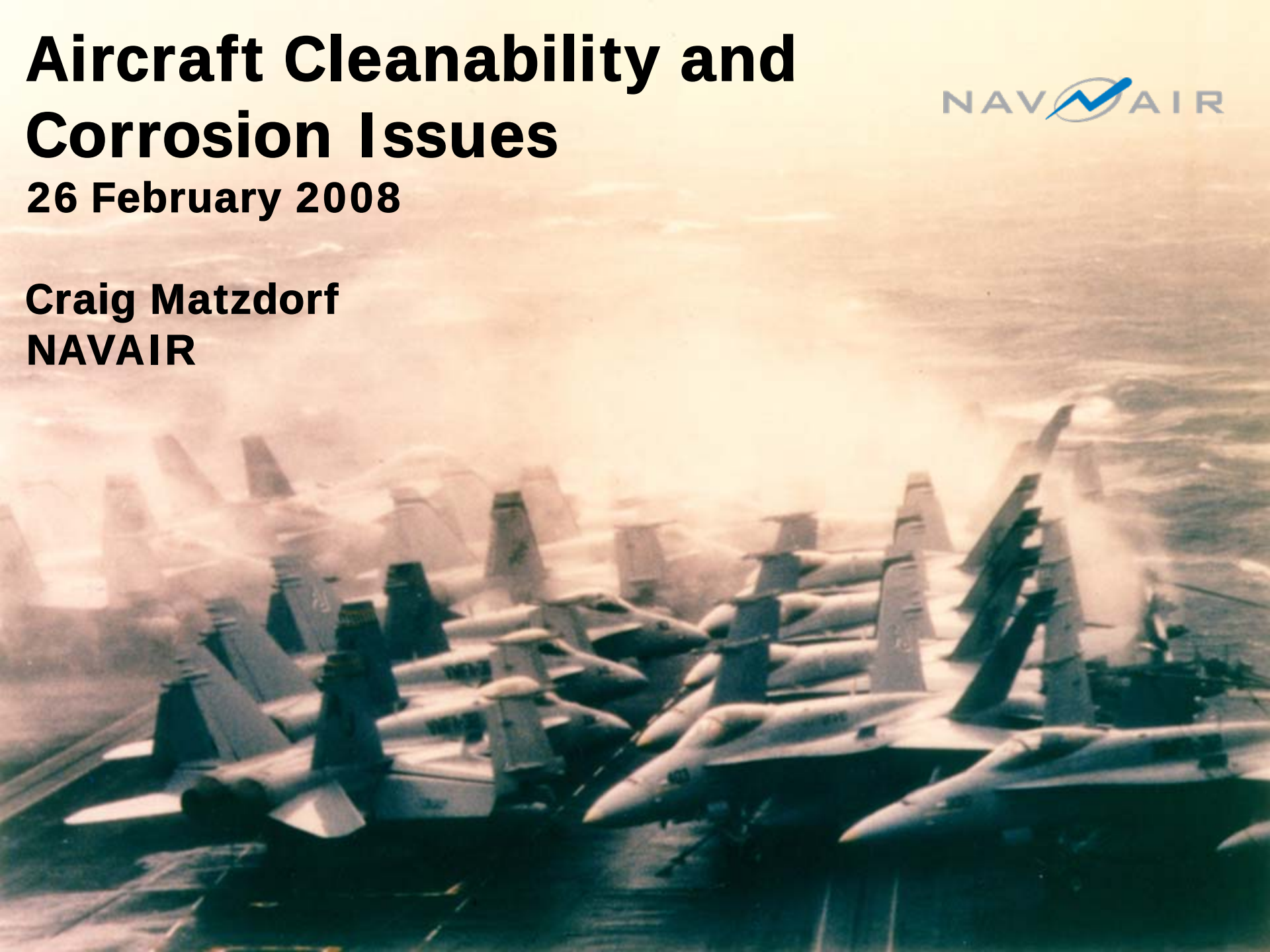


Aircraft Cleanability and Corrosion Issues

26 February 2008

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NAVAIR



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Outline

- **Overview of M&P Linked to “Cleanability”**
- **Overview of M&P Linked to Corrosion Issues**
- **Efforts Underway**
- **M&P Technology Gaps for Sustaining Aircraft**

- **Cleanability drives:**
 - Cosmetic painting and weight gain
 - Additional corrosion maintenance, reduced lifetime
- **Materials & Processes**
 - Topcoats: weathering, gloss & gloss retention, cleanability- as painted and after weathering or corrosion exposure
 - Semi-aqueous cleaners- AF and NAVAIR spec products
 - Cleanability Test- Used in topcoat and cleaner specs
 - Wash Pads
 - Wash and Rinse Intervals
 - Basing: geographic location, sheltering

