

# PROCESS TECHNOLOGY

## Cryogenic nitrogen cools thermal-sprayed parts

A new cryogenic nitrogen-based thermal spray cooling system has been installed by Air Products at the Progressive Technologies Inc. facility in Grand Rapids, Mich. The two companies are teaming up to allow potential customers to see first-hand how the new system maintains part temperature by introducing cryogenic nitrogen vapor ( $-195^{\circ}\text{C}$ ,  $-320^{\circ}\text{F}$ ) during the thermal spray coating process.

The cryogenic nitrogen vapor cooling technology makes high-quality thermal spray coatings possible by maintaining part temperature within a  $\pm 20^{\circ}\text{F}$  range, even for heat-intensive spraying processes such as HVOF and plasma spraying. The new cooling system features a cryogenic spray nozzle that installs easily on any robotically operated thermal spray gun to cool parts twice as fast as air alone.

For more information: Debbie Bauer, Air Products, Lehigh Valley, PA 18195; tel: 610/481-8061; bauerda@airproducts.com; www.airproducts.com/spray6; www.ptihome.com.



## Nano tech coatings could prevent corrosion of army vehicles

Nano-enabled EcoQuik pigmented coating formulations, which contain no organic or chemical solvents, will be a successful barrier against corrosion of the Army's vehicle fleets, says Ecology Coatings Inc., Bloomfield Hills, Mich. The company has applied for a \$2 million, fiscal year 2009 Department of Defense appropriation to conduct life cycle testing on tactical vehicles at various locations and in varied weather conditions across the United States. Through the integration of nanomaterials, the acrylic urethane coatings are said to bond to a wide variety of substrates, including aluminum, titanium, and steel. The ultra-violet curable, clean technology coatings provide high hardness and flexibility along with impact and abrasion resistance. The company proposes to work with the NAC and TARDEC (the Army Material Command) researchers to conduct life cycle testing for 18 months.

EcoQuik products are based on a proprietary technology that has no solvents and zero hazardous air pollutants. Through UV curing, the technology significantly reduces energy consumption by over 70%, increases production, and decreases capital equipment costs.

For more information: Richard D. Stromback, Ecology Coatings, Bloomfield Hills, MI 48304; tel: 248/723-2223; www.ecologycoatings.com.

### Nickel and cobalt composite coatings replace chromium

Alternative coatings that compete with chromium's unique combination of low frictional properties, high hardness, and relatively low processing cost have reportedly been developed by U.S. Chrome Corp., Stratford, Conn.

- NiCom (Nickel/SiC) electro-composite coating replaces hard chrome plating in cylinder bore applications.
- TriCom (Cobalt/ $\text{Cr}_3\text{C}_2$ ) electro-composite technology replaces chrome and thermal spray coatings in higher temperature fretting wear applications, such as seals for gas turbine engines.
- A hard version of TriCom replaces hard chrome and thermal spray coatings for a variety of aerospace components.

For more information: Al Kertesz, U.S. Chrome Corp., 175 Garfield Ave., Stratford, CT 06615; tel: 203/378-9622; www.uschrome.com.

### Excimer laser corrects defects in nanomaterials

An inexpensive way to reduce edge roughness and smooth the sides of nanostructures, enabling production of more-precise chip features, has reportedly been developed at Princeton University, Princeton, N.J.

The idea is fairly simple: instead of trying to fine-tune the fabrication process itself, which is already highly refined,



## BRIEFS

**The American Foundry Society** has introduced a new publication, *Establishing a Foundry Heat Stress Management Program*, to assist metalcasting facilities in managing heat stress among workers during excessive summer temperatures. [www.afsinc.org/heatmanagement](http://www.afsinc.org/heatmanagement)

**Avure Technologies Inc.** is constructing a Hot Isostatic Press system, scheduled for installation at the **Bodycote** facility in Surahammar, Sweden in late 2009. It will produce P/M stainless steel near net shape components and P/M tool steel billets at the rate of up to 10,000 tons per year, operating on a 24/7 basis. The heated work zone measures 71 inches in diameter by 130 inches in height. [www.avure.se](http://www.avure.se)

**Flow International Corp.** announces plans to establish a single facility for designing and building its advanced waterjet systems, which include large aerospace systems and robotic waterjet cutting cells. The Advanced Waterjet Systems Center will be located in Jeffersonville, Indiana, and will be an expansion of Flow's existing facility there. [www.flowcorp.com](http://www.flowcorp.com)

**Induction Atmospheres** has moved to a larger facility in Rochester, N.Y. The new building has double the area, at over 19,000 square feet, to accommodate its new metallurgical lab, and to provide more room for its growing engineering group, assembly areas, applications lab, and machine shop.  
www.inductionatmospheres.com

