

# SPRAYTIME®

Published by *The International Thermal Spray Association*  
Volume 13, Number 1

First Quarter 2006

It's all about materials and processes for aerospace, advanced surface engineering processes, and the latest in thermal spray technology.



**May 15-18, 2006 in Seattle, Washington**

## International Thermal Spray Conference & Exposition

Celebrating 100 years of the thermal spray industry. (See the photograph of the 1915 United States thermal spray patent on pages 24-25.)

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*Full story on page 9*

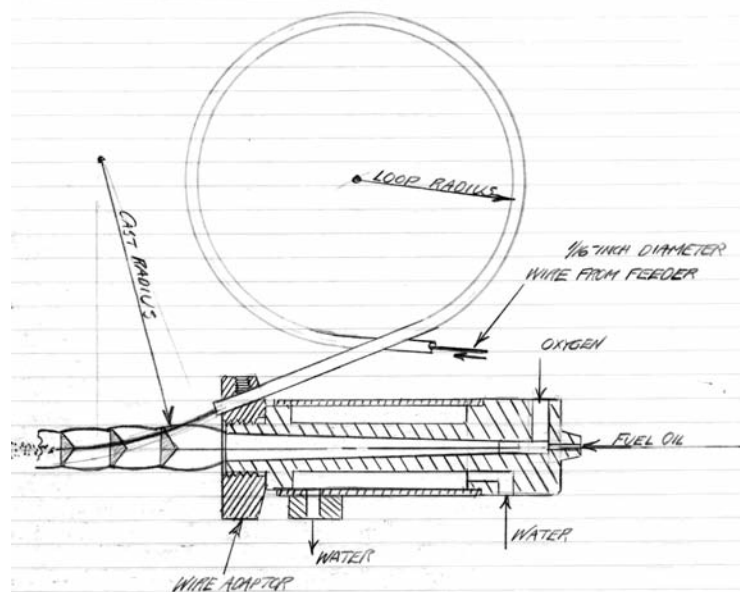
## HVOF Wire Spraying

by James Browning

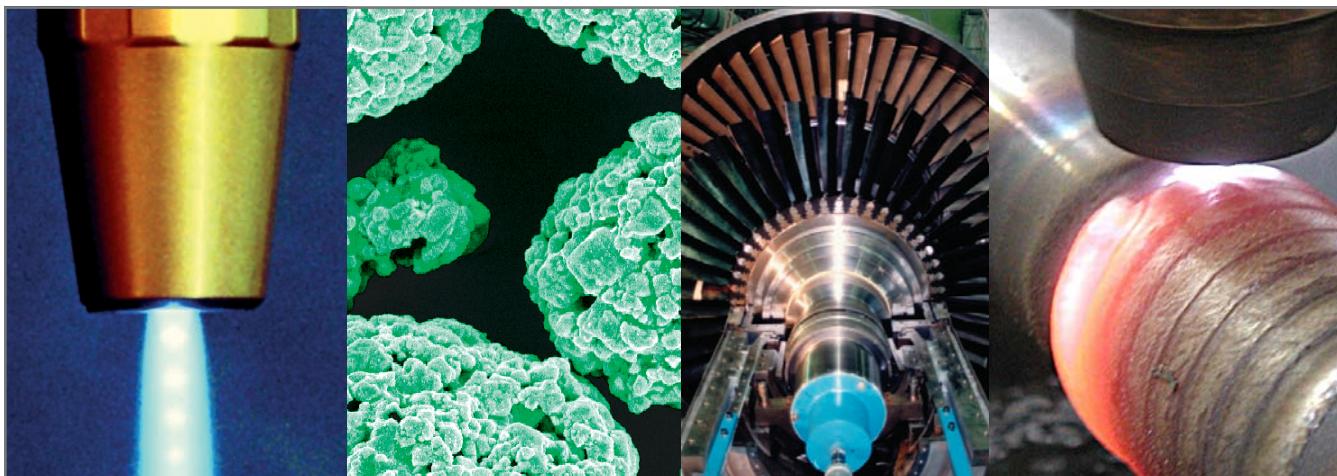
There is increasing interest in HVOF wire spraying and I would like to say a few words on what I am doing.

