

## **ESTCP PROJECT OF THE YEAR**

### **SCALE-UP OF ENVIRONMENTALLY FRIENDLY NON-DESTRUCTIVE INSPECTION FOR CORROSION THROUGH COATINGS**

MR. JOHN E. BENFER  
Naval Air Systems Command  
Naval Air Station Jacksonville  
Jacksonville, Florida  
(904) 542-4516  
john.benfer@navy.mil

CO-PERFORMERS: Mr. John Weir, Mr. Dennis Leyble, Mr. Nils Fonneland, and Mr. Steven Chu (Northrop-Grumman); Mr. Robert Ryan Westover and Mr. Thomas Cowherd (NAVAIR); Mr. John Speers (Retired, USAF); Mr. Scott McPherson, Mr. Michael Miller, Mr. Matthew Campbell, and Mr. Brian Pollock (Concurrent Technologies Corporation); Mr. Daniel Marlowe (NAVAIR Jacksonville); Mr. David Allen (ASM Management)

Aircraft paints are routinely removed to check for underlying corrosion on the surface of metal structures, and the aircraft is then subsequently repainted. Stripping and repainting operations at military rework facilities result in significant emissions of volatile organic compounds (VOC), organic and inorganic hazardous air pollutants, and hazardous waste.

Building on prior SERDP research, Mr. Jack Benfer and his team have demonstrated the use of non-destructive techniques to inspect aircraft interior and exterior structures through coatings. The technology exploits an optically transparent spectral window in military paint systems within the mid-infrared spectrum and also the difference in infrared reflection properties between corroded and non-corroded metallic surfaces. Demonstrations at NAVAIR Jacksonville and Oklahoma City Air Logistics Center on P-3, B-52 and KC-135 aircraft clearly illustrated that infrared imaging is an improved method of corrosion inspection compared to visual inspection methods (70-80% accuracy vs. 5-25% accuracy). Scan rates of approximately 150 ft<sup>2</sup>/hr were demonstrated.

For a medium-sized aircraft (6,500 ft<sup>2</sup> surface area), potential environmental savings over a 4-year period are 3,000 lbs of VOCs, 25 lbs of chromates, and 11,000 lbs of hazardous materials. Additionally, labor and material savings of \$135,000 per aircraft can be realized. Technology deployment across DoD platforms and weapon systems can result in an estimated 15-year savings of 2 million lbs of VOCs, 7 million lbs of hazardous materials, 20,000 lbs of chromates, and a \$115 million cost avoidance.

Infrared imaging will give engineering and corrosion control personnel the capability to make sound decisions regarding coating removal based on improved detection of corrosion through coatings. Hazardous pollutants will be significantly reduced by eliminating scheduled organic coating removal and moving to a process where infrared inspection results will be used to determine when and if coating removal is required, all while ensuring aircraft integrity and military personnel safety.

*For more specific information about this project, stop by Poster #149.*