Wipe Reactivation of Aged Primer

ASETSDefense Workshop 2016

Orlando, Florida
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Program Manager
**Objective**
Qualify a wipe-on adhesion promoter system to replace the current material and labor-intensive F-35 aged primer reactivation process.

**Process**
The Wipe Reactivation of Aged Primer (WRAP) process developed in Phase I will be qualified for production implementation through the development and execution of an appropriate test plan. Other material systems that can benefit from the WRAP process will be identified and verified through exploratory testing.

**Current Status**

**Phase 1** – Requirements, material formulation, lab-scale testing, material down-select. Status: COMPLETE

**Phase 2** – Pre-qualification & qualification of adhesion promoter formulation, field service evaluation on F-16. Status: In-Work

**Phase 3** – Expansion of WRAP process to fastener fills, flex primer, chromated primer, and alternate LVOC solvents. Status: In-Work

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**Task 1: Requirements Analysis**

**Task 2: Qualification Testing**
- Prequalification
- Qual 1
- Qual 2

**Task 3: Field Service Evaluation**
- ID Aircraft, Safety Eval., Install

**Task 4: Project Management**

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Benefits

• Reduced Environmental Impact
  – Primer reduction – 30 gal/aircraft
    • VOC reduction of 78 lbs/aircraft
  – Spray gun solvent reduction – 7 gal/aircraft

• Improved Occupational Safety
  – Accidental damage during scuff-sanding can release hazardous dust

<table>
<thead>
<tr>
<th>Primer Reactivation Process</th>
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<tbody>
<tr>
<td><strong>Current Spec</strong></td>
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<tr>
<td>Pre-saturated IPA Wipe</td>
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<tr>
<td>Orbital Sand</td>
</tr>
<tr>
<td>Pre-saturated IPA Wipe</td>
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<tr>
<td>Primer Spray</td>
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<tr>
<td>Spray Gun Clean</td>
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<tr>
<td>Primer Cure</td>
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</tbody>
</table>

• Robust Procedure
  – No need for strict environmental controls (humidity, spray booth, etc.)
  – Reactivation can take place outside of paint booths or in the field

• Reduced Rework
  – Sanding primer can induce damage causing expensive rework operations

• Transferable Technology
  – Methodology can be conferred to other aircraft at depots and bases
  – Transferrable to other material systems

• Span Time Reduction
  – 1 day reduction on critical path
  – Generates significant program cost savings
## Potential VOC Savings of WRAP Treatment

<table>
<thead>
<tr>
<th>Coating</th>
<th>VOC Level</th>
<th>Annual VOC Reduction</th>
<th>Lifetime VOC Reduction</th>
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</thead>
<tbody>
<tr>
<td>OML Primer Reduction (44GN098)</td>
<td>340 g/L, 30 gal/aircraft</td>
<td>8.4 tons*</td>
<td>~128 tons**</td>
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<td>Spray Gun Cleaning Solvent Reduction</td>
<td>238 g/L, 7 gal/aircraft</td>
<td>1.4 tons*</td>
<td>~21 tons**</td>
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* - Based on 200 aircraft / year  
** - Implementation estimated on 2/28/2018, 3,026 aircraft, based on PD-74 Iss25 Production Schedule
WRAP Material Testing

- **Qualification Test Series**
  - Test two WRAP suppliers against topcoat adhesion specification
  - Various environments and potential surface contaminants:
    - Walking (floor panel)
    - Hydraulic Fluid
    - Hydraulic fluid + heat cycling

<table>
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<tr>
<th>Coupon</th>
<th>Test Type</th>
<th>Temp.</th>
<th>No Soak</th>
<th>JP-8</th>
<th>Hydraulic Fluid</th>
<th>Alkaline Cleaner</th>
<th>De-Icing Fluid</th>
<th>Soiled Surface</th>
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<td>Roller Peel</td>
<td>RT</td>
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* = No Specification Requirement
WRAP Material Testing

- Successfully completed supersonic testing
  - Testing showed excellent adhesion performance
- Selected packaging options, beginning testing:
  - Pre-mixed solvent bottle
  - Pre-soaked wipes
- F-16 test panel for Field Service Evaluation (FSE) installed
  - Surface soaked with hydraulic fluid, then heat cycled to ‘bake’ in contaminate
  - Will monitor performance
WRAP Qualification – Floor Panel Test

- Taped down in high traffic area two test panels for ~6 months
- Treated with WRAP process and tested adhesion performance
- WRAP performance exceeds scuff and reactivate adhesion performance

Even on dirty floor panels, WRAP performance exceeds Scuff and Reactivate
WRAP Fastener Testing

• Tested removing primer over fasteners
  – Saves 5.25 hours of production span time, plus significant costs and chemical usage
  – Scuff and promote with WRAP only
• Inconel SS and Titanium fasteners tested

Titanium Fasteners

Inconel Fasteners

WRAP Could Replace Primer on Fasteners by Next Year
## WRAP – Implementation Strategy

### Task 1: Triage
- Gather Manufacturing and SCM Data
- Prepare and hold Triage meeting

### Task 2: ARB 1&2
- Prepare and hold ARB1
- Prepare and hold ARB2

### Task 3: Begin Production Implementation
- Coordinate with SCM and Suppliers
- Production trials in AFF
- Production Implementation

### Task 4: Management and Support

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- **Affordability Triage**
- **ARB 1 & 2**
- **Implementation**
- **Pre-Implementation**