Coatings and De-coatings Specifications Updates

International Workshop on Pollution Prevention and Sustainable Development

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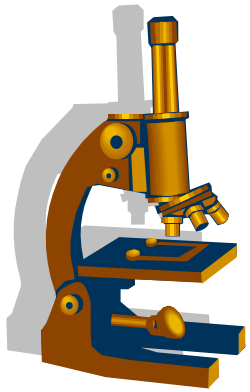
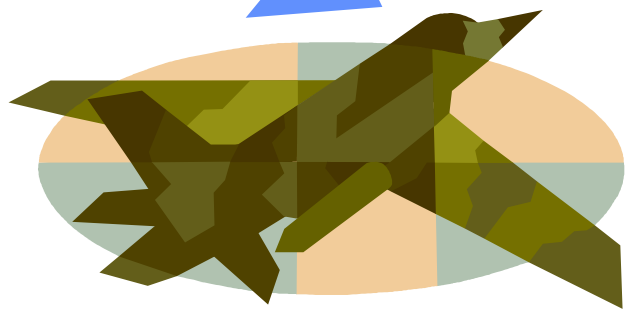
Briefing Overview

- Background
- Advanced Performance Coating System Specification
- MIL-P-85891, PMB Specification
- Chem Stripper Specification
- Erosion Resistant Specifications
- Fuel Tank Coating Specification
- MIL-C-87177

