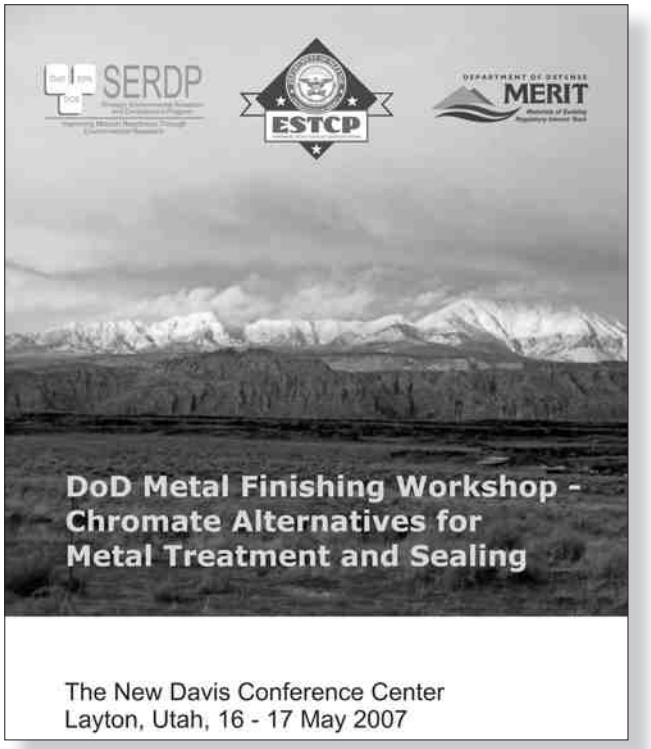
Finishing Industry–Department of Defense Meet for 3rd Defense Metal Finishing Workshop Held in Utah



The Department of Defense (DoD), in coordination with the surface finishing industry, held a third workshop on finishing and coatings technology issues May 15-17 in Layton, Utah near Hill Air Force Base. This technical workshop brought together approximately 100 DoD and finishing industry experts to share information and industry experience regarding specific needs, solutions and performance data for replacing hexavalent chromates in processes used for overhaul and new weapons systems in vehicles, aircraft and vessels. Participants offered perspectives on how emerging materials and processes already used successfully in commercial applications might be used for military applications or modified to meet DoD specifications.

The workshop was sponsored by DoD's Strategic Environmental Research and Development Program (SERDP), Environmental Security Technology Certification Program (ESTCP), and Materials of Evolving Regulatory Interest Team (MERIT). Dr. Keith Legg of Rowan Technology Group headed the Steering Committee for the workshop and provided the necessary energy and leadership for a successful event. Some of the highlights of the DoD metal finishing workshop in Utah are provided below.

Tour of Hill Air Force Base

Prior to the workshop, participants had an opportunity to tour the landing gear maintenance and repair operations at the Ogden Air Logistics Center at Hill Air Force Base. The tour included the facility's thermal spray operations, machine shop and the traditional wet process metal finishing area. It was the first visit to a DoD maintenance and repair facility for many, and industry attendees gained a new understanding and appreciation of the finishing operations involved at a military depot.

DoD Emerging Contaminants Program

Dr. Carole LeBlanc from the DoD MERIT Program presented a summary of the Pentagon's Emerging Contaminants Program. Emerging contaminants (ECs) are materials that either do not yet have toxicity values or regulatory standards or whose existing values or standards are being reviewed based on new science. Of particular interest to DoD are emerging contaminants that are critical to military operations, but may pose potential human health and environmental risks and may need to be managed appropriately to reduce risk.

The DoD uses a "Scan-Watch-Action" process for ECs. First, materials are "scanned" to determine if they are being used, or may be used, by DoD and have the potential to impact DoD's mission, personnel, the public or the environment. The EC "watch" list includes those "scanned" materials for which there is a potential for a regulatory change that could impact military operations. If these changes and impacts are significant enough, then risk evaluations will be conducted and management options will be developed so that appropriate "actions" can be implemented to address the changes and minimize impacts.

