

Evaluation of LOS vs NLOS Applications for Alternatives to Hard Chrome and Nickel Plating (Task N.0824)

Statement of Need

The Army currently performs hard chrome plating and nickel plating at depots on components refurbished for Army materiel. These processes, which utilize hazardous materials, particularly hexavalent chromium, pose a risk to personnel and sustainability due to future regulatory pressure. Efforts to replace these hazardous processes with less hazardous ones are in work throughout the Department of Defense (DoD). Current alternative technologies rely on line of sight (LOS) methods for application. However, it is unknown how many components can be processed by LOS technologies or if research and development (R&D) investment in non line of sight (NLOS) technologies is required to address replacement of these legacy processes. A survey was required to answer this question.

Technical Approach

The objectives of this effort were met by conducting a survey of depots and other maintenance activities performing hard chrome and nickel plating to determine how many components can be addressed with LOS versus NLOS alternative technologies. Site surveys were conducted at three (3) Army depots performing hard chrome and nickel plating: Anniston Army Depot (ANAD), Corpus Christi Army Depot (CCAD), and Rock Island Arsenal (RIA). During the site surveys, hard chrome and nickel plated parts were assessed to determine if the alternative technology should be LOS or NLOS for each component. Then, an assessment of potential alternatives was conducted, including an analysis of the cost benefit of pursuing NLOS technology. To help with this assessment, a site visit was conducted at Fleet Readiness Center – Southeast (FRC-SE) in Jacksonville, FL. FRC-SE is currently using nanocobalt phosphorus (nCoP) as an alternative to some of their NLOS chrome plating. Information was gathered regarding usage, lessons learned, plating requirements, limitations, etc. This information, in addition to the information gathered at ANAD, CCAD and RIA, was provided in an Applicability of LOS versus NLOS Alternative Technologies to Replace Hard Chrome and Nickel Plating on Army Components Final Report.

Results and Benefits

A list of parts processed at the Army depots surveyed during this effort was generated and overall process throughput and workload requirements were identified for hard chrome and nickel plating. The cost analysis of alternative technologies provided information necessary for determining a cost-effective approach for replacing the existing processes.

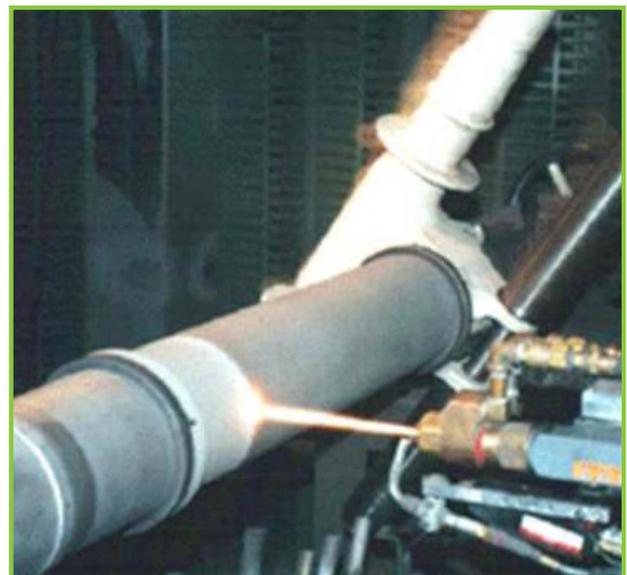
The alternative technologies identified included: high velocity oxygen fuel (HVOF) and cold spray for LOS parts and trivalent chrome and nCoP for NLOS parts. HVOF is expensive and requires special equipment for post plating grinding and cold spray is still a relatively immature technology. Trivalent chrome would require the least amount of plating process changes and is essentially a drop-in replacement. The nCoP showed favorable results; however, it may require qualification testing which can be costly and time prohibitive. Results were characterized to enable the Army Environmental Quality Technology Pollution Prevention Technology Team to make future decisions regarding investments in R&D funding for LOS versus NLOS alternatives to hard chrome and nickel plating.

Government POC
Mark Feathers,
AMSAM-ENV-TI

Status
Complete

Technology Transfer and Outreach

Completion of the site surveys and cost analysis will assist in providing a basis for future decisions regarding technologies to pursue for the replacement of hard chrome and nickel plating processes. Ultimately, the goal of the Army is to implement safer, more environmentally friendly processes. This task assisted in providing the information necessary to select alternatives for future evaluation and technology transition efforts.



Application of a Hard Chrome Alternative Coating by High Velocity Oxy-Fuel Thermal Spraying, a Line of Sight Process