Background
CTIO Mission & How to Accomplish It

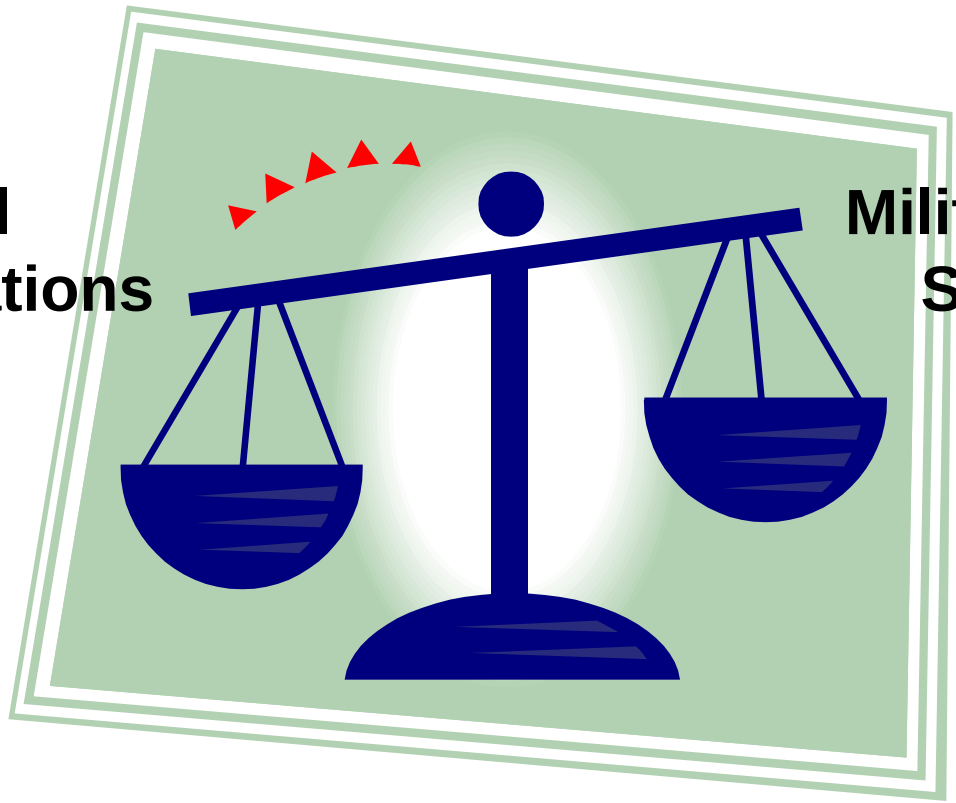


CTIO



Background
Which Specification Route To Take

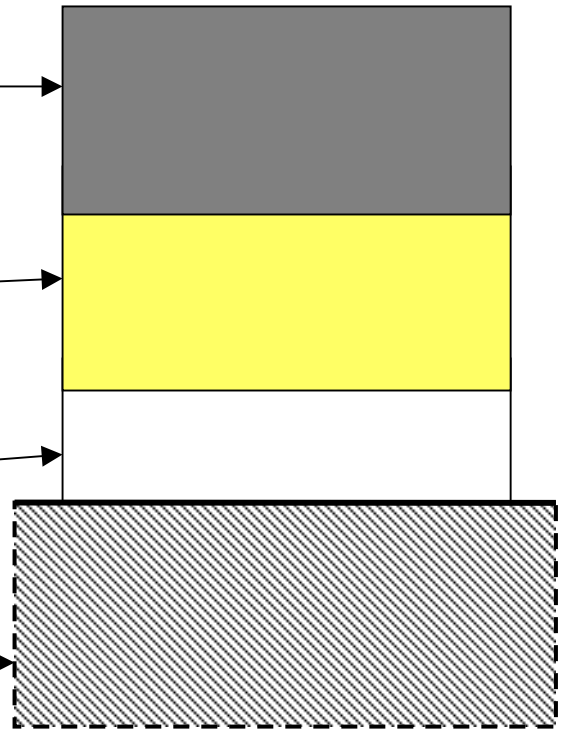
Commercial Specifications



Military Specifications

Air Force Coating System
Related Specifications

- Cleaner (MIL-PRF-87937D, MIL-PRF-85570D)
- Depaint Method (MIL-P85891A, Chem Strip PD)
- Top Coat (MIL-PRF-85285)
- Primer (MIL-PRF-23377, MIL-PRF-85582)
- Pretreatment (MIL-C-5541D, MIL-DTL-81706A)
- Substrate

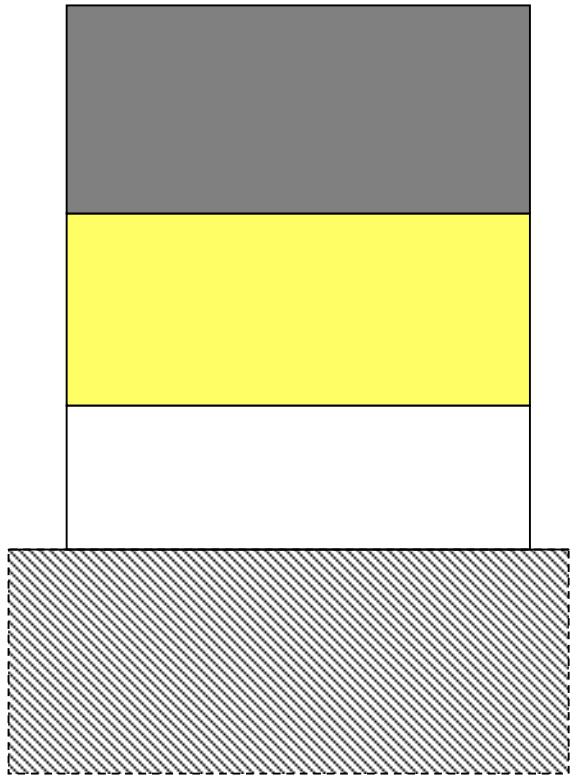


Aluminum, Titanium, Composite, Magnesium, Steel, etc.

Technical Order T.O. 1-1-8

Advanced Performance Coating (APC) System Specification

- Top Coat
- Primer
- Pretreatment
- Substrate
- Cleaner
- Chemical Depaint Method