Many competing ideas have been tested. Take a standard HVOF gun and pass straightened wire along the axis of the exiting rocket jet. Simple. Unfortunately, it did not work. The process requires a long passage through the jet. The "straight" wire, upon heating, remembers its cast and moves out of the jet winding up as a wriggling red-hot snake on the floor. Increase wire heating by passing it through the jet nozzle within the gun. Cast problems again, plus the phenomenon of flame reversal, where the flame passes backwards toward the operator producing startling activity! What was finally developed was to take advantage of this natural bend (cast) of the wire previously tightly wound on a small diameter spool. Twist the wire to line up with the jet. This can be done passing the wire through a loop of tubing.

*continued on page 4*



WS5 (half-scale) with single wire and loop. 3 wires-with-loops operation sprays up to 60 lb/hr. Unit is 6 in. long, weighing 2 lbs.



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**Mission:** To be the flagship thermal spray industry newsletter providing company, event, people, product, research, and membership news of interest to industrial leaders, engineers, researchers, scholars, policy-makers, and the public thermal spray community.

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SPRAYTIME (ISSN 1532-9585) is a quarterly publication of the International Thermal Spray Association.



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### SPRAYTIME® Continues as Industry Newsletter

The International Thermal Spray Association is pleased to announce that it will continue to provide **SPRAYTIME** free-of-charge to the thermal spray community. If you have been receiving **SPRAYTIME**, you will continue receiving **SPRAYTIME**. If you or your colleagues wish to sign up for a free subscription, visit [www.spraytime.org](http://www.spraytime.org) and choose the **SPRAYTIME** logo to complete a short questionnaire.

**SPRAYTIME** will continue to grow by reaching across other industries (AWS, SAE, NACE, ASME, etc.) for pertinent information-sharing and additional readership. As a result of this collaboration with other professional industries, open enrollment and expanded readership, we expect our circulation to increase significantly to 10,000 in this decade.

If you are a member of the thermal spray community or have an interest in thermal spray, **SPRAYTIME** is your newsletter and we continue to encourage and welcome your contribution of articles, news, and events.

ITSA is proud of what we started with **SPRAYTIME** in 1992 and what we have planned for future expansion of news and circulation.



*continued from page 1*

Wire curling upward leaving the spool can be directed to curve downward (or any other angle) to travel in the plane of the jet. Using such loops, the wire(s) are passed into the jet just beyond the gun's nozzle exit. Spray rates up to 20 lb/hr for each 1/16-in. wire of stainless steel are achieved. 3/32 in. wire spray rates increase to 30 lb/hr; 1/8 in. wire to 40 lb/hr.



Single 316 stainless wire of 1/16 in. diameter being sprayed in HVOF process.

Compared to electric arc spraying, the 7,000 ft/sec jet yields particle velocities much greater than the something around 2,000 ft/sec compressed air jet. The plume is narrow - much like HVOF powder. Compared to earlier wire spray methods, coating costs remain about the same. The selection of HVOF wire could possibly reduce porosity and oxidation.

It is an entirely different matter when compared to HVOF and plasma powder spraying. HVOF, using solid-impact cannot be duplicated by a melting wire process. Plasma and HVOF work with ceramics and materials which cannot be drawn into wire. Plasma works excellently within vacuum and

Cost Analysis Using 316SS Powder or Wire For Three Spray Processes				
COST ITEMS	PROCESS			
	Powder HVOF & Plasma	HVOF - Wire		
		1 Wire	2 Wires	3 Wires
Labor + Direct Overhead	\$ 50/hr	\$ 50	\$ 50	\$ 50
Oxygen + Fuel Oil	- -	\$ 60	\$ 60	\$ 60
Spray Rate lb/hr	(20)	(20)	(40)	(60)
Powder Cost @ \$15/lb	\$ 300	- -	- -	- -
Wire Cost @ \$5/lb (1/16 in. D)	- -	\$ 100	\$ 200	\$ 300
Cost/hr	\$ 350	\$ 210	\$ 310	\$ 410
Cost/lb Material	\$ 17.50	\$ 10.50	\$ 7.75	\$ 6.80
Savings/hr Using HVOF-Wire	- -	\$ 140	\$ 390	\$ 642

environmentally controlled chambers. So, if you have one of these applications, forget wire.

