

FINAL REPORT

Cadmium Alternatives for High-Strength Steel

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Distribution Statement A

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ABSTRACT

This is the Cost and Performance report for cadmium alternative coating systems evaluations IAW the “High Strength Steel Joint Test Protocol for Validation of Alternatives to Low Hydrogen Embrittlement (LHE) Cadmium for High Strength Steel Landing Gear and Component Applications.” Coatings suitable for full size components referenced in this report include LHE Zn-Ni, Electroplated Al and Magnetron Sputtered Al which were compared against electroplated cadmium and IVD-Al controls. Repair coatings that were evaluated included brush plated Zn-Ni, brush plated Sn-Zn and spray/brush-applied SermeTel® 249/273. The control coating for repair was brush cadmium plating. The most promising candidates to replace cadmium plating included LHE Zn-Ni and electroplated Al which showed the most favorable balance of performance and cost, although there were process specific reasons to consider the other coatings for certain applications. LHE Zn-Ni compares most cost effectively to plated cadmium in terms of process NPV when including both capital and operating costs; the aluminum coating processes are all significantly more costly in terms of process NPV. With more stringent ESOH regulations starting to impact the military depots in 2013 this balance was shown to be tipping toward more costly yet environmentally compliant processes for industrial and maintainer safety. Process NPV is strongly sensitive to long term coating performance which has not been analyzed for long enough duration to be integrated into these cost analyses.

The full report has been classified as a Distribution B report. To request access to the full report, please contact:

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