All in one specification

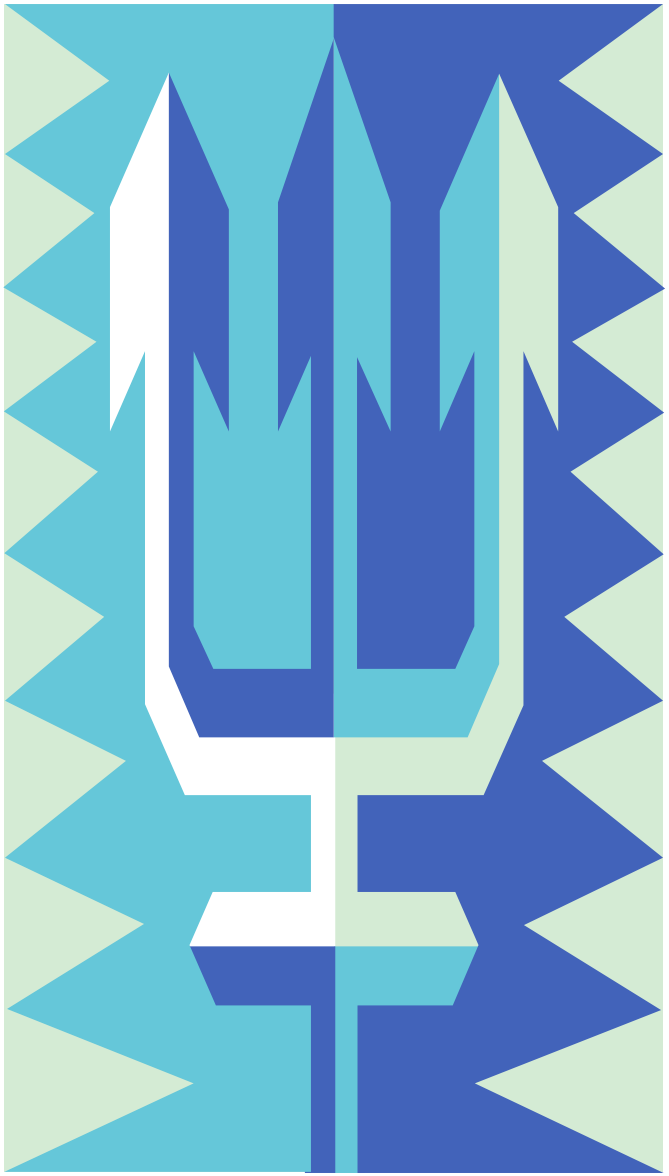
Advanced Performance Coating System Specification

- 2 Versions
  - Military
  - SAE
- Military Version
  - Military version created & briefed to ASC Tech Directorates
    - Implementation approved and funding resolved
  - ASC/ENOI reviewing specification – 23 March
  - DOD distribution – 27 March (45 day review period)
  - Resolve comments – 18 May
  - Comments being resolved
  - Preliminary Testing started

Advanced Performance Coating System Specification

- SAE version
  - G-8 Spring ‘05 meeting
    - Balloting complete
    - Issues resolved & spec updated
- SAE G-8 Chair reviewed MIL SPEC
  - MIL SPEC version changes should be implemented in AMS version
  - SAE G-8 version to be modified to reflect MIL SPEC version appropriate & re-balloted

MIL-P-85891A, PMB Specification



- **PMB Media Suppliers Audit**
- **Specification QPL**
- **Specification Revision**

PMB Media Suppliers Audit

- **1st Article Tests just show that a supplier can produce Mil Spec Quality media.**
- **Charge Lot (50,000 lbs) & Batch (a.k.a. Finish) Lot (10,000 lbs) data give information whether or not the suppliers provide Mil Spec quality media.**

"4.1.2 Source inspection. The finished product furnished under this specification shall be source inspected to insure that the plastic media meets the Quality Conformance Inspection prior to leaving the manufacturer's plant. The material shall be packaged as specified in Section 5 of this specification. *The manufacturer shall maintain a record of the quality test results and retain a small sample, by lot number, for a period of two years.* A copy of the quality conformance test report shall be forwarded to the contracting officer."