However, let us examine costs against HVOF-powder and atmospheric plasma spraying. To make computations easier, the analysis above eliminates costs of producing the plasma (electricity and gases) as well as combustion expenses for HVOF-powder. The deposition efficiency of each process is assumed to be the same.

A cost savings of \$642/hr, if true, is remarkable. But, it may not be worth the complexity of three-wire use. Let us settle on 2 wires and reduce the hourly savings to \$300 to cover possible errors in the analysis. Each 100 hours of spraying time saves the user \$30,000. Not Bad! Stated another way,

INDUSTRY NEWS

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each hour of HVOF or plasma powder spraying represents a monetary loss of \$195. This assumes, of course, that the wire coating is at least as good as the powder counterpart.

Examine the photomicrograph. Particle average diameter is about 30µm. This is nearly as small as for many powders. The oxygen content is lower than plasma spray in the "open" - higher than HVOF. Porosity is much lower than plasma - about the same as HVOF. (Compared against arc spraying, the particle size is about 1/3 that of the arc process - porosity is dramatically less, particularly in the higher spray rate ranges.)



**316L stainless HVOF-wire coating. 3 1/2% oxygen content, hardness 167 VHN<sub>0.3</sub>. Photo and analysis courtesy of Prof. H. Kreye, Hamburg, Germany.**

Using wire adaptors to fit existing HVOF systems is the simplest way to step into HVOF-wire use. The equipment manufacturer could provide this at low cost. In addition, loop(s), wire conduits, and feeder(s) are required. Start with a single wire. For more spraying speed, add another. The adaptors screw on to the exit end of the nozzles.

#### **Equipment Types and Their Suitabilities For Wire Spray Add-ons**

**JetKote®** - Unless combustion pressures are raised significantly, I do not recommend wire use.

**Gaseous-fueled equipment** - Several firms make excellent HVOF equipment fueled by high flame temperature gases such as propylene. If over 125 psi, wire coatings would certainly be the equivalent of plasma-powder in the open atmosphere. I would rate coating quality as "very good", particularly when run with a fuel rich flame to minimize oxidation. Up to 40 lb/hr using 3 each 1/16 in. wire is a conservative estimate.

**JP-5000® and Metco's WokaStar™ systems** - These are operated using liquid fuels at combustion pressures to 300 psi. Coating qualities would be "superb". Spray rates would be only modest, say 75 lb/hr at the relatively low combustion rates used.

For not too much greater cost HVOF equipment designed specifically for wire use should also be made available by a licensee. Additional equipment includes the usual water pump and fuel oil pump. A spring-operated actuator sensing a drop in cooling water pressure cuts off the fuel flow.

The WS7 (another model), with a 7/32 in. "shock-stabilized" combustion bore, sprays many different wire sizes from less than 1/16 in. to 3/16 in. Different wire adaptors are needed.

Using 3, or 4, 3/16 in. wires in guns of larger bore should reach a spray rate of nearly 200 lb/hr. Large flows of oxygen at pressures to 300 psi are used to reach maximum rates.

**References:** U.S. Patents 4,568,019 and 6,924,007

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### **ITSA Technical Program Open to Public**

The International Thermal Spray Association member companies have agreed to encourage non-member attendees at the technical program portion of their membership meetings. ITSA semi-annual membership meetings are typically three-day events with a thermal spray technical program on Friday from 8:00 am through 5:00 pm.

In revising their long-standing "member only" attendance policy for the Technical Program, ITSA is responding to interest from non-member individuals wanting to take advantage of these valuable thermal spray educational opportunities.

The October 2006 Technical Program will be held in Hartford, Connecticut. The cost for non-members to attend the ITSA Technical Program is \$300, which includes breakfast and lunch.

