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Electrocoat Process for Non-Chromate Primers in DoD Manufacturing

ESTCP Project:
WP-201010

Presenter:
Thor Lingenfelter
PPG Industries, Inc.



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Electrocoat Process for Non-Chromate Primers in DoD Manufacturing



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- Electrocoat Process Description
 - Electrocoat “Basics”
 - Performance review
- Overview of ESTCP Program
 - Scope of Project
 - Project Tasks

Electrocoat Applications

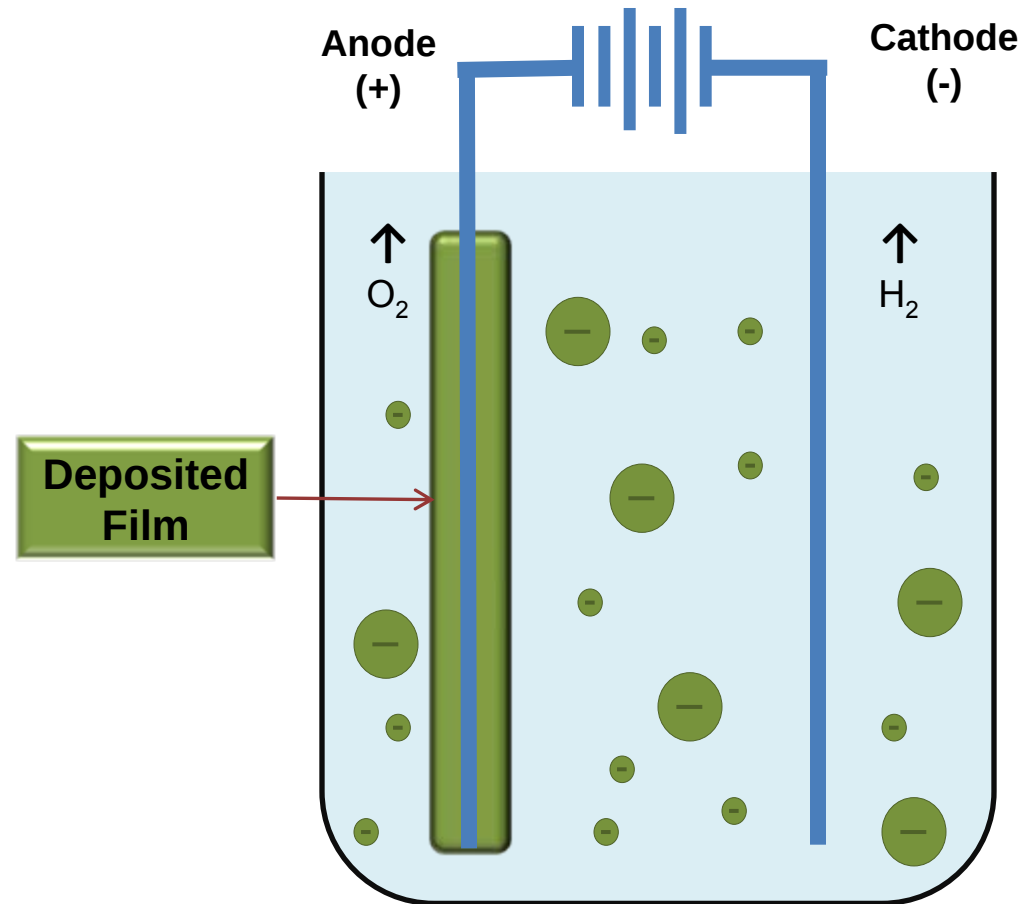


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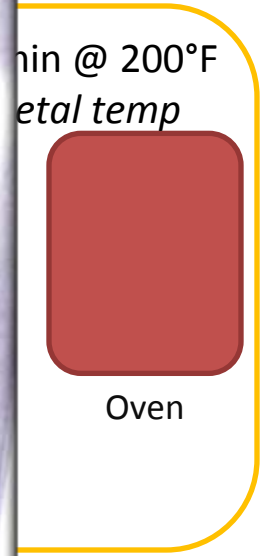
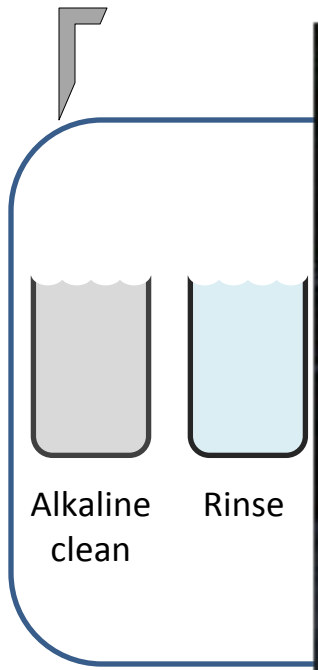


Anodic Electrocoat

- Waterborne coating
- Negatively charged paint particles; applied with electrical current
- Lower temperature cure
30 minutes metal at 200°F
- Chemistry and cure requirements are uniquely suited for aerospace aluminum.