MIL-P-85891A Tests
1st Article & Lot Testing

Performance

- Strip Rate
- Surface Residue
- Aggressiveness
- Anti-Static Behavior
- Consumption

*- Charge Lot (Raw Material) (<50,000 lbs) Tests

***- Batch (Finish) Lot (<10,000 lbs) Tests*

Physical

- Chlorine Content
- Iron Content
- Water Absorption
- Hardness*
- Infrared Spectrogram *
- *Specific Gravity***
- *Extract Content***
- *pH***
- *Ash Content***
- *Conductivity***
- *Heavy & Light Particulates ***
- *Particle Size ***

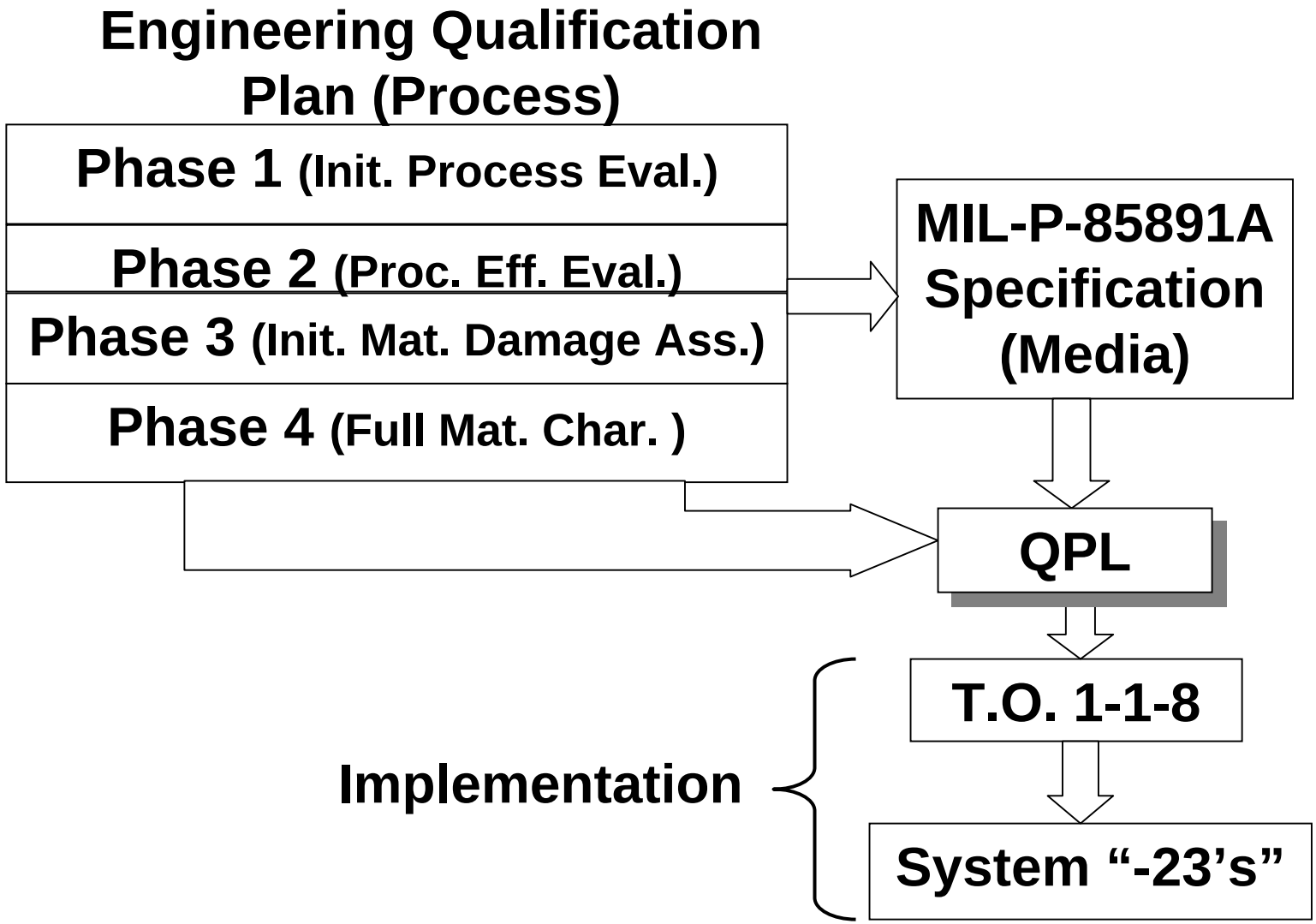
PMB Media Suppliers Audit

- **Hill AFB experience:**
  - **Hill AFB requires their PMB media suppliers submit Charge Lot and Batch (Finish) Lot test reports BEFORE accepting PMB media.**
  - **Mil Spec material could be recirculated 6 times during PMB operations, whereas Non-mil Spec Material could only be recirculated 3 times.**
- **PMB use in the AF will increase.**
- **It becomes critical that media supplied actually IS Mil Spec quality media**
- **The Goal :**
  - **to Protect AF Assets**

PMB Media Suppliers Audit

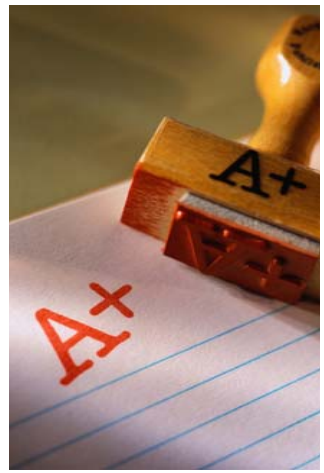
- ✓ Determination of Audit Team(s)
- ✓ Charter/Ground rules
- ✓ Obtain list of Qualified Suppliers