The **Linde Group** has launched Linspray Arcmixe, an optimal nitrogen mix that reduces dust and fume levels, lowers oxide content, and achieves deposit efficiency of 90%.  
www.linde.com

**The Office of Naval Research Navy ManTech Program** has directed the **Navy Metalworking Center** to initiate a project that will reduce the manufacturing costs of Inconel 625 piping systems on Virginia Class Submarines. This 20-month project will demonstrate that a closed-die, cold-forming technique can be economically and successfully applied to manufacture the fittings made of Inconel 625.  
www.ctc.com

**Rautomead Ltd.**, has supplied two horizontal continuous casting machines to **Rapsri Engineering**, India; and **Cimini & Associates Inc.**, Rhode Island. It has also secured an order for an RS upwards-vertical continuous casting machine to **Metalka Majur**, Serbia.  
www.rautomead.com

**Castech Metallurgy Inc.**, Thetford Mines, Quebec, Canada, recently won a five-year contract to cast steel hubs for wind turbine manufacturer **AAER Inc.**, Bromont, Quebec, Canada. The agreement represents an order of 320 hubs valued at more than \$55 million over the first three years of the contract. The agreement also involves Castech's strategic partner **Plessitech**, Plessisville, Quebec, Canada, which will machine the castings. The finished castings will be delivered to AAER's Bromont facility before the end of 2008.

Castech and Plessitech have invested more than \$3 million in the past year to gain the capabilities to produce hubs for AAER. To handle the 10-ton, 2.5-m diameter parts designed to hold the blades of a one megawatt wind turbine, the companies purchased three large-capacity induction ovens and auxiliary machinery.  
www.minfo.net/castech

Stephen Chou's strategy is to correct intrinsic defects after fabrication. Called self-perfection through liquefaction (SPEL), it involves an ultraviolet laser that melts away the defects.

The SPEL technique features an excimer laser that heats only the top surface layer of its target object. A 20-nanosecond laser pulse melts only the superficial rough spots in the structure and leaves the rest intact. Then the liquid flows or is guided into the correct shape before solidifying.

This process produces smooth sides and a flat top to the line of metallic material. In addition, it makes the material taller and narrower, which means that microchip manufacturers will be able to make a denser chip.

For more information: Stephen Y. Chou, Princeton University, Princeton, NJ 08544; tel: 609/258-3500; chou@princeton.edu; www.princeton.edu.

**Cast-Decant-Cast process combines two alloys in one casting**

Near-net shape components may be cast from two dissimilar alloys or metals in a single multi-step casting operation known as Cast-Decant-Cast. NovaUCD, the Innovation and Technology Transfer Centre at University College Dublin, announces that Eck Industries, Manitowoc, Wis., has purchased a non-exclusive license for the CDC Process.

Rather than a well-defined interface between the two alloys, the CDC process produces a transition zone having a smooth gradient in concentration, microstructure, and properties. The process has been used to produce components joining a range of alloys, including two different Al-Si alloys; an aluminum alloy and an aluminum metal-matrix composite; and an aluminum alloy and a zinc alloy.

For more information: Dave Weiss, Eck Industries Inc., P.O. Box 967, Manitowoc, WI 54221-0967; tel: 920/682-4618; fax: 920/682-9298; www.eckindustries.com.

**Stainless steel articulating joint made of metal stampings**

Okay Industries Inc., New Britain, Conn., has received the 2008 Ulbrich Award for Competitive Excellence in Product Development as part of the Precision Metalforming Association's Awards of Excellence in Metalforming. Okay won the award for developing a sub-assembly for an endoscopy device used in minimally invasive surgeries. The company produces metal stampings and sub-assemblies for the medical/surgical, automotive, defense/aerospace and other specialty industrial markets.  
www.okayind.com.

**Rapid prototyping machine self-copies**

A relatively cheap rapid prototyping machine with the novel capability of being able to self-copy has been announced by RepRap, University of Bath, England. RepRap is short for Replicating Rapid-prototyper, a practical self-copying 3D printer. This 3D printer builds the component up in layers of plastic via fused deposition modeling (FDM). This is a type of rapid prototyping or rapid manufacturing (RP) technology commonly used within engineering design. FDM works on an "additive" principle by laying down material in layers. A plastic filament or metal wire is unwound from a coil and supplies material to an extrusion nozzle that can turn the flow on and off. The nozzle is heated to melt the material and can be moved in both horizontal and vertical directions by a numerically controlled mechanism, directly controlled by a CAD software package. In a similar manner to stereolithography, the model is built up from layers as the material hardens immediately after extrusion from the nozzle.

For more information: Adrian Bowyer, RepRap, University of Bath, England; tel: 44 1225 385453; A.Bowyer@bath.ac.uk; ttp://people.



The tube, known as an articulation joint, is a stamped stainless-steel link assembly with 28 springs.