Electrocoat System



Fully Cured

Why Electrocoat for Aerospace?



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➤ Environmental, Health and Safety Considerations

- Aqueous based
- Minimal waste discharge – closed loop process
- Minimal exposure of workers to hazardous materials

➤ Productivity / Efficiency

- Automated process – increased productivity
- Virtually 100% materials utilization
- Immediate part handling after thermal cure (30 minutes metal @ 200 °F)
 - Do not have “dry to touch”, “dry to tape”, “dry to fly” restrictions

➤ Application / Performance

- Uniform film across entire surface including recessed areas
- Excellent barrier / corrosion resistance properties

- Requirements of MIL-PRF-23377

- Corrosion Resistance

- Salt Spray
- Filiform

- Adhesion

- Flexibility

- Water Resistance

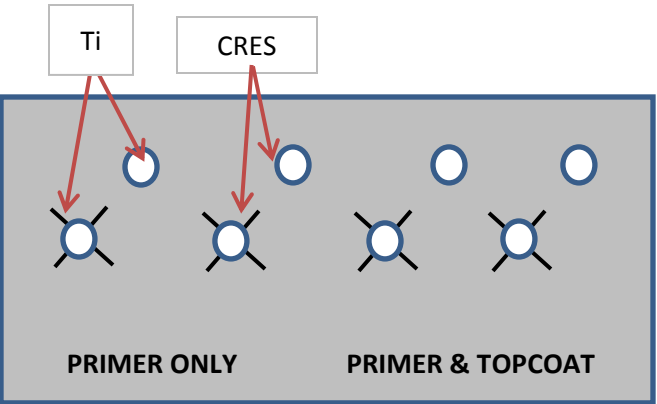
- Solvent Resistance

- Fluid Resistance

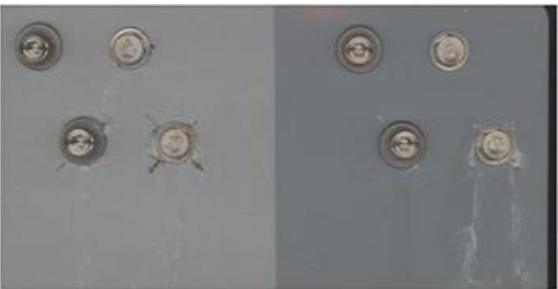
➤ SO₂ Salt Fog testing (ASTM G 85 Annex 4)