  - "Off Site" Facilities
- ✓ Layout TDY Schedule
- ✓ Determination of Supplier Lot Data Criteria (What are we looking for?)
  - – Charge Lot Information
    - Conformance to Material
    - Hardness
    - Infrared Spectrogram
  - – Batch Lot Information
    - Particle Size
    - Specific Gravity
    - Heavy & Light Particulates
    - Conductivity
    - pH
    - Ash Content
    - Extract Content
- ✓ Pre Audit Questionnaires
- ➢ Conduct audits
- • Reports and Recommendations

Dry Media Blast Approval Process

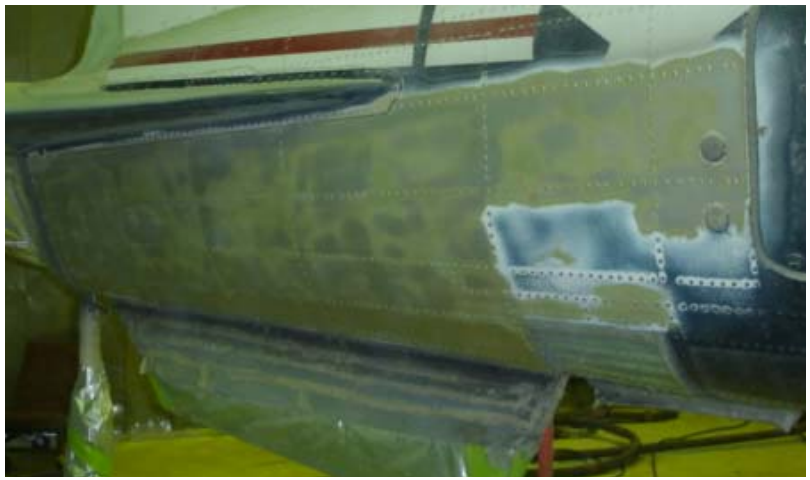


Specification QPL

- T.O.1-1-8 paragraph 2-21.1.1 as a base line
- PMB Supplier Audit input
- Draft QPL to ASC/ENOI (Specs & Standards Group)
- Process for updating QPL
- Procedures for removal of “Non-Compliant” suppliers
- “Penalty” Period
- Requalification procedures



MIL-P-85891A Changes
New Plastic Media Approvals



Type VII

- ADM GPx Cornstarch Acrylic Hybrid Polymer media
- CTIO Approval Letter
- T.O. 1-1-8 Approval

Type VIII

Nano-composite (amino resins (Thermoset) & reinforcing fiber)

- US Technology “Magic II” media
- CTIO Approval Letter
- Will be included in next spec revision

