Army ESD Efforts

Tony Pollard
Anniston Army Depot

Wayne Ziegler
US Army Research Laboratory
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23rd Replacement of Hard Chrome Plating Program Review Meeting, November 18-19, 2003, Cape Canaveral, FL. Sponsored by SERDP/ESTCP.

14. ABSTRACT

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19a. NAME OF RESPONSIBLE PERSON
Army ESD Accomplishments

• Training complete at Anniston Army Depot (ANAD)
• Training session held at ARL attended by:
  • Boeing – Philadelphia
  • Sikorsky
  • Johns Hopkins University
  • Johns Hopkins Applied Physics Lab (APL)
• ANAD has completed repair of M1A1 Cannon Cradle
• CCAD has identified none rotating parts to be considered for ESD repair
M1A1 Cannon Cradle Repair

- Large corrosion pits in chromed part 1/8” by 3/8” – 0.060” deep
- Build up pits with base material, 4130 steel
- Part cost approximately $25K
- 75 damaged parts in storage
- Reclamation procedure has engineering approval
- Candidate parts list being reevaluated based on training and success with cradle repair
M1A1 Cannon Cradle Repair

Ground Out Corrosion Pits

Build up in Progress

Repaired Area After Plating
Success Story – Electrospark Deposition

The Problem:

- M1A1 Abrams Tank Gun Cradle Corrosion
- No Ability to Repair Large Pits
- Cradles in ~ 10% of Tanks Overhauled are Defective
- Deeply Corroded Cradles are Discarded

The Program:

- Electrospark Deposition Process for Chromium Extended under SERDP
- Under Dem/Val in ESTCP
- Process Adapted by Anniston Army Depot to Repair Gun Cradles
- Process Implemented as Process PMD-03-39

Payoff:

- Reclamation of Serviceable Gun Cradles
- Cost Saving of $360K per year at Anniston
- Cost of Cradle = $25K
- Cost of Repair = $770.00
M1 Intermediate Compressor Housing

- Chrome plating performed in very localized areas
- Very complex geometry for HVOF thermal spray
- Ideal for ESD

Chrome-plated areas

No coating allowed
TACOM/ TARDEC

- Repair of flaws in Cr plating of 4130 rod
- Valve seat resurfacing
- Drive shaft yoke
- Examining list of applications being considered for laser repair
- Revising list of candidate parts based on successful experience with cradle repair
Technical

• Primary Technical Requirements
  - Wear
  - Corrosion resistance

• POCs
  - Tony Pollard, ANAD
  - Roger Wood TACOM-TARDEC
  - Jeremy Turner, ANAD
AMCOM/ CCAD

- CCAD Dir Engineering Services is interested
- AMCOM/AMRDEC are decision making authorities
- T700 Stage 2 Blisk
- SH-60 Landing Gear
- Additional T700 Components
AMCOM/ CCAD Technical

• Technical Requirements
  - Fatigue testing laboratory repair simulations
  - Endurance testing
  - Corrosion & wear (Cr repair applications)

• POCs
  - Kirit Bhansali AMRDEC Ch, Materials
  - Jim Holiday, CCAD Industrial Engr Div
  - Elaine Lambert, CCAD Materials Lab
ARL Support

• AMCOM & TACOM Applications
  - Define performance criteria
  - Develop test protocol
  - Execute lab and component testing

• Materials Characterization

• R&D Unique Coating Applications
  - HVOF/HVAF/Cold Spray/ESD
ARL Planned Efforts

- Metallurgical Characterization
  - HAZ
- Mechanical
  - Fatigue testing
- Corrosion
- Wear Resistance