Environmentally Friendly Pretreatments for Ferrous and Non-ferrous Substrates

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Agenda

- Programs
- Laboratory Testing
- Ground Support Equipment Demonstrations
- Aviation Demonstrations
- Transition
• Environmentally Friendly Zirconium Oxide Pretreatment (WP-1676)
  • Funded By Strategic Environmental Research and Development Program (SERDP)
  • FY09- FY12
• Demonstration of Zirconium Oxide Pretreatment to Prevent Corrosion (WP-201318)
  • Funded by Environmental Security Technology Certification Program (ESTCP)
  • FY13-FY16
• Environmentally Friendly Zirconium Oxide Pretreatment (W14AR01)
  • Funded By Office of the Secretary of Defense (OSD)
  • FY14-FY16
• Cr(VI)-Free Conversion Coatings (TMR 14-02)
  • Funded as part of the Environmental Quality Technology Pollution Prevention Toxic Metal Reduction (TMR)
  • FY14-FY19
• **Screen commercially available products**
  - Galvanic cyclic test
  - Cross hatch adhesion
• **Down selection the best performing products.**
• **Initiate long term testing on laboratory samples**
  - B-117 neutral salt fog
  - GMW-14872 Cyclic testing
  - Outdoor static testing
  - Additional Galvanic cyclic testing
  - All other Specification required testing
• **Final down selection**
• **Start demonstrations at Army Depots and corrosion repair locations**
Laboratory and Depot Testing:

- All coatings were initially assessed at ARL using the NAVAIR developed rapid screening galvanic test panels. (11 products screened)
- Rapid Galvanic panels allow ARL/NAVAIR to screen multiple products in a 21 day cyclic corrosion test (GMW 14852 Test)

Conversion Coat & Primer – 2 S/S and 2 Ti Fasteners

Conversion Coat, Primer & Top Coat – 2 S/S and 2 Ti Fasteners
Galvanic Test Results: Baselines

Hexavalent Chrome Pretreatment

Trivalent Chrome Pretreatment
Galvanic Test Results: Failures

The Nation's Premier Laboratory for Land Forces
Galvanic Test Results: Passing
One year Outdoor Exposure
Two years complete December 2016

Zirconium Pretreatment
X-Bond® 4000
MIL-DTL-53022 Type III Primer
MIL-DTL-53039 CARC

Zinc Phosphate
Chryscoat OC
MIL-DTL-53022 Type III Primer
MIL-DTL-53039 CARC
Ground Support Equipment Demonstrations
GSE Demonstrations

Location/ Date:
Letterkenny Army Depot (LEAD)
  Jun 2014
Albany Marine Corps Logistics Base
  Aug 2014
Anniston Army Depot (ANAD)
  Oct 2016

- Six stage pretreatment process @LEAD and MCLB for Fe and AL
- Six stage pretreatment process for Fe and nine stage process for AL @ANAD
- Zirconium operation performed at room temperature
- Reccoat with CARC primer as soon as parts are dry-no waiting 18-24 hours
- No sludge or solid waste developed
Aluminum components pretreated at ANAD Oct 2016
Aviation
Demonstrations
Location:
Corpus Christi Army Depot (CCAD)

Date:
January 25\textsuperscript{th}- 29\textsuperscript{th} 2016 (Spray)
June 13\textsuperscript{th}-17\textsuperscript{th} 2016 (Immersion)

• 3 vendors selected for spray demonstration, 1 vendor for immersion
• Vendors required to bring all material and equipment for application
Baseline Pretreatment
Immersion Process

Deoxidizer Tank
Heated to 110°F

Conversion Coat Tank
Room Temperature
Components Drying (upper left)
BER components after final paint
6 Month Outdoor Exposure at CCAD
12 Month Outdoor Exposure at Cape Canaveral
Upcoming Demonstration:

- The next demonstration will be on a flyable asset at the 1109th TASM-G in Groton, CT.
- This demonstration will also include the latest generation of non-chromate primers (Al-rich technology).
- Demo coatings will be applied to selected parts and components on a UH-60L:
  - Nose door, Gunners window frames, cargo doors, decoy launcher frames and stabilator (1/2-n-1/2).
  - Good mix of metallic and composite components to verify the new coating(s) performance for the next 2 years.
Transition

- Qualification to TT-C-490
  - Type IV
  - Alternative to zinc phosphate
  - ETA: Jan 2017

- Revision to MIL-DTL-53072
  - Allow use in place of TT-C-490 Type I
  - ETA: Feb 2017

- Revision, Qualification to MIL-DTL-5541
  - In coordination with NAVAIR
  - Updated testing requirements
  - ETA: 2018
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Questions