Specification Revision

- Lock down tests
  - (Statistical (±) limits)
  - Updated methods/procedures
- Format Changes to Specification
- Update Specification References
- Draft Specification to ASC/ENOI (Specs & Standards Group)
- Tri-service coordination

  (60 days plus time to resolve any issues)
- Public comments
- Revised Specification must be ready by 2007

Chemical Remover Chronology

- **Methylene chloride**
- **Environmental concerns/NESHAPS**
- **Environmentally "*friendly*" chemical paint removers**
- **OC-ALC chemical paint remover purchase description**
- **WR-ALC chemical paint remover purchase description**
- **Peroxide-based dual & single component removers**
- **CTIO effort to reconcile purchase descriptions (Jan 04)**

Plastic Media Types
(MIL-P-85891A)

- Type I - Polyester (Thermoset)
  - ***Type II - Urea Formaldehyde*** (Thermoset)
  - ***Type III - Melamine formaldehyde*** (Thermoset)
- Type IV - Phenol formaldehyde (Thermoset)
  - ***Type V - Acrylic*** (Thermoplastic)
- Type VI - Poly (allyl diglycol carbonate) (Thermoset)
  - ***Type VII - Starch-g-acrylic***
  - ***Type VIII – Nanostructured composite (amino resins (Thermoset) and reinforcing fiber)***
    - ***(Approved per Technical Order 1-1-8)***

