

**RESEARCH CATEGORY:** 6.3 Advanced Development

**LEAD AGENCY:** U.S. Navy

**LAB:** Naval Air Warfare Center Aircraft Division - Patuxent River, MD

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## **FY 1997 COMPLETED PROJECT**

**OBJECTIVE:** The objective was to replace hazardous plating processes (chromium, cadmium, cyanide, etc.) currently used on Naval aircraft (A/C) and weapon systems. Chromium and cadmium are heavy metal pollutants and carcinogens. The 1990 Clean Air Act Amendment (CAAA) as well as other Environmental Protection Agency and State Departments of Environmental Resources regulations such as the CAAA Chromium Electroplating National Emission Standard for Hazardous Air Pollutants (NESHAP) restrict the emissions from these processes. In addition, Service directives require significant reductions in these hazardous wastes. Alternative plating processes need to be developed and validated in order to comply with these directives, while maintaining aircraft performance and operational readiness.

**BENEFIT:** The elimination of chromium and cadmium plating significantly reduces the total amount of hazardous materials emitted from Navy overhaul/repair operations. Elimination of chromium plating also eliminates the need for expensive emission control equipment required by CAAA and Air Quality Management Districts legislation (estimated at up to \$1M per Depot facility). Furthermore, these alternatives significantly reduce disposal costs of chromium and cadmium from Navy operations. This effort is in direct support of Navy and Department of Defense (DoD) hazardous waste minimization policies and directives. Without the use of adequate replacements, aircraft operational readiness could be curtailed due to excessive environmental degradation and cost. This is particularly important considering the cost of Navy A/C and weapon systems as well as the severely deleterious environment in which the Navy operates. This technology is being coordinated with commercial airlines, equipment and fastener manufacturers.

**ACCOMPLISHMENTS:** (1) Tin-zinc, zinc-nickel, and the Aluminum-Manganese processes developed as part of this SERDP effort are being presented to the Joint Group for Acquisition Pollution Prevention (JGAPP) - Cadmium alternatives as viable processes for cadmium replacement for most applications. (2) A tin-zinc electroplating bath has been installed at Naval Depot Cherry Point for prototyping purposes. A 100 gallon plating bath has been built for Aluminum-Manganese molten salt plating at Dover Industrial Chrome in Chicago, IL.

**TRANSITION:** The technology is being implemented at various naval aviation depot and also transitioned to other DoD and commercial applications through JGAPP.