PROJECT ID:
580

Development and Implementation of Methods to Reduce Sealant Waste in Fleet/Depot Level Operations

This NESDI project seeks to develop a simple test protocol for assessing sealant usability of various aircraft programs (including the F/A-18F Super Hornet).

(Photo Credit: Mass Communication Specialist Seaman Apprentice Conner Foy)

OBJECTIVE:

The primary aim of this project is to develop a simple test protocol for assessing aircraft sealant usability and demonstrate its effectiveness with the intent of reducing hazardous waste and improving Fleet readiness.

PROBLEM STATEMENT:

Sealants containing polysulfide and polythioether play significant roles in naval aviation. These products have short shelf lives, which often means that materials are already near their expiration date by the time they reach the end of the logistical supply chain. This problem is compounded by the fact that as hazardous materials (HAZMAT), the usage and disposal of these products represents a significant cost to the programs using them.

Current requalification protocols for expired materials require laboratory environments and are impractical in the field which means that a large volume of expired material goes untested and is often scrapped, unnecessarily. At the same time, this results in a shortage of material for maintenance at the Fleet level. This, of course, also affects Navy readiness and lethality.

Manufacturer shelf life is not necessarily an accurate measure of the condition of the material.

It is estimated that 20-25 percent of sealant materials purchased by the Navy are expired prior to use, and much of this is disposed of as hazardous waste. This represents an estimated material

This NESDI project will demonstrate the effectiveness of a test protocol in reducing sealant waste generated by various aircraft programs including the MH-60S Sea Hawk helicopter. (Photo Credit: Mass Communication Specialist Seaman Apprentice Darren Newell)

cost of $500,000—calculated before additional significant HAZMAT disposal costs are factored in. Aircraft sealant materials, properly stored, can often last well beyond their shelf life. There is an immediate need for new methods/concepts for dealing with shelf life issues.

DESCRIPTION:

A recent report from the Navy's Corrosion Action Team (CAT) stated that "Unexpired, in-stock HAZMAT is still significantly lacking while on deployment." Another issue reported by the CAT was that of arbitrary HAZMAT shelf life extensions. These extensions are often granted without any additional testing or assessment of the material. This is a practice that further complicates the issue and may lead to decreased maintenance intervals. A simpler, field-based method for which expired materials can be recertified is the goal of this project.

The ability of sealant materials to last beyond their stated shelf life is strongly dependent on several factors. Of these factors, temperature is, by far, the most important. This project is leveraging data being collected by the corrosion prevention team at Naval Air Station Patuxent River (PAX). This program is embedding temperature sensors in sealants as they travel through the supply chain. Temperature data will be collected through the products' shelf life and beyond with the goal of understanding the conditions faced by materials in different locations, and generating data that can be used to develop more realistic temperature profiles.

This team will use the data provided by PAX personnel to develop test protocols for laboratory-based artificial aging of sealants. Then, time-temperature models will be created to better assess sealant condition. From these models, simple test protocols to assess sealant condition will be developed and validated against current laboratory-based methods.

Select sealants will be chosen based on available shelf life data. An emphasis will be placed on sealants most prone to deterioration, and those used most frequently across platforms. Since the majority of sealant use in the field is in the form of cartridge kits, the protocol will primarily focus on materials available in this form.

Once an appropriate set of tests is defined, an initial testing protocol will be drafted and sent to the Fleet Readiness Centers (FRC) for review. At the same time, the project team will begin to assemble a testing toolkit for field level testing. Once the test protocol is defined and validated in-house, depot/field level demonstration and validation will begin. The FRCs at Jacksonville and North Island currently perform standard requalification testing on expiring sealants, and it is anticipated that the new protocols may be evaluated against the standard tests at these locations to determine the efficacy of the limited test protocol. Feedback from the FRCs will be critical in refining these protocols prior to the final step: field level evaluations.

The site for the field level demonstration has not yet been selected, but if the PAX program to track materials in the supply system continues to thrive, a tie-in for demonstration at a site receiving tracked materials would provide the most useful data set, since the testing could be tied in with analysis of the temperature data. Successful demonstration at the field level is of crucial importance to the adoption of this program.

TRANSITION DESCRIPTION:

Transition to the end user will be achieved through the development of a testing toolkit and detailed guidance documents explaining the rationale for the tests and details on how to perform the tests and interpret results.

By participating in validation of this procedure, the FRCs (likely Jacksonville and North Island) will be familiar with the test protocol by the end of this project, and will be able to immediately put it to use. Assuming a successful transition of the test protocols, a possible future goal (beyond the timeframe of the current program) may be to update recertification requirements in existing specifications.

CONTACT:

For more specific information about this project, contact the Principal Investigator at 301-342-6807. Contact the NESDI Program Manager at 805-982-4893 for more general information about the program.

ABOUT THE NESDI PROGRAM

The Navy Environmental Sustainability Development to Integration (NESDI) program is the Navy's environmental research and development demonstration and validation program, sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division and managed by the Naval Facilities Engineering Systems Command from the Engineering and Expeditionary Warfare Center in Port Hueneme, CA. The mission of the program is to provide solutions by demonstrating, validating and integrating innovative technologies, processes and materials and by filling knowledge gaps to minimize operational environmental risks, constraints and costs while ensuring Navy readiness and lethality.

Visit the program's public website at https://www.navfac.navy.mil/NESDI for more information.