Electrocoat passes all performance specifications

Electrocoat Performance Galvanic Assemblies



After 500 hrs B117

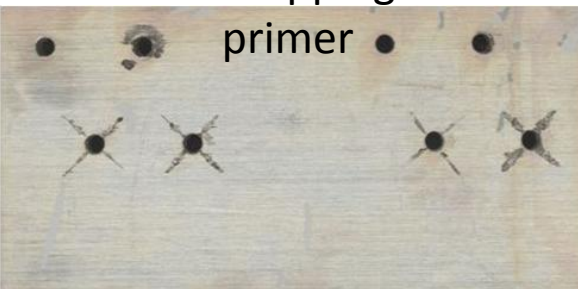


Cr-free Ecoat
over CrCC



MIL-PRF-23377
Type I Class N
over CrCC

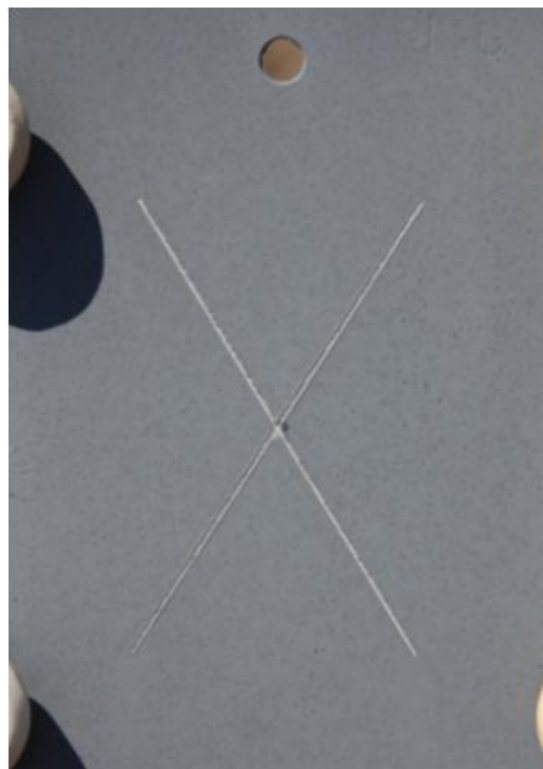
After stripping off
primer



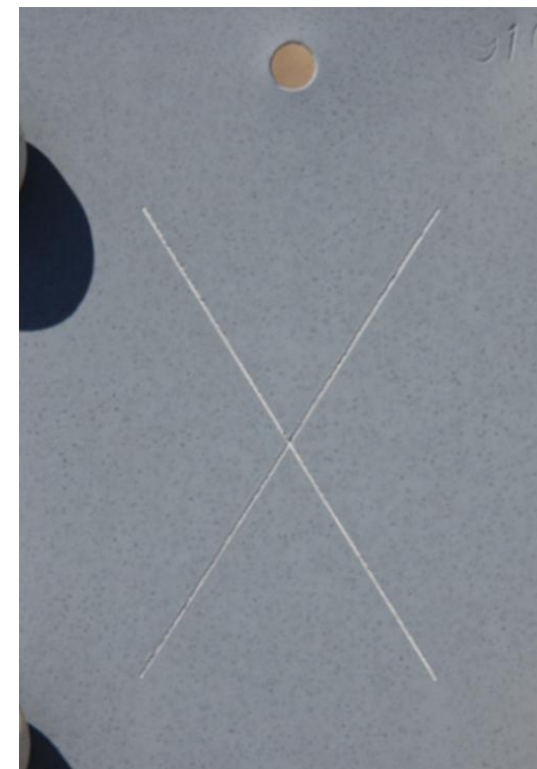
- Beach exposure – 18 months at Kennedy Space Center



Chromium spray primer
over Cr conversion coat
10 rating



Cr-free Ecoat over Cr CC
9 rating
(initial rating was 9 prior to exposure)



Cr-free Ecoat over TCP
10 rating

ESTCP Project Objectives



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- Demonstration and validation of a novel, non-chromated, environmentally friendly, electrodeposited primer.
 - The primers will be tested and demonstrated with previously transitioned “green” metal finishing solutions
- Depot level rework will be used to validate the performance of the proposed coating system.
- Environmental, productivity and life cycle cost benefits of the technology will also be evaluated.

The proposed demonstration and validation project will be structured in two phases:

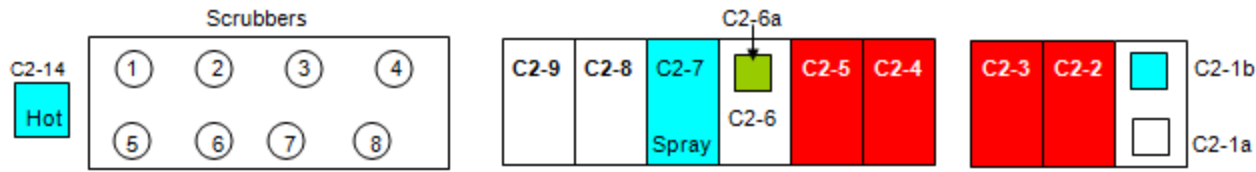
- Phase I- Task 1: Proof of concept test matrix
 - Performance over various substrates will be evaluated
 - Multiple surface treatments
 - Conversion coats (MIL-DTL-81706 Type I and II)
 - Anodized (MIL-A-8625 IIB)
 - Panels topcoated with MIL-PRF-85285 Type IV coating

Upon completion of testing, a Go/ No Go decision will be based upon coating performance and program office buy-in

- Phase II- Task 2: Installation of an electrocoat system at FRC-Southwest North Island
 - System will include a 2000 gallon electrocoat tank and rinse stages to enable coating parts and assemblies up to several feet in diameter.
 - The electrocoat system will be installed in several unused tanks in the cleaning shop

If material is qualified, system can accommodate full-scale production

Layout of existing cleaning shop tanks at North Island



Proposed site for electrocoat system



Existing hoist can be used

- Phase II/ Task 3: Selection, coating, and evaluation of various test parts
 - Focus on components such as wheel assemblies and seat tracks to be installed on Air Force and Naval aircraft.
 - Performance will be tracked relative to hexavalent chromated spray controls
 - Electrocoat performance productivity will be measured in terms of material usage, labor costs, hazardous waste volumes for life cycle calculations.



Representative test parts: wheel assemblies and seat track components

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