Borescope-Guided Remote Zone Corrosion Mitigation Research Development Test and Evaluation

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Overview

• Background
• The Challenge
• Program Objectives
• Initial RDT&E Results/Findings
• Current Developments
• Future Program Goals
Background

- Growing need to address corrosion degradation in hidden and inaccessible zones of aging aircraft, vehicles, support equipment
- **Cost to depot**: Unplanned “Over and Above” corrosion maintenance must be addressed on the line—causes bottlenecks and late deliveries
- **Cost to field**: False sense of safety; reactive corrosion maintenance—adversely effects equipment availability
- Budgetary constraints limit new acquisitions—Sustainment of existing assets is a “MUST DO”
The Challenge

• Develop tools and processes to aggressively address corrosion in hidden structural zones

Must be:

• Non-invasive—Borescope-enabled; No teardown required; minimal panel removal

• Portable—Lightweight; Small footprint

• Practical/Feasible—Enables remote zone corrosion mitigation using COTS (with minimal mods) tooling

• Cost effective—Process value/benefits outweigh cost of corrosion repair labor/materials

• Highly capable—Versatile equipment package treats corrosion in the most inaccessible structural zones susceptible to corrosive attack (internal frame surfaces on vehicles/AGE; cargo aircraft sub-floor)
Program Objectives

- **Initial Phase:** COTS Equipment RDT&E (Sep 2010 – May 2011)
  - Borescope-guided Corrosion removal tools
    - *Rotary (dremel-type) tools:* Non-feasible
    - *Portable abrasive blast:* Non-feasible
    - *Mini dry ice blast:* Feasible
  - Borescope-guided CPC application tools
    - *6.2mm working channel insertion tube:* Feasible
  - Borescope-guided Sealant application tools
    - *Pneumatic mini sealant gun:* Non-feasible
  - Borescope-guided mini vacuum
    - *Pneumatic gun vac:* Non-feasible
    - *Mini pneumatic suction vac:* Feasible
Initial RDT&E Results/Findings

• Mini Dry Ice Blast: Coldjet Microclean i3
• CPC Application: Olympus IV8635X1 Insertion Tube
• Mini Vacuum: Wandres SP-14 Suction Vac
Initial RDT&E Results/Findings

**Mini Dry Ice Blast: Coldjet Microclean i3**

- Easily coupled to borescope
- Removes Corrosion Products
  - Surface corrosion, crevice corrosion
  - Excellent surface prep for CPC, Alodine, Primer
- Removes Paint, Sealant, Dirt
- Minor Abrasion to base materials only
- No secondary wastestream (CO2 sublimes)
Initial RDT&E Results/Findings

- **CPC Application:** Olympus IV8635X1 Insertion Tube
  - Superb remote CPC applicator in COTS configuration w/Sure Shot atomizer and AAACL working channel extension tubes
  - 6.2mm diameter of scope and CPC tube assembly—easily gains access to remote zones through structural gaps/fastener holes
  - Compatible with Olympus Iplex FX industrial borescope—common equipment at most field units
Initial RDT&E Results/Findings

• **Mini Vacuum: Wandres SP-14 Suction Vac**
  - Superb wet/dry capability
  - Easily coupled to borescope via AAACL formable scope sleeves
  - Captures liquids/debris in spill-proof filtered container
  - Outstanding suction force
  - Lightweight/small footprint

![AAACL Formable Scope Sleeves](image1.png)

![Wandres SP-14 Mini-Vac](image2.png)
Current Developments

• Follow-on RDT&E—H-1/HH-60 Remote Corrosion Mitigation Kit (RCMK) Prototype Build (Jun 2011 – Sep 2013)
  • Directly addresses recurring/costly corrosion issues in inaccessible zones on H-1 and HH-60 helicopters
  • Incorporates equipment identified in initial phase
  • Assemble highly portable/deployable field maintenance kit
  • COTS configurations with only slight modifications
  • Lays the foundation for T.O. 1-1-691 Remote Corrosion Mitigation supplement and aircraft-specific T.O. procedures (-23)
Future Program Goals

- Produce both “equipment-specific” and “multi-purpose” RCMK’s, expanding applicability
- Reduce RCMK footprint/weight—Increase capability through advanced technology
- Reduction in overall equipment sustainment costs
- Contribute to on-time depot turnaround
- Extend aircraft/equip service life
- Enabled enhanced “condition-based”, tail number-specific maintenance and operational planning
- Increase aircraft/equipment availability
Open Floor

Thank you for your time and attention!