Army ESD Efforts

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# Army ESD Efforts

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**Supplementary Notes:** 23rd Replacement of Hard Chrome Plating Program Review Meeting, November 18-19, 2003, Cape Canaveral, FL. Sponsored by SERDP/ESTCP.  

**Abstract:**  
**Subject Terms:**  

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- Report: Unclassified  
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**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