**For more information,** contact Kathy Dusa, ITSA Corporate Secretary, email: [kathydusa@thermalspray.org](mailto:kathydusa@thermalspray.org)

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## FW Gartner Develops a Successful Thermal Sprayed Nanostructured Coating For Severe-Service Mining Application

by George Kim

**Introduction:** In May of 2000, FW Gartner Thermal Spraying Co. (FWG) partnered with a major client, Mogas Industries, and acquired the consulting services of Perpetual Technologies to develop a customized, nanostructured ceramic coating specifically for Au and Ni/Co High Pressure Acid Leach (HPAL) ball valves. These ball valves are critical components used to contain and control the flow of hot acid slurries under very severe service conditions. The operating conditions within the Ni/Co HPAL autoclaves consist of high temperatures (up to 265°C {509°F}), high pressures (up to 5500 kPa {798psi}), high acid concentrations (> 95% H<sub>2</sub>SO<sub>4</sub>), and solid concentrations (> 20wt%). The overall objective was to develop a coating that would outperform all existing coatings for this specific application.

After carrying out a detailed analysis of the failed components, it was evident that none of the existing coatings/processes would adequately serve the HPAL application. Hence, a decision was made to proceed with the development of a nanostructured titanium dioxide (n-TiO<sub>2</sub>) coating. The technical approach consisted of utilizing the knowledge gained from the work conducted by Gell et al. [1, 2, 3] under the ONR program, "Thermal Spray Processing of Nanostructured Coatings" [4], headed by Dr. Lawrence T. Kabacoff (Program Officer), between 1996 and 2001.

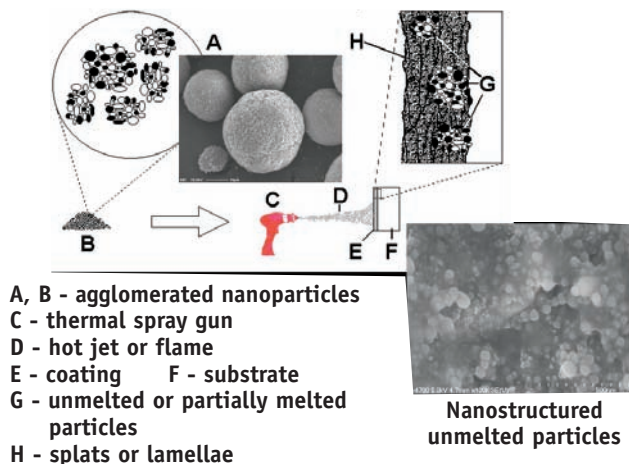


Figure 1 - Schematic of approach to thermal spraying of nanostructured ceramic coatings.

**Technology:** The general approach to the processing of nanostructured thermal spray ceramic coatings is illustrated in Figure 1. The main aspects of the approach included processing well-bonded agglomerates of nanostructured or ultrafine particles, thermal spraying of powder to optimize coating properties, and characterization/testing of the coating.

Once an adequate powder feedstock was processed, air plasma spraying (APS) spray parameters were developed to optimize bond strength, microstructure, microhardness, and

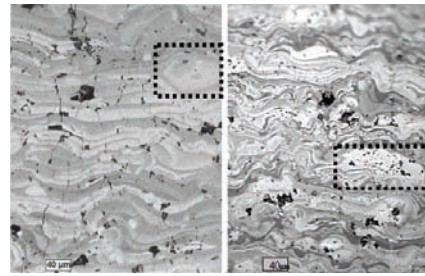


Figure 2 - Cross-sectional view of APS TiO<sub>2</sub> coatings: conventional (left) and nanostructured (right).

crack propagation characteristics. Comparisons were made between APS TiO<sub>2</sub> coatings derived from conventional microstructured and customized nanostructured powders. From the cross-sectional microstructures (Figure 2), it was noted that both coatings consisted of lamellar structures, accentuated by the different phases (shades of gray), and of vertical microcracks. Upon conducting a microhardness test, a very interesting feature was noted in relation to the crack patterns formed by the micro-indentations. Figure 3 provides views of the indentation (at 500 g load) regions for both APS coatings. It was apparent that the commercial coating had higher degrees of crack density, width, and length, as compared to the nanostructured coating. A closer look at the region around the cracks in the APS-applied nanostructured coating

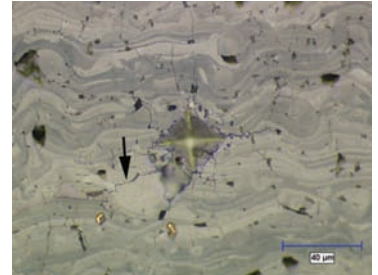


Figure 3a - APS-applied TiO<sub>2</sub> coatings.

