



PROJECT ID:
600

Advanced Anodize Repair



This NESDI project seeks to find suitable replacements for hexavalent chromium-based formulas for the repair of anodized aluminum coatings on the F/A-18 Hornet and other U.S. Navy aircraft.

(Photo Credit: Sgt. Booker T. Thomas III)

OBJECTIVE

This project seeks to promote and demonstrate two technologies as suitable replacements for hexavalent chromium-based formulas for the repair of anodized aluminum coatings.

PROBLEM STATEMENT

Conflicting directives to minimize the use of hexavalent chromium while reducing the number of manhours spent on maintenance and increasing readiness, have created the need at Naval Air Systems Command (NAVAIR) Fleet Readiness Centers (FRC) to pursue new repair technologies on anodized surfaces.

DESCRIPTION

Trivalent chromium touch-up applicators have been on the approved products list for over 10 years.

However, transitioning to these applicators has largely been avoided due to the difficulty of visually inspecting the applied coating, as it is colorless. A recent NESDI project (project no. 514: Enhanced Trivalent Chromium Pretreatment (eTCP) for Improved Coloration and Corrosion Performance of Aluminum Substrates) has shown the efficacy of a trivalent chromium coating system that incorporates a dye into the coating, producing an easily visually identified conversion coating.

The leading hexavalent chromium-free touch-up applicators will be tested for five qualities, time until failure in an accelerated salt fog environment (American Society for Testing and Materials B117 Neutral Salt Fog), paint adhesion, conductivity, coating



weight and the ease of use.

The applicators will be tested and compared to hexavalent chromium-based applicators, and the best performing applicator will be tested and demonstrated at an FRC.

The second repair method that will be advanced is brush aluminum anodizing. Anodizing is an electrochemical oxidation treatment commonly formed on the surface of aluminum for providing wear and/or corrosion resistance. It is a mature technology that's been around for decades. This project will verify its effectiveness and will test for the optimum sealer.

Providing that both technologies perform equal to or better than hexavalent chromium, a decision tree will be created to help FRC personnel choose the best process for their needs.

RETURN ON INVESTMENT

The cost of a typical hexavalent chromium touch-up applicators is approximately \$8 per square foot (sq. ft.) treated with hexavalent chromium applicators, and approximately \$4 per sq. ft. when

treated with fluorozirconate-trivalent chromium applicators. This is a 50 percent reduction in purchasing costs, not even accounting for the increased disposal costs associated with hexavalent chromium.

The costs associated with brush anodizing are minimal after the initial equipment purchase, with the chemicals costing approximately \$5 per sq. ft. The associated disposal savings would be similar.

NAVY BENEFITS

It is extremely difficult to remove hexavalent chromium from the waste stream as it must be either incinerated or placed in a landfill. If successful, this project will remove 12.7 gallons of hexavalent chromium annually from the waste stream at FRC Southwest alone, with more anticipated from FRC Southeast. It will also eliminate thousands of associated contaminated plastic applicators. Just as important, the hazardous waste generated during the application is not carcinogenic or mutagenic, reducing the risk of serious health issues for service members. Lastly, readiness will be positively affected, as military equipment may be properly repaired overseas in countries with more severe restrictions on the use of hexavalent chromium.

TRANSITION DESCRIPTION

This project team will take commercial off-the-shelf technology and transition it to two NAVAIR FRCs. These technologies have already been approved by the appropriate regulators, so the only transition necessary is to the operational environment. The transition will include a certification event for the various FRC engineering personnel, who will subsequently set up the local training program to fit their own needs without any disruption to the production environment.

Once the products have been successfully demonstrated in the operational environment, a Local Process Specifications will be generated and distributed, ensuring that future users have a clear understanding of how to use these products and processes.

CONTACT

For more specific information about this project, contact the Principal Investigator at 301-342-7004.



ABOUT THE NESDI PROGRAM

The Navy Environmental Sustainability Development to Integration (NESDI) program is the Navy's environmental research and development, demonstration and validation (6.4) program, sponsored by the Chief of Naval Operations, Energy and Environmental Readiness Division (OPNAV N45) and managed by the Naval Facilities Engineering Systems Command (NAVFAC) out of the Engineering and Expeditionary Warfare Center (EXWC) in Port Hueneme, CA.

The mission of the program is to provide solutions by demonstrating, validating and integrating innovative technologies, processes, materials, and filling knowledge gaps to minimize operational environmental risks, constraints and costs while ensuring Fleet readiness and lethality. The program accomplishes this mission through the evaluation of cost-effective technologies, processes, materials and knowledge that enhance environmental readiness of naval shore activities and ensure they can be integrated into weapons system acquisition programs.

The program is the Navy's complement to the Department of Defense's Environmental Security Technology Certification Program which conducts demonstration and validation of technologies important to the tri-Services, U.S. Environmental Protection Agency and Department of Energy.

For more information, visit the NESDI program web site at www.navfac.navy.mil/nesdi or contact Ken Kaempffe, the NESDI Program Manager at 805-982-4893, DSN: 551-4893 or kenneth.c.kaempffe.civ@us.navy.mil.

Distribution Statement A: Approved for public release; distribution is unlimited. Mention of any product or service does not constitute an endorsement by the U.S. Navy.