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Maintenance Center Albany Puts the Hex on Hexavalent Chromium

Safer Substitute Found for Anodizing Aluminum Parts

THE MARINE CORPS Logistics Command (LOGCOM) Maintenance Center Albany (MCA) recently replaced a hexavalent chromium (Cr(IV)) anodizing process for aluminum parts with a more benign trivalent chromium process.

LOGCOM, located in Albany, Georgia, is the focal point for the planning and execution of maintenance management for ground weapon systems for

aluminum parts. The anodizing process oxidizes and creates a protective coating on the metal, also known as a conversion coating. Traditionally hexavalent chromium has been a key ingredient in the process, but hexavalent chromium is also a well-known toxin. The Occupational Safety and Health Administration (OSHA) has stated that hexavalent chromium may cause cancer in workers who breathe airborne emissions.

replacements for hexavalent chromium applications.

Lamar Petties, MCA Risk Management Manager, discusses the reasons for choosing trivalent chromium as a replacement. "Trivalent chromium is better for not only the work environment, but the larger environment. It is cheaper in the long run because it doesn't cost as much for disposal." As far as processes go, there won't be a

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U.S. Marines. As the leadership organization for the two maintenance centers that maintain, repair and rebuild ground combat and support equipment, Logistics Command encourages all efforts to improve security, support and safety of providers and users. Each maintenance center strives to improvise, improve and enhance product refinement, development and security.

An important part of LOGCOM's work revolves around the anodization of

Due to the serious health and environmental risks related to the use of hexavalent chromium, national and international restrictions and controls are increasing. These restrictions will continue to increase lifecycle costs and regulatory burdens while decreasing material availability. A recent memo (dated 25 November 2008) disseminated by the Office of Secretary of Defense, directs the Department of Defense (DoD) to make substantial investments in finding suitable

noticeable difference. "Both the hexavalent chromium and trivalent chromium anodizing are dip-tank processes requiring parts to be dipped into containers of the solution," says Petties. "With the trivalent chromium process, we become more environmentally compliant, create a safer working environment, and will have equaled, if not increased, corrosion protection."

Lee Sanders is the National Sales Manager for Government and Military accounts for Chemetall, the chemical



company that is providing the trivalent chromium product, Metalast TCP-HF. Mr. Sanders stated, “This is proof that government can keep up with civilian manufacturing in innovation and technology. Being the first DoD depot to make this change was not scary for them once they thoroughly studied the technology and calculated the benefits. There is no longer a reason to use hexavalent chromium for conversion coatings and seals. Any agency reluctant to change needs to review the alternatives.”

Mr. Sanders sees trivalent chromium as a solid stepping stone to a no-environmental-impact conversion coating. The chemical coatings industry is reaching a point that he calls “the chemical equivalent of putting a man on the

moon.” He adds, “We now have products that contain no metal and perform as well as zinc phosphate.”

Today’s chromium-containing coatings are environmentally and waste stream friendly. These products are making their way through the testing programs at various government research agencies for future use on military equipment.

The benefits of the new trivalent chromium process include:

- Air-emission reductions,
- Reductions in wastewater treatment and hazardous waste generation,
- Energy use reductions,
- Quality improvements,

- Lower toxicity and worker exposure, and
- Regulatory compliance.

The trivalent chromium transition initiative was an element of a larger phased project which focused on removing hexavalent chromium from all of the production processes of the LOGCOM depots. Phase I of this initiative commenced nearly ten years ago, and included a joint project with the Army Research Laboratory and the Naval Surface Warfare Center, Carderock Division. This project successfully removed hexavalent chromium from United States Marine Corps primers and topcoats.

Phase II focused on a two-part effort that led to the removal of hexavalent



Welding operations can also produce hexavalent chromium.

chromium in the anodizing process and the discovery of a safer product that met the same performance specifications. Phase II also addressed the depot's hazardous chromium plating operations. After a technical and cost-benefit analysis, the decision was made to outsource chromium plating operations.

As a result of Operation Iraqi Freedom, the armor and stainless steel workloads in MCA were significantly expanded. Phase III was initiated to address the hazards created from welding and grinding operations. The high temperatures generated in these processes can cause chromium to convert to a hexavalent state.

Teaming with National Defense Center for Environmental Excellence, Concur-

rent Technologies Corporation, and several other industry partners, a Sustainable Installations Initiative Project: "Hexavalent Chromium (Welding) Emissions Reductions" was launched in Fiscal Year 2006. The project included baseline hexavalent chromium emissions in the welding and grinding operations and finding the best solution to ensure short- and long-term compliance with OSHA hexavalent chromium limits. The team also identified air filtration equipment that can mitigate emissions with the least impact on output and welder ergonomics.

As a result of these efforts, MCA has successfully eliminated hexavalent chromium in all of their production processes. Not only have they significantly enhanced working conditions

for employees, but they have accomplished it in a cost-effective manner without impacting production.

Steve Allen, MCA Coatings Branch Manager said, "What we are doing today is on the cutting edge in multiple areas. This kind of thinking is important in cleaning up the environment, making working conditions safer while still getting the job done. We are probably riding the crest of the wave in this technology." 

Photos by Gregory Russell

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