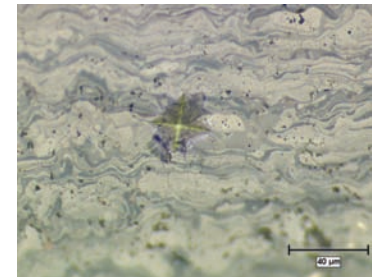


Figure 3b - APS-applied TiO<sub>2</sub> coatings.

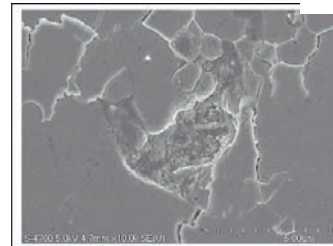


Figure 4 - Field emission-SEM micrograph of cracks around porous nanostructured unmelting particles.

(Figure 4) reveals interesting associations between the presence of nano-porous unmelting or partially-melting particles and crack propagation. These porous particles seem to deflect the crack and/or blunt the crack tip, thus hindering its propagation, unlike the dense



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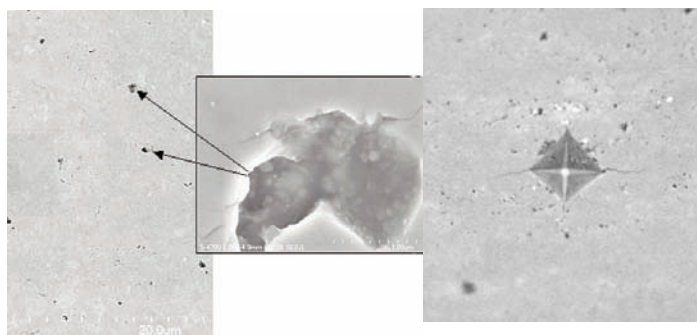
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unmelted particles found in the commercial coating (arrow in Figure 3a) which seem to allow for the crack to propagate through in an unimpeded manner.

Once the association between coating toughness and porous unmelted particles was realized, the focus shifted from developing and applying a novel nanostructured titanium dioxide coating using a conventional thermal spray process (APS) to selecting and developing a deposition process to further increase the presence of the porous unmelted particles without compromising their hardness or strength. The difficult task was in introducing more of these porous unmelted particles without compromising on the mechanical integrity of the coating. Figure 5 provides a cross-sectional view and crack pattern of the n-TiO<sub>2</sub> coating deposited by a proprietary process.

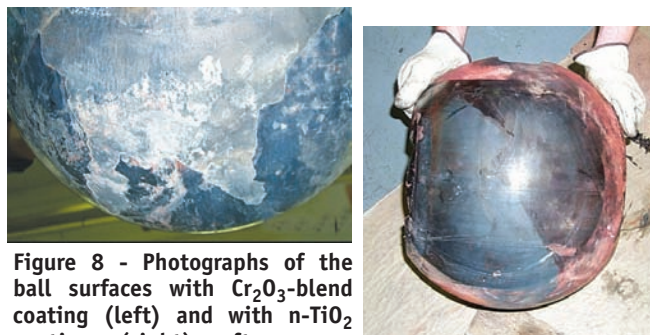


**Figure 5 - Cross-sectional view of n-TiO<sub>2</sub> coating deposited using a proprietary process: FE-SEM of coating (left) and porous particles (center); micro-indentation crack pattern (right).**

The microstructure of the proprietary n-TiO<sub>2</sub> was denser (< 1% porosity) and uniform (non-lamellar and single phase), with no signs of microcracks. The high magnification view of the dark spots within the structure (Figure 5-center) reveals the presence of the familiar porous unmelted particles, distributed uniformly throughout the coating. The crack pattern around the Vickers indentation (Figure 5-right) shows very low degrees of crack density, width, and length, as compared to the APS coatings. This apparent increase in toughness was accompanied by a notable increase in average microhardness.

