoing throughout program
- Task 3 – Performance Testing
  - Develop Test Plan – March 2015
  - Initiate Testing – April 2015
  - Test report – November 2015
- Task 4 – Implementation and Reporting
  - Information Exchange Workshop – Fall SPC meeting
  - Draft Guideline – November 2015
  - Draft Final Report – December 2015
  - Panel Briefings – as required

Methods for Treating Inaccessible Voids

- PCP, Fill and drain MIL-PRF-16173, Gr 1 (e.g., Tectyl)
- Inert Gas Purge (oxygen content below 8%)
- Foam-filled (Syntactic or polyurethane)
- Vapor Phase Inhibitors
- PCP only, no treatment required

Alternative Corrosion Control Methods for Inaccessible Void Spaces

CRITICAL PATH ITEMS

- Identify sources of performance data
- Engage NAVSEA in Guideline development
- Develop testing program

Identify Sources of Performance Data

- Collected records regarding various inaccessible void performance
  - Generally, no problems reported unless there is some issue other than corrosion (usually cracking)

	A	B	C	D
1	**Void Type**	**Ship Classes**	**Treatment**	**Performance History**
2	Rudder interior	All	PCP; Fill & drain MIL-PRF-16173 Gr. 1	1. DDG64, 73, rudder stools, ca. 2003: significant internal structural corrosion in rudder stool areas where seawater had filled after structure cracked.
3	Bilge keel	All	PCP; Fill & drain MIL-PRF-16173 Gr. 1	1. CVN68, ca. 2011: Sections had seawater intrusion due to cracks found. Repair work indicated no corrosion in void sections where water had entered.
4	Skeg voids	All	PCP; Fill & drain MIL-PRF-16173 Gr. 1	
5	Bow peak/Vee structure	DDG1000	[Pete Lockwood provide-what was final?]	Too new for significant performance indications.
6	"Above-deck troughs and ramps ... on the Flight Deck and in the Hangar as shown on the drawings. The ramps shall be 50 mm high with a maximum angle of 2.4 degrees.	LPD17	PCP only; no treatment required (LPD-20, 21, 22)	
7	Bouyancy or insulative voids?	CVN	Foam-filled	CPA and CNAL (Vickers) report no knowledge of any past problems in these voids, but also little direct observation.
8	Masker emitter air box voids	DDG51	Inert gas such as argon or nitrogen to ensure an oxygen content of less than 8%	
9	Chain Locker canning plate voids	DDG51	Inert gas such as argon or nitrogen to ensure an oxygen content of less than 8%	
10	"...voids formed by enclosed structure under topside platforms, such as the bridge wings and the AN/SLQ-32 platforms, shall be of airtight construction…"	DDG51	Purged with an inert gas	
11	Composite deckhouse base joint voids	DDG1000	[Pete Lockwood provide-what was final?]	Too new for significant performance indications.
12	Sonar Dome Voids: area below banjo; area aft of diagonal bulkheads	DDG51, DDG100	filled with cellular polyurethane rigid foam in-place, MIL-P-21929, 2 lb/ft^3	
	Sonar Dome Voids: periphery of the Sonar Dome Rubber Window formed when		filled with a 44 lb/ft3 syntactic foam IAW MIL-S-	

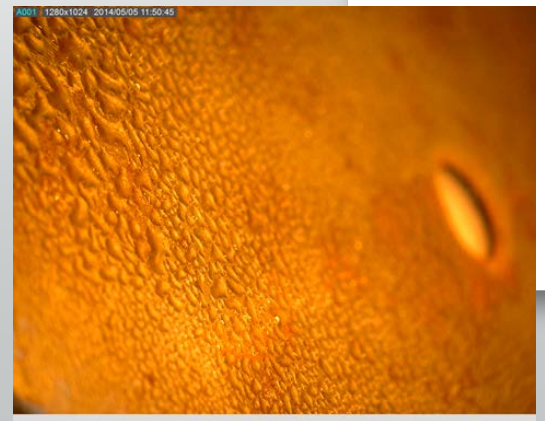
Sheet1

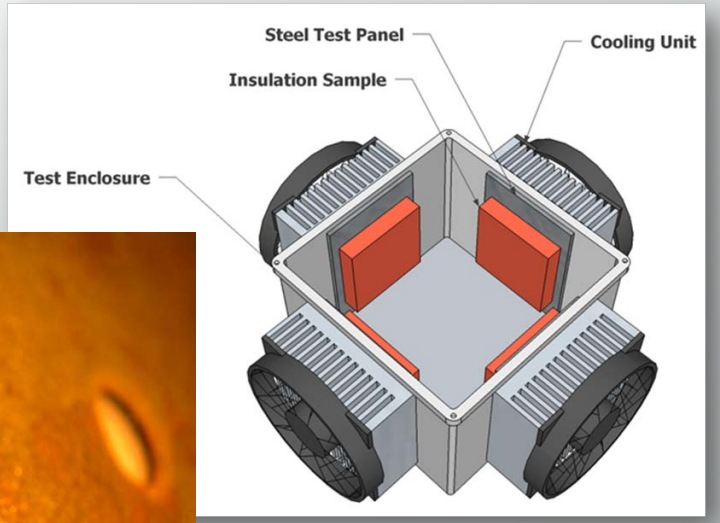
Engage NAVSEA in Guideline Development

- Stakeholder meeting with NAVSEA on March 25, 2015 @ 1000
  - Review project goals and background
  - Review and update compiled Navy inaccessible void experience
  - Collect multi-disciplinary input on any requirements or guidance that would affect permissible corrosion control options for voids in various locations
- Invited Participants:
  - NAVSEA representatives from Materials Engineering, UW Hull Husbandry, Structures, and Rudders
  - Elzly & BIW Project team members

Develop "Lab" Testing Program

- Details based on Stakeholder meeting
  - Evaluate corrosion rate of bare and "treated" steel in a controllable configuration to "bound" the performance of various treatments
  - Test conditions will include ideal conditions and upset conditions





Questions?