M1A1 Cannon Cradle Repair at Anniston Army Depot

Presented by

Tony Pollard
Anniston Army Depot (ANAD)

Phillip F. Leyman
Army Research Laboratory (ARL)
Report Documentation Page

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18. NUMBER OF PAGES
10

19. NAME OF RESPONSIBLE PERSON

Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
The Problem

- M1A1 Abrams Tank Gun Cradle Corrosion
- No Ability to Repair Large Pits
- Cradles in ~ 10% of Tanks Overhauled are Salvage due to corrosion
The Program

• Large corrosion pits 1/8” by 3/8” - 0.060” deep
• Build up pits with base material
• Base material - 4130 steel
• Repair material - Inconel 718
The Payoff

- Reclamation of Serviceable Gun Cradles
- Cost of New Cradle = $25K
- Cost of Repair = $700 per Cradle
- Cost Saving of $360K per year at Anniston (15 Cradles)
Procedure

• Clean cradle using vapor degreaser.
• Using hand-held grinder w/ wire brush, remove corrosion from pit.
• Using hand-held grinder w/ grinding tool, break the sharp edges of the pit.
• Using the ESD Equipment fill the pit to .005” - .010” above the parent material surface.
• Using ID grinder, grind ID to prepare for chroming.
• Chrome plate and finish grind.
Initial Repair Process
ESD Settings

- Pulse Rate - 580 Hz
- Capacitance - 20 mfd
- Voltage - 100 volts
- Step Rate - 270 Hz
- Swing - 3
- Rotate Increment - 3
- Direction - CW
- Interval - 6
Development of Improved Process
ESD Settings

- Pulse Rate - 400 Hz
- Capacitance - 30 mfd
- Voltage - 150 volts
- Step Rate - 340 Hz
- Swing - 3
- Rotate Increment - 3
- Direction - CW
- Interval - 6
- Argon Gas Atmosphere

Micrograph of ESD applied Iconel 718 (.010” dimple)
## Inspection

<table>
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<tr>
<th>Characteristic</th>
<th>Method of Inspection</th>
<th>Requisite</th>
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<tbody>
<tr>
<td>Serviceability</td>
<td>Visually (10X Microscope)</td>
<td>No blistering, peeling, cracking allowed.</td>
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<tr>
<td>Dimensional</td>
<td>Measure</td>
<td>IAW DMWR 9-2350-264-2</td>
</tr>
<tr>
<td>Surface Finish</td>
<td>Measure</td>
<td>IAW DMWR 9-2350-264-2</td>
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M1A1 Cannon Cradle Repair

Build up in Progress

Ground Out Corrosion Pits

Repaired Area After Plating
Future Projects

• Investigate additional candidates for ESD Repair Process
  – M88/M60 Roadwheel Arm Spindle
  – M198 Recoil Rod