

Aeronautical Systems Center

Dominant Air Power: Design For Tomorrow...Deliver Today



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Hexavalent Chromium Substitution Projects

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Dr. Peter Lurker, PE, CIH
77 AESW/EEV
(937) 255-3567
Peter.Lurker@wpafb.af.mil

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Overview of Presentation

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- **Background**
- **Scope of EEV Efforts**
- **Current and Past Projects**
- **Pending Projects**
- **Lessons Learned**
- **Recommendations/Conclusions**



Background



- **RoHS – EU regulations on electronics products**
- **REACH – EU legislation is imposing restrictions on Cr⁶⁺ use**
- **OSHA PEL reduction to 5 µg/m³ (Feb 2006)**
- **Aerospace Industry Exemption to 25 µg/m³**



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USD(ATL) Memorandum

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- **Cr⁶⁺ has international restrictions, which will increase LCC & decrease Cr⁶⁺ availability**
- **Approve the use of alternatives when they perform adequately**
- **Document Cr⁶⁺ risks & alternative efforts in PESHE**
- **PEO will certify Cr⁶⁺ on new systems & legacy system modifications/updated maintenance procedures if no alt. exists**



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PEO Certification Details



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- **Cost effectiveness of alternatives vs. Cr⁶⁺**
- **Technical feasibility of alternatives**
- **ESOH Risk of alternatives vs. Cr⁶⁺**
- **MRL of at least 8 for alternatives**
- **Materiel availability of alternatives vs. Cr⁶⁺**
- **Corrosion performance differences as defined by service SMEs (AFCPCO & CTIO)**



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Scope of EEV Cr⁶⁺ Efforts



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- **3010/3020 Funding – directly support the production of aircraft and missiles**
- **Our Cr⁶⁺ efforts are on:**
 - **Corrosion Control of aircraft surfaces (Pretreatments, Primers and Coatings)**
 - **Corrosion Control of fasteners**
 - **Fuel tanks**
 - **Sealants**



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Other Cr⁶⁺ Alternatives Efforts



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- **AFRL/RXSSO (Coating Technology Integrated Office)**
- **Depots and AF Corrosion Prevention and Control Office, Robins AFB**
- **PEWG, Tinker AFB**
- **Other services such as NAVAIR, Army Aviation and Coast Guard**
- **Academia**
- **Commercial**



Status of Cr⁶⁺ on Some of the USAF Legacy Systems



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- **Non-Cr Primer and Non-Cr Surface Treatments:**
 - AETC (T-38) Non Cr Primer & Non Cr Surface Treatment
 - WR-ALC (F-15)
 - ACC (F-16) Planned Mg Rich Primer & Non Cr Surface Treatment
 - F-35
- **Non-Cr Surface Treatment (Prekote) and Cr Primer**
 - OO-ALC (C-130, F-16, A-10)
 - AETC (T-6, T-38 and T1A)
- **Both Cr Primers & Non-Cr primers as well as Cr Surface Treatment**
 - F-22



Current and Past EEV Cr⁶⁺ Efforts



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- **Low-Chrome Conversion Coating and NC Primer for C-130J OML**
- **Non-chrome primer – C130J Inner Mold**
- **Barrier coat for F-16**
- **Non-chromated, Low VOC Qualification of Fuel Tank Coating per Mil Spec AMS-C-27725**
- **Mg Rich Treatment**



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Future EEV Cr⁶⁺ Projects



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- **Evaluate and Validate Non-chrome conversion coating for Aircraft Touch-up applications**
- **Evaluate and Validate Non-chrome conversion coating for Immersion applications**
- **Next Generation Mg Rich Treatment**
- **Evaluate and Validate Non-Threaded Fastener for wet sealant Corrosion Protection**



Lessons Learned



- **Our projects are based on data calls to GOCO facilities & ASC Program Offices**
- **Our Projects benefit is on production with ancillary impacts at the Depots**
- **Our projects' emphasis is environmental compliance**
- **Each weapon system requires Qual & Testing of the alternative on their system**
- **OEM “process” change – requires Qual Testing & OEM Spec changes**



Lessons Learned Cont'd



- **Need to insert all Cr⁶⁺ related projects into DoD ASETSdefense database**
 - Our plan is to provide summary of each of our Cr⁶⁺ projects
- **Depend on AFRL, Academia & Commercial entities to mature technologies**
 - Use ASETSdefense for DoD and Commercial applications
 - DTIC for DoD-related efforts



Recommendations/Conclusions



- **Need to collaborate with others (e.g., AFRL, OEMs and depots) for future projects to avoid duplication of effort**
- **Some Cr⁶⁺ will be continued to be used:**
 - **Unless the alternatives are equal in corrosion control, have less LCC, are available and have less ESOH risk (as defined by MIL STD 882D)**
 - **Unless Cr⁶⁺ becomes no longer available due to increasing international & US regulations**