Ingalls Shipbuilding
A Division of Huntington Ingalls Industries

Elzly Technology Corporation

GENERAL DYNAMICS
Bath Iron Works

Retention of Type VI Epoxy under UHS Epoxy

NSRP Surface Preparation and Coatings Panel Meeting
9/6/17

Conlan Hsu
Structural Engineer

Team Members

- Ingalls Shipbuilding (Project Lead)
  - Conlan Hsu, John Hurley, Keith O'Brien, Jay Pertuit, Josh Reeder
- Elzly Technology
  - Pete Ault, Eric Shoyer
- Bath Iron Works
  - Robert Cloutier
- ATI
  - Frances Pearce (Project Manager)
- Electric Boat
  - Mark Gaynor (Project Technical Representative)

Background

- Current specifications for tanks and critical spaces require a MIL-PRF-23236 Type VII Ultra High Solids (UHS) epoxy coating over bare steel
- This requires either retaining Pre Construction Primer (PCP) through the entire build process until late-stage final paint application, or to apply the first coat of a multi-coat Type VII epoxy earlier in the build
- PCP will not provide adequate corrosion protection of the steel over long periods of weather exposure
- UHS epoxy can be damaged or burned during construction, and is difficult and expensive to repair

Type VI epoxy could economically bridge this gap if it can be retained for final painting

Project Concept

- This project will develop the data needed to request Navy approval to apply a Type VII UHS epoxy over a Type VI epoxy in critical coated areas

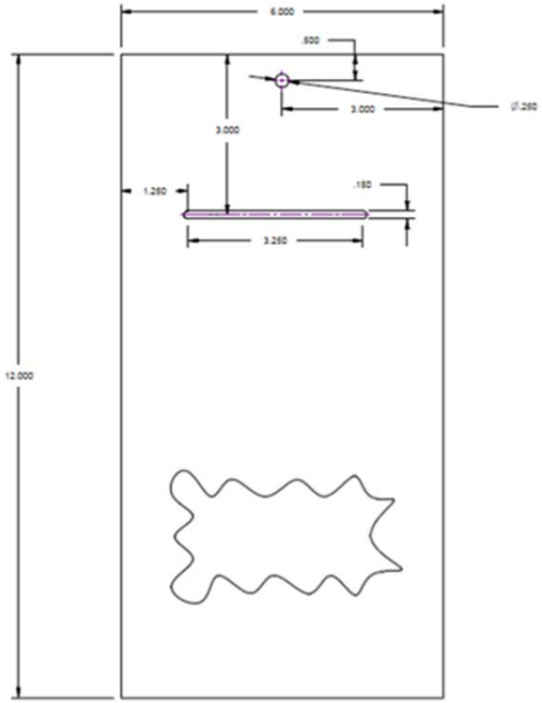
- This would apply to areas that would normally receive one to two coats of Type VII UHS epoxy

Project Work Breakdown Structure (WBS)

- Task 1: Identify Target Applications, Requirements, and Constraints
- Task 2: Select Candidate Systems
- Task 3: Finalize Applications and Test Requirements
- Task 4: Develop Test Plan
- Task 5: Fabricate Test Articles
- Task 6: Perform Testing
- Task 7: Issue Final Report

Test Strategy

- 6”x12”x1/8” steel panels
- Apply initial coat
- Simulate burn/weld defects
  - For adhesion & immersion only
- Age & Weather for ~7 months
- Secondary Surface Prep
- Apply final coat
- Performance Testing