The ASTM G65 (procedure E) dry sand rubber wheel abrasion test results for the coatings are presented in Figure 6. It is well understood that abrasive wear resistance is a reflection of strength/hardness and toughness. As we move from left to right in Figure 6, the coating gets not only harder, but also tougher. It is believed that the dramatic enhancement in toughness provides such a drastic increase in abrasive wear resistance. Unlike conventional materials/coatings, where increase in hardness is often accompanied by a decrease in toughness, these nanostructured coatings seem to defy this trend.

The results from the slurry erosion test (Figure 7) showed improved resistance for the n-TiO<sub>2</sub> coating, in the same order as per



**Figure 8 - Photographs of the ball surfaces with Cr<sub>2</sub>O<sub>3</sub>-blend coating (left) and with n-TiO<sub>2</sub> coating (right) after same service exposure and conditions.**

the abrasion resistance. A unique feature was observed in the erosion results; the n-TiO<sub>2</sub> coating showed improved erosion resistance at both low and high angle slurry impingements. This reinforces the hypothesis derived from the abrasion test results of enhancing the toughness without compromising on the hardness.

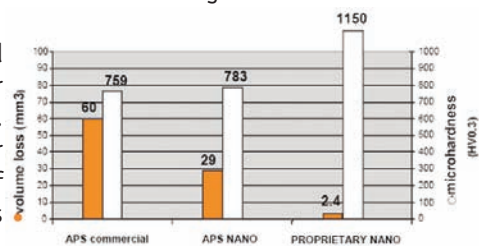
Due to numerous variables in the service conditions that each valve endures, most performance comparisons between valves are made in an indirect manner with, in some cases, uncertain critical assumptions. In 2003, Lihir installed two 10 in. ID Ti Gr5 Mogas ball valves (with n-TiO<sub>2</sub> and Cr<sub>2</sub>O<sub>3</sub>-blend coatings) into the same service exposures and conditions for the same duration. Figure 8 provides photographs of the ball surface upon inspection after 10 months of service.

It was clearly evident that the n-TiO<sub>2</sub> coating was in a far superior state when compared to the non-nanostructured Cr<sub>2</sub>O<sub>3</sub>-blend coating. The surface of Cr<sub>2</sub>O<sub>3</sub>-blend coated ball had large regions without coating. In contrast, the n-TiO<sub>2</sub> coated ball had a few isolated regions without coating.

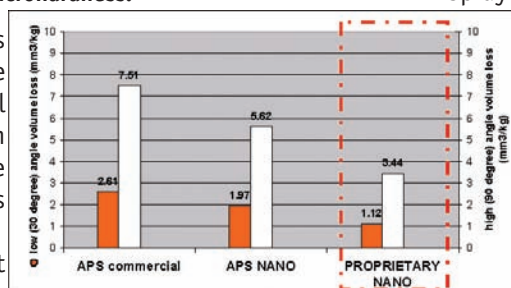
**Summary:** A customized nanostructured TiO<sub>2</sub>-base coating has been developed, qualified, and successfully applied onto ball valves for eight HPAL mines around the world. The patented (U.S. Patent 6,835,449) novel corrosion-resistant coating possesses enhanced toughness and increased hardness; these features contribute to superior abrasive and erosive wear resistance over the conventional coating of the same material. Field results indicate superior performance over prior art coatings.

#### References:

- [1] M. Gell with E.H. Jordan, et al., "Fabrication and Evaluation of Plasma Sprayed Nanostructured Alumina-Titania Coatings with Superior Properties," *Mater. Sci. Eng., A301*, pp. 80-89, 2001.
- [2] M. Gell with L. Shaw, et al., "Development and Implementation of Plasma Sprayed Nanostructured Ceramic Coatings," *Surface and Coatings Technology*, vol. 146-147, pp. 48-54, 2001.
- [3] D. Goberman, Y. Sohn, L.



**Figure 6 - Abrasive wear volume loss and microhardness.**



**Figure 7 - Slurry erosion volume loss at low and high impingement angles.**



Shaw, E. Jordan, M. Gell, "Microstructure Development of  $\text{Al}_2\text{O}_3$ -13wt.% $\text{TiO}_2$  Plasma Sprayed Coatings Derived from Nanocrystalline Powders," *Acta Materialia*, 50, 1141-1152, 2002.

