

HCAT Program Overall Objective

Conduct demonstration/validation or research & development on advanced surface engineering technologies that will eliminate or mitigate environmental problems while improving materials performance that will lead to reduced life-cycle costs in military weapons systems

The following are projects completed or being performed by HCAT:

- *HVOF thermal spray to replace hard chrome plating on external surfaces (five projects) (ESTCP w/ JG-PP or PEWG)*
- *Plasma spraying using miniature guns for hard chrome replacement on internal surfaces (SERDP)*

Additional HCAT Project Areas

- *Electrospark deposition for localized repair of coatings or non-coated components (ESTCP with PEWG)*
- *Nanocrystalline Co-P alloy plating for hard chrome plating replacement on internal surfaces (ESTCP)*
- *Electrolytic plasma processing for surface cleaning and cadmium plating replacement (SERDP)*
- *Supersonic particle deposition technology for repair of magnesium aircraft components (ESTCP) (FY06 new start)*

Program on Qualification of HVOF Coatings as Hard Chrome Replacement

OBJECTIVE: *Demonstrate and validate high-velocity oxygen-fuel (HVOF) thermal spray coatings as an environmentally acceptable and cost-effective alternative to electrolytic hard chromium (EHC) in most maintenance operations at Navy, Air Force, and Army aircraft depots and in manufacturing operations at Defense Department OEMs*

- *Establish superior performance of thermal spray coatings to hard chrome, leading to increased time intervals between required maintenance*
- *Demonstrate reduced turnaround times for repair of components using thermal spray, enhancing weapons systems readiness*

Five projects related to replacement of chrome plating with HVOF coatings

HVOF Projects

Landing Gear:

- *ESTCP funding ended in March 2003*
- *Final Report published as archival NRL Report in March 2004 (available on HCAT web site)*
- *HVOF WC/Co and WC/CoCr being widely implemented by commercial and military OEMs and in repair/overhaul operations*

Propeller Hub Components:

- *ESTCP funding ended in March 2003*
- *Final Report published as archival NRL Report in March 2004 (available on HCAT web site)*
- *HVOF WC/Co fully qualified by OEM; expect insertion at Navy/Air Force repair/overhaul facilities*

HVOF Projects

Gas Turbine Engines:

- *ESTCP funding ended in March 2004*
- *Final Report published as archival NRL Report in May 2005 (available on HCAT web site)*
- *Pratt & Whitney issued Engineering Change for replacing hard chrome with WC/Co on TF33; OC-ALC moving towards technology insertion*
- *Navy using HVOF coatings in selected applications*

Hydraulic Actuators:

- *ESTCP funding ended in 2005*
- *Draft Final Report being written*
- *Extensive actuator qualification testing being conducted by Air Force; intent is to implement HVOF WC/CoCr coatings in repair operations*

HVOF Projects

Helicopter Dynamic Components:

- *ESTCP funding through March 2006*
- *Joint Test Protocol completed and materials testing in progress*
- *Component testing at Bell Helicopter to be conducted in first half of 2006*

Proposed New Hexavalent Chromium Permissible Exposure Limit (PEL)

- *Occupational Safety and Health Administration, under Federal Court Order, was supposed to issue final PEL during week of 16 January*
- *Issuance delayed until 28 February*
- *Christian Richter will discuss this in his presentation*

Development of New Aerospace Recommended Practice for HVOF on Landing Gear

 <p>SAE Aerospace An SAE International Group</p> <p>AEROSPACE RECOMMENDED PRACTICE</p>	<p>SAE ARP5835</p>	<p>REV. "</p>
<p>Issued</p>	<p>Proposed Draft (Nov 2005)</p>	

Use of HVOF Thermal Spray Coatings for Hard Chrome Replacement in Landing Gear Applications
Project A5-01-01

SAE ARP 5935

- *Document prepared by SAE Committee A-5 on Landing Gear Systems; Chairperson is Tom Nemcheck from Aircraft Braking Systems Corp.*
- *References various documents including AMS 2448, 2449, 7881 and 7882 developed by HCAT*
- *Discusses coating materials, spraying equipment, spray process description, coating thickness range, surface finishing (including grinding and superfinishing), stripping, very brief mention of coating properties, and quality assurance*

HCAT

Program description, reports, meeting presentations, test data all available at www.hcat.org or www.materialoptions.com

Final reports on completed projects available without need to enter username and password

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