Corrosion Prevention & Control (CPC) Standards for DoD Weapon Systems & Facilities
Standards Topics to be Addressed

- Joint Industry CPC Planning Standard
  - SSPC CPC-1
  - NACE SP21412-2016
- DoD Aerospace Standards Example
- How Does DoD Use These Standards
- Summary Thoughts
- Questions?
The Department of Defense (DoD) recognizes that Corrosion Prevention and Control (CPC) planning is critical to acquisition program success. The need for CPC planning is paramount:

- **It Is In Law**—CPC planning is mandated in 10 U.S.C. 2228 and must be part of the 10 U.S.C. 2366(b) certification;

- **It Is In Policy**—CPC planning is required in DoD Directive (DODD) 5000.01, DoD Instruction (DODI) 5000.02, DODI 5000.67, and other policy; and

- **It Is Costly Not To**—Approximately $20 billion annually goes into maintenance due to corrosion, which is almost 20% of every maintenance dollar. Availability and safety of systems/equipment is also impacted significantly by corrosion.

So what is CPC Planning?

- There was no single consolidated source that described what the key elements of CPC planning are nor how to go about doing CPC Planning!
FY15: NACE & SSPC established the joint task group (JTG-527) consisting of both DoD and Industry Corrosion SMEs.

FY15/FY16: A draft **CPC Planning Standard** was developed covering both products & facilities.

FY16: The **CPC Planning Standard** was balloted and approved by members of both NACE & SSPC.

Nov 2016: Both NACE & SSPC ratified the **CPC Planning Standard**. (1 Dec 2016 Official Approval Date).

Standard has Two ID’s: SSPC CPC-1 & NACE SP21412-2016

FY17 DoD Adoption being pursued with NAVAIR as Adopting Activity
SCOPE and Coverage of CPC Planning Standard

1.2 Scope and Limitations

This standard defines the key elements/composition of what corrosion prevention and control planning encompasses for design, manufacturing, construction, operation and sustainability of products and facilities. It is designed for use by U.S. federal agencies, but may also be used by other governmental bodies and other industries where appropriate. Failure to produce a joint standard limits the ability to influence change in the prevention and mitigation of corrosion in procurement/contracting and sustainability projects where investment in proper corrosion prevention and control planning is beneficial. While products and facilities follow different processes and requirements, this standard attempts to provide both areas with assistance in determining the best approach for CPC Planning with the desired outcome of realizing the useable service life consistent with the investment and expectations.

1.3 Overview of Topics Covered by this Standard

- Generic CPC Planning Matrices/Checklists
- Elements of CPC Planning
- Attributes that contribute to or affect CPC Planning considerations for material selection & design
- Miscellaneous issues that affect CPC in the design, fabrication and construction, operation and use, and maintenance and sustainability
- Definitions relevant to this standard
Usage of CPC Planning Standard

2.0 Checklists for Products and Facilities
There are two checklists contained in this standard
▪ Table 1 for Products
▪ Table 2 for Facilities

These checklists are hot-linked to the specific topic requirement (Body of the standard) which are hot linked to Guidance and detail information (Appendix of the Standard).

❖ CPC Planning Standard DEMO:

The Standard provides a common Baseline for CPC Planning.

All requirements are tailorable, as needed, to any Program.

The Standard also includes definitions and key references.

Adoption IAW DoD Manual 4120.24M Defense Standardization Program (DoD Adopting Activity: NAVAIRSYSCOM)

Standard Communication Plan being Executed (MP Article Mar 2017; SSPC News Release Winter 2017; Paper at DoD ANTCC 2017, etc...)
Aerospace CPC and M&P Standards Efforts

- **MIL-STD-1568D: Aviation Corrosion Prevention and Control:**
  - *Standard and Associated Data Item Descriptions Issued 22 Aug 2015 and is being cited in new DoD ACQ programs.*

- **MIL-STD-1530D: Aircraft Structural Integrity Program:**

  - Following formal coordination with the Services, a *modernized version of MIL-STD-1587 is targeted for release/re-instated in June 2017.* Following the release of the “D” version, a *complete technical update of this standard will be executed with formal release targeted for early 2019 time frame.*

- **MIL-STD-889: Dissimilar Metals**
  - A modernized version of this standard (*MIL-STD-889C*) *was released on 22 Aug 2016.* A technical revision effort (including a new approach and additional materials by area) began in FY17 with a target completion date in 2019 with the release of MIL-STD-889D.
Aerospace CPC and M&P Standards Efforts

- **MIL-HDBK-1250: Avionics Corrosion Prevention & Control (SAE-AS-12500)**
  - DSC selected SAE Int’l for re-instating this standard. The SAE G-25 Committee (DoD & Industry Electronics, Avionics & Corrosion SMEs) developed the draft *SAE-AS-12500*. Comment adjudication from the Jan 2017 successful Ballot is in progress. *Publication is targeted for late FY17*, with DoD Adoption targeted for late 2017 (Adopting Agency TBD).