[4] L. De Sio, "Nanostructured Coating Approved For Use on Navy Ships", ONR's Corporate Communications Office-News Release, Arlington, VA, USA, 2000.

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#### **What Is Thermal Spray?**

**For a free copy of the International Thermal Spray Association "What Is Thermal Spray?" publication, send an email request to [itsa@thermal.spray](mailto:itsa@thermal.spray)**

### **Thermal Spray Conference Returns to North America in 2006**

The International Thermal Spray conference and Exposition (ITSC) will be held in Seattle, Washington, May 15-17, 2006. At this edition of the annual event, the worldwide thermal spray community will celebrate 100 years of progress and discuss future challenges and growth opportunities.

ITSC is sponsored and organized by the ASM Thermal Spray society (ASM TSS), the German Welding Society (DVS), and the International Institute of Welding (IIW).

To reflect the international audience for the event, ITSC rotates annually to locations in Europe, the Pacific Rim, and North America. Being held in Seattle brings thermal spray, a unique surface engineering and coating technology, closer to American aerospace manufacturers and suppliers that already apply the technology, but organizers also look forward to bringing the benefits of thermal spray - namely, cost-effective resistance to wear, heat, corrosion, and erosion - to many other industries.

"Beyond aerospace applications, thermal spray technology is critical to the industrial gas turbine, automotive, and oil and gas industries, to name a few," said ITSC 2006 chairman Peter Hanneforth, president of SpaCom LLC, Huntington, NY, and ASM TSS vice president. "For example, turbine aircraft engines can't fly efficiently without thermal spray technology. But we also want to see our attendance grown beyond the choir, so that we reach a new audience with the message that thermal spray can reduce costs and improve service life for many other industrial and consumer product applications."

ITSC 2006 will be co-located with AeroMat Advanced Materials for Aerospace Applications and the International Surface Engineering Congress, both sponsored by ASM International. Besides providing attendees with the added value of "three conferences for the price of one," ITSC organizers look forward to reaching new engineers and designers with their message.

"We believe that thermal spray is not as well known and understood as it should be," Hanneforth said. "We want to reach engineers and designers who have had surface-related problems and have solved them the best way they could - but are open to a better, more cost-effective way, one that has been proven successful in other applications and industries."

ITSC 2006 will be the largest in the event's history in terms of presentations, attendees, and exhibitors. Organizers will develop the technical program from a record number of abstract submissions, while the ITSC Exposition will feature the world's largest gathering of thermal spray equipment, materials, and consumables supplies, as well as coating applicators and service providers.

Join us as the materials science and engineering communities come to Seattle to discuss new developments and new ways to increase performance while meeting the industry's needs for lower cost, longer service life, maximum safety and minimal impact to the environment.

**For more information**, visit [www.asminternational.org/seattle](http://www.asminternational.org/seattle) and see introduction story on page one.



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## NSF Center for Thermal Spray Research



For the past 8 years, the National Science Foundation - Materials Research Science Engineering Center (NSF-MRSEC) Center for Thermal Spray Research (CTSR) at the State University of New York at Stony Brook has been at the heart of a number of exciting and fundamental initiatives to enhance the scientific base of thermal spray (TS) coating technology. TS is a rapidly evolving field that services a broad industrial community; coatings are ubiquitous in infrastructure maintenance, gas turbine engines, automotive and construction industries. Emerging applications include coatings for orthopedic and dental implants, free-standing fuel cells, and functional sensors for harsh environments.

The Center focuses on fundamentals of thermal spray processing. It carries out state-of-the-art experimental and theoretical research on the synthesis, modeling and properties of wide classes of traditional and novel materials, plus novel functional configurations. CTSR supports two interdisciplinary research groups. One group focuses on process science, characterization and modeling of coating microstructure and properties. The other group explores the potential of the far-from-equilibrium nature of TS to develop new metastable materials and phases.