M&P Needs Linked to Corrosion

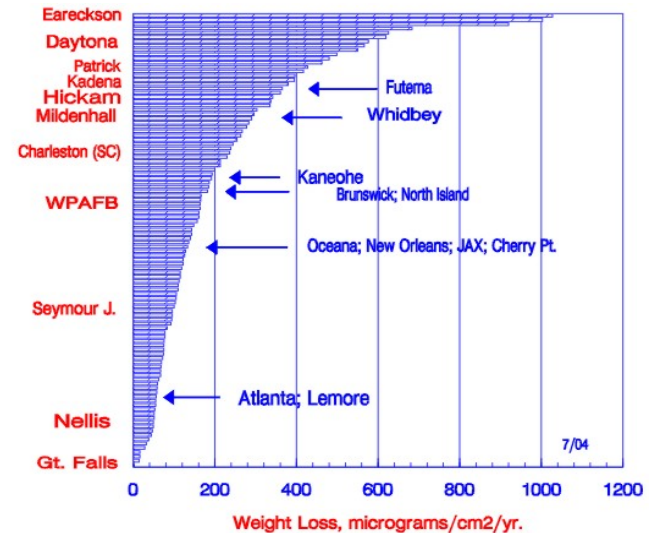
- **Mildew removal**
- **Chemical paint remover, field use**
- **Paints**
 - Self-Priming Topcoat
 - Unauthorized aerosol paints
 - Primers & Topcoats
- **Improved Corrosion Preventive Compounds**
 - Navguard
 - MIL-L-87177
 - Fluid Film CID
- **Pre-coated Fasteners- Fred Lancaster brief tomorrow**
- **Boot and Tape removal**
- **Conversion Coating Touch Up Pens**
- **Improved -85570 Type II Cleaners**
- **Repair of new coatings**



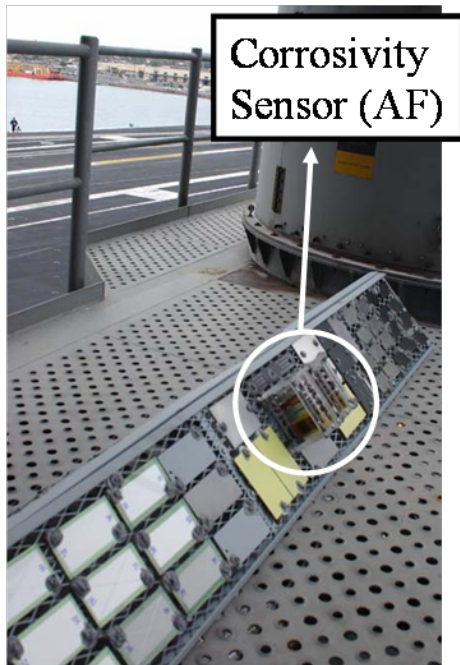
Geographic Assessment



Comparison of Corrosion Rate Data for Navy Sites to Worldwide Distribution: 1-Year Cumulative Corrosion of 6061-T6 Aluminum

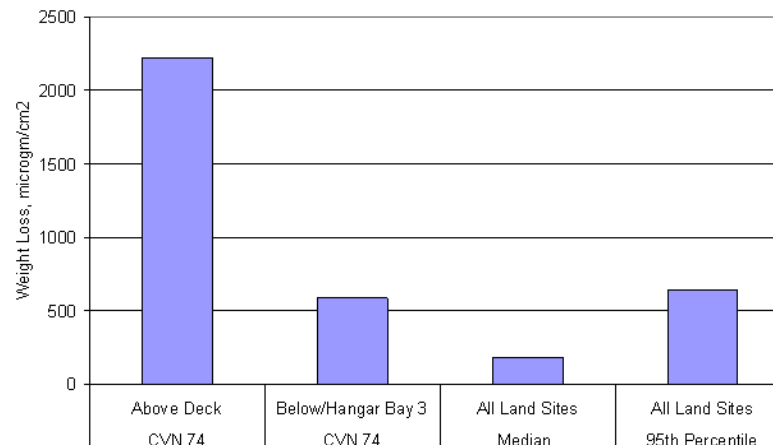


Navy/Marine Aviation and Air Force Land Sites



Carrier Exposure Rack on CVN 74

Corrosion Of 6061 Al; Comparisons Of Land vs. Carrier Data; Projected 1 Year Values



(Abbott and Kinzie, 2004)

Naval Aviation Sheltering

EA-6B shelters at Whidbey Island, WA



Funding: OSD Corrosion IPT and DLA Reliability Program

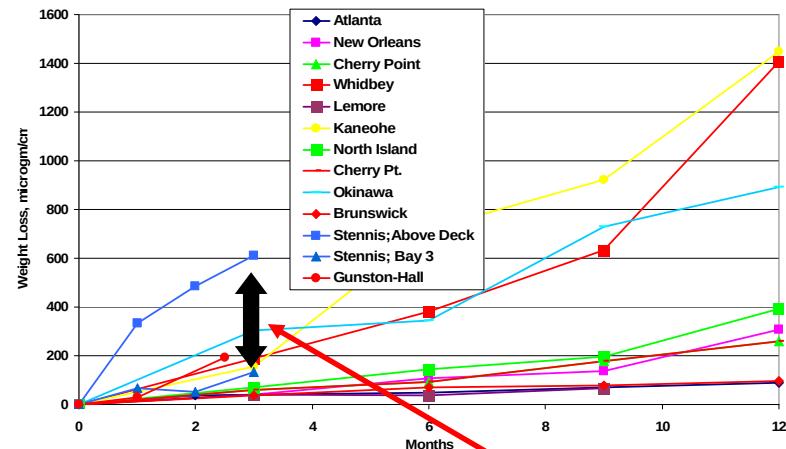
- Purchase and install shelters at Whidbey Island and Oceana (EOY 2006)
- Monitor performance of aircraft under shelters compared to control aircraft
- Install corrosivity sensors under shelter and next to shelter, collect data and compare results to aircraft