Hexavalent chromium is one chemical now being assessed. Dr. LeBlanc posed the following questions to the workshop participants regarding the use of hexavalent chromium within DoD.

1. What are the uses of hexavalent chromium for which DoD cannot live without?

2. What are the roadblocks, both technical and otherwise, affecting the selection of alternatives to hexavalent chromium?

3. What are the risk management options currently being examined by your organization?

DoD intends to use the responses to these questions as part of its EC assessment for hexavalent chromium. In addition, the EC Program is convening a stakeholders meeting for "subject matter experts" to discuss possible risk management options for the use of hexavalent chromium throughout the DoD. The technical information presented at the workshop will also be included as part of the EC assessment process for hexavalent chromium.

Global regulatory requirements and trends

To provide some context for the technical discussions on surface coating alternatives, Mike Wyrostek of MacDermid, Inc. addressed the increasing global regulatory trends and their impact on how chemicals are used in industrial processes and in consumer products. Mr. Wyrostek summarized the major environmental directives from the European Union: Restrictions on Hazardous Substances (RoHS), Waste Electrical and Electronic Equipment (WEEE) and End-of-Life Vehicle (ELV).

These directives are examples of the increasing trend to regulate the chemical content of products as opposed to the more traditional command and control restrictions on industrial processes. Additional product restriction legislation is being developed by Canada, China, Japan and Korea and nearly half of the U.S. states are also considering possible legislation to restrict the use of hazardous substances in products.

Regardless of the country of origin, these restrictions on hazardous substances such as hexavalent chromium in products impact all companies that provide services or manufacture parts and products in global markets. Even without specific restrictions, many environmentally conscious companies are requiring suppliers and vendors to provide alternatives to hazardous substances in their products. These increasing global restrictions and market pressures will continue to push technology and prompt decision makers to identify more alternatives to potentially hazardous substances used in products.

Potential alternatives to hexavalent chromium finishes

Numerous technical papers were presented on alternatives to hexavalent chromium finishes for specific applications, both military and commercial. The presentations addressed the use of hexavalent chromium coatings and alternative finishes for specific applications at military maintenance and repair depots, commercially available alternatives to hexavalent chromium finishes, specific niche applications for alternative coatings and some encouraging research on the use of new materials such as cerium.

The following companies contributed technical information on the status and availability of alternatives to hexavalent chromium finishes: Atotech, Enthone, Henkel, MacDermid, Luster-On, Metalast, Pantheon, Taskem, Sur-Tec, Alumiplate, Boeing and SWD. Representatives from the different military services and the maintenance and repair depots also presented information on their experience with conversion coatings and other surface finishing applications. These presentations, as well as the others from the workshop are available at www.hazmat-alternatives.com. While the presentations demonstrated that viable commercial alternatives to hexavalent chromium coatings are available for many applications, additional research is needed to identify alternatives for numerous other military applications.

The successful commercial applications of non-hexavalent chromium finishes and the challenges and opportunities for using these for military applications was also the subject of a panel discussion of industry and DoD experts. Another panel that included Bill Emery of Southwest United Industries, John Lindstedt of Artistic Plating Company and Peter Gallerani of Integrated Technologies addressed the past experiences of and challenges faced by job shops in implementing new finishing technologies. The discussion focused not only on the technical issues of chemistry and product quality, but also some of the practical considerations of employee training and customer acceptance of such technologies.

The workshop also included breakout sessions that provided an opportunity for the participants to explore some issues in greater detail. The breakout sessions covered some specific applications including conversion coatings for nonferrous alloys, chromate treatment of steel and chromate treatment processes such as ion vapor deposition, electroplating of aluminum and zinc and zinc/nickel finishes. The reports from the breakout sessions summarizing the discussions will be included in the workshop report that is now being prepared.