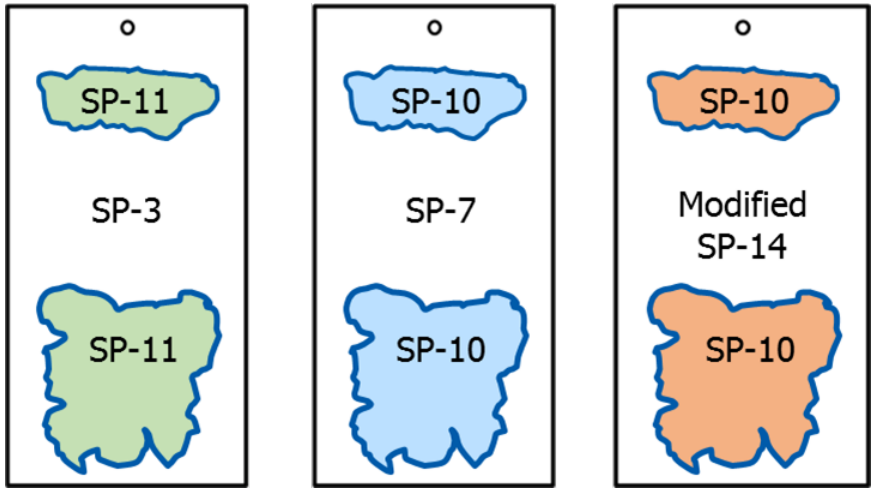


Candidate Coating Systems

- International
  - Type VI: Intergard 264
  - Type VII: Interbond 998, Interline 783
- PPG
  - Type VI: Amercoat 240
  - Type VII: Amercoat 240
- Sherwin Williams
  - Type VI: SeaGuard 5000 HS
  - Type VII: Fast Clad ER, Dura-Plate

Secondary Surface Preparation

- Secondary Surface Preparation Methods
  - SP-3 (abrade)/SP-11
  - SP-7/SP-10
  - Modified SP-14/SP-10
- Characterizing Secondary Surface Preparation
  - Visual Inspection
  - Film Thickness
  - Surface Profile
  - Surface Conductivity
  - Prepared Coating Surface Tension
    - Dyne Pens (experimental)

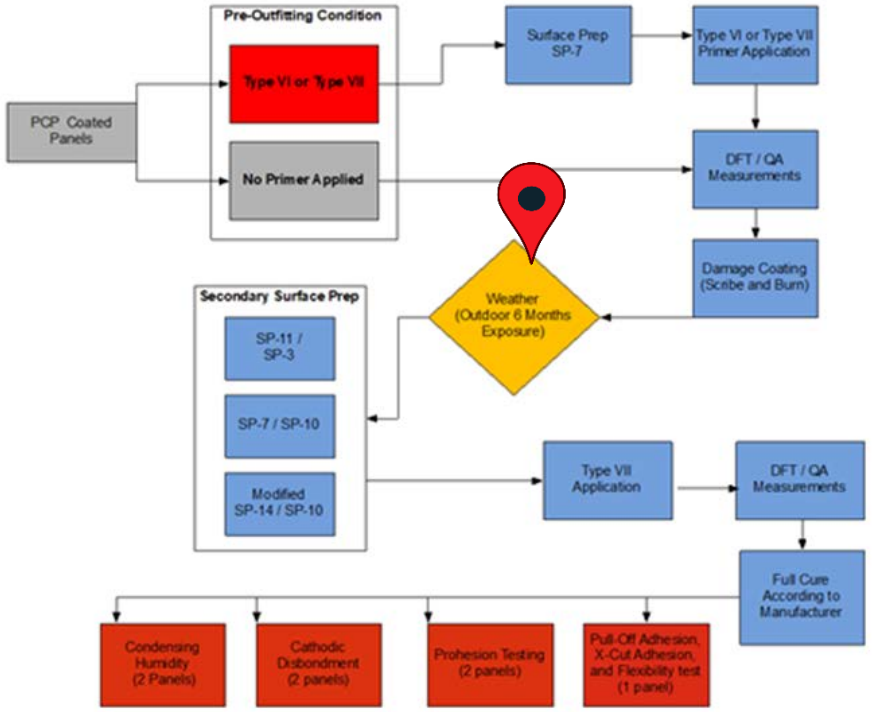


Performance Test Methods

- Pull Off Adhesion (ASTM D4541)
- Flexibility (Bend Test)
- Knife Adhesion (ASTM D6677)
- Cathodic Disbondment (MIL-PRF-23236D)
- Prohesion (Cyclic Corrosion Exposure) Test (ASTM G85 Annex A5)
- Condensing Humidity (ASTM D4585)

Project Deliverables

- Quarterly Status Reports – March 31st, June 30th, September 30th
- Test Plan – June 30th, 2017
- Test Reports – ~~November 30th, 2017~~ TBD
- Final Report – ~~December 20th, 2017~~ TBD



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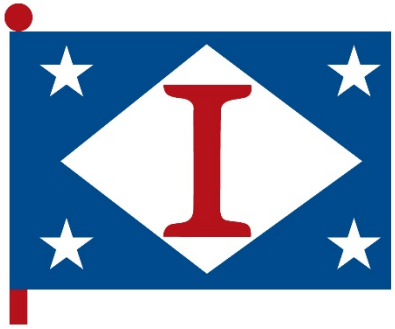

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