- **MIL-STD-7179: Aerospace Finish Systems**
  - *An effort to update MIL-STD-7179 is planned to begin in FY17 in conjunction with the 1587 effort. A technical update revision is planned for completion and release in 2018.*

- **MIL-HDBK-808: Finish Systems for Support Equipment**
  - *L-HDBK-808 has been assessed and the support equipment requirements could be incorporated into 1587 and 7179. Pursuing concurrence from Service Reps on the path forward: 1) Incorporation during the 1587/7179 technical revision processes for these standards or 2) Reinstatement and technical revision path.*

- **MIL-STD-810: Testing**
  - *MIL-STD-810 (Army Lead) is in the technical revision process*. Once completed, formal Service coordination followed by comment adjudication & released (*Target date: TBD*).
Aerospace CPC and M&P Standards

**Key Elements of CPC Planning**

- **MIL-STD-1568D**
  - (Material and Processes for CPC in Aerospace Weapon Systems)
- **EC-434-000-003**
  - (Prohibited/Restricted Materials)
- **MIL-STD-1530**
  - (AF ASIP STD)
- **MIL-STD-889C**
  - (Dissimilar Metals)
- **MIL-STD-810**
  - (Testing)
- **SAE-AS-12500**
  - (CPC for Electronic Components & Assemblies (MIL_HDBK-1250))
- **MIL-STD-1587D**
  - (M&P Requirements for Air Force Weapon Systems)
- **M&P DID**
  - EC-434-000-005
  - (CPC Navy/Marine Corps Aviation Systems: Vol 1- Acquisition)
- **DIDs for CPC Plan and Finish Spec**

**Overarching A/C Design Requirements**

**Operations & Sustainment**

- **NAVAIR-01-1A-509 (Vol 1-4)**
  - (Joint Service CPC Maintenance Manual)
- **AF T.O. 1-1-691 (Vol 1,3,5)**
  - (CPC Maintenance Manual)
- **EC-434-DFT-006**
  - (CPC for Navy & Marine Corps Aviation Systems: Vol 2- Sustainment)
- **MIL-HDBK-6870A**
  - (NDI Program Requirements: NDI for Aircraft and Missile Materials and Parts)

**Coating/Finishing Systems**

- **MIL-DTL-5002E**
  - (Surface Treatments and Inorganic Coatings for Metal Surfaces of Weapon Systems)
- **EC-434-000-004**
  - (Risk Mitigation for Non-Chromate Coating Systems)
- **MIL-HDBK-808**
  - (Finish, Protective & Codes for Finishing Schemes for Ground Support Equipment)
- **MIL-DTL-18264E**
  - (Application and Control of Organic Finishes for Weapon Systems)
- **MIL-STD-7179A**
  - (Finishes, Coatings & Sealants for Protection of Aerospace Weapon Systems)
CPC performance has notoriously been traded for cost, schedule & performance reasons during acquisition

- Lack of awareness/focus on long-term impact (Next Guys Problem)
- Difficult to specify corrosion requirements (What’s Needed & Why)
- Each requirement negotiated individually (Lack of Standard Approach)
- Difficult to quantitatively measure long term corrosion performance with short term tests (Corrosion, OK When and How Severe?)
- Increased corrosion performance often requires an investment (e.g. Increased Cost, Weight, Schedule Slip, Signature Impact, etc.)

Other Factors Affecting CPC Incorporation in Programs

- Acquisition $ (My money) versus Operations/Support $’s (OPM)
- Belief that lessons learned aren’t applicable to this “new” system…
- Focus on “Out of Box” performance and Manufacturing Costs
- Cost, Schedule and Performance Pressure (in that order!).
Many corrosion-related specs and standards were eliminated during acquisition reform in the 1990’s

- Causes corrosion requirements to be negotiated individually during acquisition

**OSD CPO Worked with MilDeps to reestablish some needed Specs/Stdns**

  - Supported by DI-MFFP-82119 “Program Unique Materials & Process Specifications”

**Migrating some requirements to commercial standards**

- Developing new standards with non-governmental standards bodies (e.g. SAE-AS-12500 *Corrosion Prevention and Deterioration Control in Electronic Components and Assemblies*)
- Joint Standard for CPC Planning (NACE SP21412-2016 & SSPC CPC-1)
CPC Planning During System Acquisition

How to Include CPC Requirements in System Acquisition

(Aerospace System example)

Negotiate Hundreds of Individual Requirements

- System Finish Specification
- Environmental Testing
- Material & Process Selection Criteria
- Corrosion Team

Hundreds of Individual M&P Specs for Primers/Coatings, Surface Treatments/Prep, Metals, Composites, Sealants, Dissimilar Couples, Adhesive Bonding, etc...

Negotiate Several Consolidated Requirements

- Legacy Lessons Learned
- CPC Risk Management
- Aircraft Structural Integrity
- CPC Verification / Validation Criteria
- Prohibited Materials
- NDI

Negotiate Hundreds of Individual Requirements

- NACE/SSPC CPC Planning
- 1568 CPC for A/C Design
- 1530 Structural Integrity
- 7179 A/C Finishing Systems
- 1587 M&P for A/C Design
Corrosion is rarely only just a technical problem

- Design, Technology, Environment, Materials, Processes, Training, Policy, Funding, Schedule, Availability, Usage, Inspection, Storage, etc…
- Prevent; Detect; Mitigate & Manage

Corrosion may not hurt today, but it hurts tomorrow

- Pushing the problem/issues down the line for someone else…
- Easier to invest in corrective (is) than preventive maintenance (might be).
- Difficulty in quantifying the problem until after it happens.

Corrosion is often a “people” problem

- Hard to maintain leadership focus (Swamp full of Alligators…)

Successful corrosion control requires:

- Awareness and buy-in from leadership
- Teamwork between subject matter experts, designers, and maintainers – “Corrosion prevention and control is not the most important thing we do, but it is important for us to do it…”
- Tools, training, and time for the personnel implementing the processes
QUESTIONS???