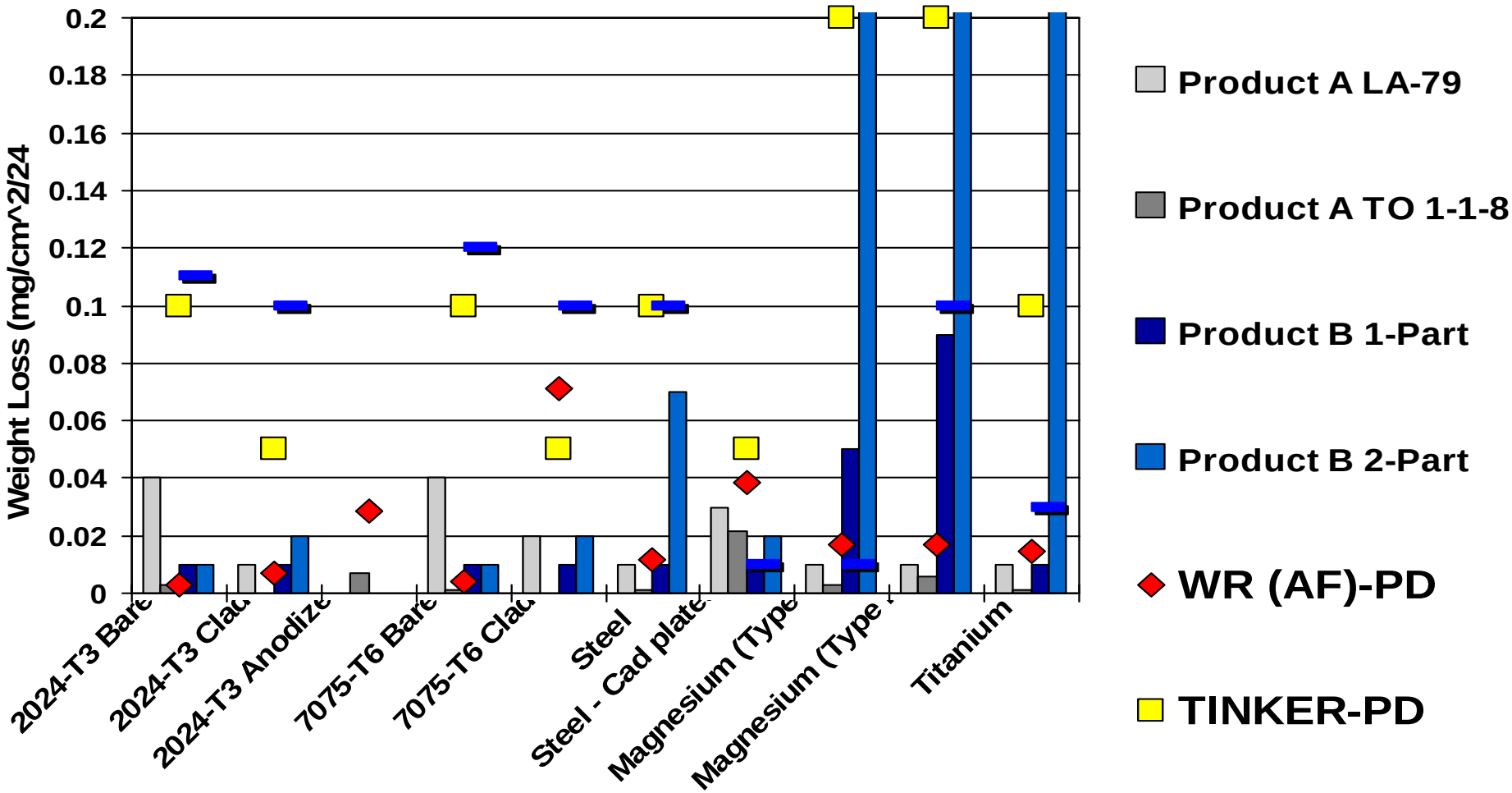
Chemical Remover Tests

- Toxicity
- Consistency:
  - Flow
  - Viscosity
- Volatility
- Flammability
- Effects on metals
  - Corrosion
- Accelerated storage stability
- pH
- H_2 embrittlement
- Paint stripping efficiency
- Rinsability
- Refinishing properties of stripped surfaces
- Storage stability
- Service tests

AF Chemical Remover Team Recommendations

- Environmentally acceptable chemical paint remover military specification preferred
  - SAE G-8 approached
- Combined draft from Tinker & Robins purchase descriptions/specification written
  - 2 Types
    - Single & dual component
  - Classes
    - Based on coatings to be removed
  - Reconciling immersion corrosion requirements

Immersion Corrosion Requirements
(courtesy of Louise Nguyen, OC-ALC)



Chem Stripper PD/Spec

- **AFCPCO to set Immersion Corrosion weight loss limits**
  - **0.04 mg/cm^2/168 hrs for Al, Ti, & Stainless Steel**
  - **.2 mg/cm^2/168 hrs for Steel & Mg**
- **Draft coating systems for remover evaluation sent to AFCPCO & ALC's for comments**
  - **MIL-PRF-85285, MIL-PRF-23377, MIL-PRF-85582, TT-P-2760, Polysulfide, APC (?)**

Erosion Resistant Specifications

- **AMS-C-83231**

  “Coatings, Polyurethane, Rain Erosion Resistant For Exterior Aircraft And Missile Plastic Parts”

- **AMS-C-83445**

  “Coating System, Polyurethane, Nonyellowing White, Rain Erosion Resistant, Thermally Reflective”.

- **No products currently on the QPLs for these specifications**

Erosion Resistant Specifications

Erosion Resistant Coating Petition sent out by Performance Review Institute (PRI) end of Feb 06 for coating systems to be qualified to AMS-C-83231 and AMS-C-83445

- **Sent to 19 companies, including SAE Committee G-8 coating manufacturers**
- **Letters of intent due 15 March 2006**
  - **POCs: Debbie Adrian, PRI**

    Jerry Brown, Chair, SAE Committee G-8
- **Qualification testing to be performed by University of Dayton Research Institute (UDRI)**
  - **POC: Dave Barrington, UDRI**

Fuel Tank Coating Specification

- Need for DIEGME Resistance
- Add to SAE-AMS-C-27725 as Type III
  - DIEGME Resistant
    - Parameters of the test?
  - No Chemistry Formulation Requirement
    - Current Spec only allows Epoxy formulations
- Coating manufacturer identified with promise

MIL-C-87177
CPC Specification

- Specification originally owned by Hill AFB
- Under revision by AFCPCO
- ASC/ENOI to assume administrative responsibilities
- CTIO/AFCPCO working out who assumes technical responsibilities
- Qualification upon adoption of the revised specification

Questions?

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