Greater efficiency for existing finishing processes

The event also focused on the notion that mitigating risks associated with using potentially hazardous substances can also be achieved through efforts other than chemical substitution and alternative finishing processes. Peter Gallerani of Integrated Technologies presented a modern design for surface finishing facilities to reduce human health and environmental risk and to improve the efficiency of traditional surface finishing processes. By more effectively designing the process layout and space planning for a surface finishing facility, operators can improve workplace safety and environmental compliance of existing wet processes that involve hexavalent chromium and other potentially problematic substances. The same processes can be designed to increase productivity and gain efficiencies in their use of water, chemicals, energy and labor.

Finding effective ways to improve the efficiency of existing wet processes is imperative for the surface finishing industry and military installations and depots. Hexavalent chromium finishes continue to be used because they work extremely well and provide superior product performance, and hence it is likely they will continue to be in demand for the foreseeable future. As long as mission-critical applications of hexavalent chromium finishes are needed, designing finishing operations to minimize risk on the environmental and workplace safety front will viable and necessary option.

DoD qualification and authorization process

One of the most discussed challenges of implementing new technologies for military applications is the Pentagon's product and services approval process. Robert Herron of Redstone Arsenal provided a summary of DoD's process for introducing new products for corrosion prevention and control. DoD has launched an online tool on its Corrosion Exchange website at www.dodcorrosionexchange.org to assist suppliers through the product introduction process.

In general, the process involves two steps: qualification and authorization. For the qualification step, a company must submit documentation to demonstrate that the product meets the applicable military specifications or that it is suitable for the proposed military application. Qualification of a product by itself does not guarantee that the product will be authorized for use or government procurement.

For the authorization step, a company must demonstrate that the product can be used for a specific application. This would entail laboratory testing, field prototypes, verification, validation and data analysis and use procedures, which can be an

expensive and time-consuming process. Once the product is authorized for use, the DoD would issue an authorization letter, process specification, technical order and/or manual designating how the product can be used.

The qualification and authorization process can vary depending on which branch of military service the product will be used. As a general rule, the process takes approximately two to three years to complete (and possibly more if additional field testing and verification is needed). A panel of military representatives discussed their experience with this process, some of the cultural considerations within the DoD community and some of the challenges for implementing new technologies for military applications. In addition, the depots need additional management support and funding to implement new technologies that are authorized and warranted for use. Understanding the process and using the DoD's online tool are key steps to facilitate the new product introduction process for suppliers.

Next steps for DoD and the finishing industry

The DoD metal finishing workshops have provided both the Pentagon and the surface finishing industry with a valuable venue for exchanging information on surface coating technologies. A continued dialogue is critical for both industry and DoD to facilitate and support the mission of corrosion prevention and control for military operations. Based on the discussions and information presented at the workshop in Utah, several action items were identified for future consideration by the participants:

1. Further investigations and evaluations are needed to identify a primer and conversion coating system for aerospace that would use less - or no - hexavalent chromium,

2. Develop a strategic plan to address the DoD's EC Program assessment of hexavalent chromium and

3. Identify some potential research projects on the use of hexavalent chromium coatings as well as alternatives for possible funding consideration by SERDP and ESTCP.

Given the positive feedback from the Utah meeting and the previous two workshops, additional conferences and discussions are being considered to focus on new, improved and alternative surface finishing processes that meet DoD performance standards and sustainability goals. One suggestion has been to expand and rename the existing DoD "Hard Chrome Alternatives Team (HCAT)" to encompass the broader set of metal finishing issues and challenges for military applications that have been identified by NASF members and military personnel. Additional information will be provided as the details are developed and refined.

If you would like more information or have any questions about the DoD metal finishing workshops, please contact The Policy Group: Christian Richter, crichter @thepolicygroup.com or Jeff Hannapel, jhannapel@thepolicygroup.com. *P&SF*