T-45 shelters
at NAS
Meridian

- **Evaluation of impact on aircraft corrosion (and other maintenance) planned for 2006-2008:**
 - EA-6B at NAS Whidbey, WA
 - T-45 at NAS Kingsville & NAS Meridian
 - F/A-18 at NAS Oceana, VA
- **Assess aircraft performance compared to sensor data**
- **EA-18G at Whidbey NAS- potential implementation during airfield upgrade**

Corrosion Kinetics of 2024 T3 Aluminum At Navy Sites



Sheltering showing up to 5-fold reduction in corrosivity in carrier environment and similar attenuation at Tyndall AFB, FL

Corrosion-Inhibited Mildew Remover



- **Joint NAVAIR & AMCOM assessment of reformulated Mildew Remover**
 - Meets critical characteristics specified in MIL-PRF-85570 and ADS-61A-PRF cleaning specs
 - Effectively removes mildew without corrosion risk of bleach
- **U.S. Patent applications filed for compositions & kit**
- **Composition and kit licensed to commercial supplier**
- **NAVAIR & AMCOM authorized in 2005**
- **Implementation pending FIFRA registration and NSN assignment**

Mildew Growth Inside T-39 Aircraft Before Cleaning



Cleaning Mildew Growth by Spraying Mildew Remover



Paints

- Topcoats (MIL-PRF-85285)
 - CSG assessing properties of current topcoats with intent to upgrade overall topcoat requirement in spec or create new type for “APC” or “ELT” products with clearly defined performance requirements
- Primers
 - Current non-chromate products being field tested
 - Details in my talk tomorrow
- Unauthorized Aerosol paints: 2-prong attack to eliminate use
 - 2K products now authorized and being used (MIL-PRF-85285 and MIL-PRF-23377 products)
 - 1K products being assessed (MIL-PRF-81352)
 - Type I and Type III

Improved CPCs

- MIL-PRF-81309
 - Long-lived Internally-Applied Corrosion Preventive Compound (“Navguard”)
 - Multi-year F/A-18 Field Test underway
 - Product Licensed to Industry
 - **Commercial products being tested against requirements to MIL-PRF-81309 (Armick & Corrosion Technologies)**
- MIL-L-87177
 - Raytheon test report delivered to NAVAIR
 - Decision on implementation pending
- Fluid Film
 - Commercial Item Description being developed by NAVAIR



Tape and Adhesive Remover

- Objective- Demonstrate & validate 3M TAR (Tape and Adhesive) Remover
- Problem- Mechanical removal of radome neoprene boots, polyurethane belly and leading edge tapes causes significant substrate damage – often these protective materials are not re-applied as a result
- 2008 Plans- Dem/val of TAR product in field for squadron use, finalize testing and authorization

Type II Touch Up Pen

- Objective- Field test new MIL-PRF-81706 Type II products in applicator pen format
- Problem- NAVAIR has implemented Type II, non-chromate surface preparation for use under chromated primers. Two Type II touch up pen products are commercially available but have not been assessed
- 2008 Plans- Dem/val, qualify and implement (if successful) the Type II pens for “lead the fleet” use at FRC Cherry Point

RTU MIL-PRF-85570 Cleaner

- Objective- Assess and Implement Improved “RTU” or aerosol cleaners
- Problem- Current MIL-PRF-85570 Type I or II – Low cleaning efficiency – often high-pH deck cleaners used on A/C as well (shipboard)
- 2008 Plans- Review current “Sudsie Bubbles” use shipboard on A/C - 85570 Type I aerosol - Investigate OTS products to test against existing FRC cleaners/solvents

- **Chemical Paint Stripper- peroxide activated products not good enough**
 - Need: Product that removes qualified primers and topcoats in field, at low temperatures, ~40 F, similar strip rates to methylene chloride
- **Semi-Aqueous Aircraft Cleaners- not very good at cleaning aircraft soils, shelf-life stability issues**
 - Need: More effective Type II (NAVAIR) and Type IV (AF) cleaners with improved shelf-life stability
- **Primers**
 - Need: Non-chromate primers with equivalent performance to chromated primers
 - Need: Water-reducible primers with similar barrier properties to solvent-borne primers
- **Topcoats**
 - Need: products with improved weathering, gloss retention, and corrosion performance with qualified primers (C and NC, solvent and water)