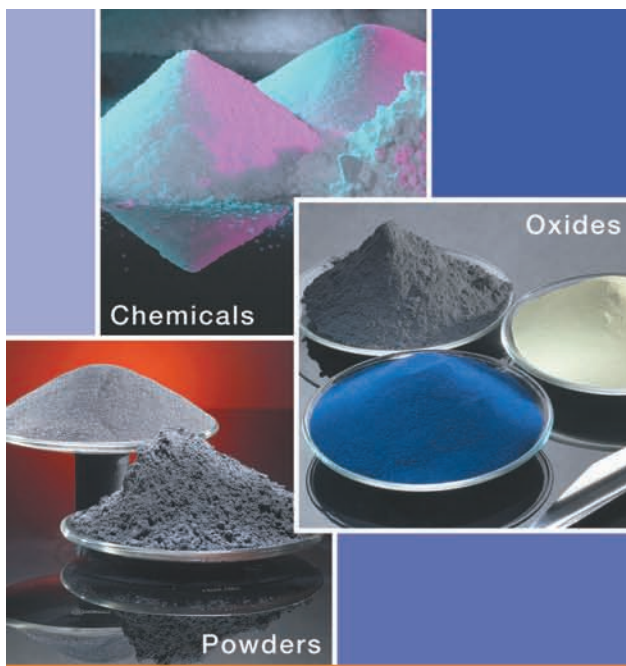
High temperature coating evaluation lab.

Donated equipment from local and regional companies enhances the Center's experimental research and practical applications to improve thermal spray processing. CTSR affiliates include the University of California at Santa Barbara, Florida International University, several international universities, four national laboratories, and two federal research centers. In addition, a highly successful Defense Advanced Research Projects Agency (DARPA) Program - Mesoscopic Integrated Conformal Electronics (MICE) led to a successful expansion of TS into direct-written patterned sub-millimeter structures, ideal for the fabrication of harsh environment sensors and electronics. Mesoscribe Technologies, Inc. was spun-off as a result of this effort and continues collaborative efforts with CTSR.

### The key research goals of the CTSR include:

- Integrated approach to process-materials-properties through modeling/experiments

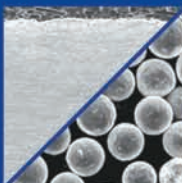
continued on page 12



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The **ASM Thermal Spray Society** is one of five affiliate societies of ASM International serving unique needs of specific member groups. These groups offer dedicated leadership, a focused mission/goals, and unique benefits including member publications and specialized annual events.

**Mission:** The **ASM Thermal Spray Society** will be the leading member driven, international society for thermal spray to foster communication, information development, technology advancement, education and scientific understanding. ASM TSS members are dedicated to learning about thermal spray performance, processes, properties, and applications; exchange information with other members via forums, programs, and services; and bringing the aerospace-proven advantages of thermal spray to other industries.

**For information** on membership, products, services, and events, contact ASM TSS Customer Service tel: 800.336.5152 (toll-free in United States) or 440.338.5151, fax 440.338.4634; email [customerservice@asminternational.org](mailto:customerservice@asminternational.org); or visit web: [www.asminternational.org/TSS](http://www.asminternational.org/TSS)

**See page 38 for ASM TSS Board Nomination Information.**

### ASM TSS Email Discussion Group

**Over 600 subscribers** from 40 countries use this lively discussion forum. Sharing information and networking with colleagues is one of the key goals behind a society such as the ASM Thermal Spray Society. All thermal spray related communication is welcome. The forum has seen ideas on applications for thermal spray, coating properties, equipment for sale, positions wanted and job openings, calls for papers, and other news of interest to the thermal spray community. **Join the group now!** Visit [www.asminternational.org/tss](http://www.asminternational.org/tss) and choose "Technical Resources" for subscribing information.

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**continued from page 10.**

- Exploration of the fundamental physics underlying splat-splat interfaces
- Understanding of the fundamental physics underlying coating-substrate adhesion
- Development of continuum-based models to describe TS thermomechanical behavior
- Advanced process maps (models/experiments)
- In-situ and ex-situ sensing for property evaluations and microstructural control
- Advanced neutron and synchrotron-based characterization methodologies
- Nonequilibrium and chemical precursor based synthesis of functional materials
- Understanding of electromechanical TS properties for harsh environment sensors

### **Industrial Outreach**

The Center welcomes industrial participation, from sharing in research results to funded programs in specific study areas. The goal is to create a mutually beneficial arrangement; students and faculty develop an industrially-relevant perspective and companies learn about cutting-edge fundamental research. These arrangements have been successful in forwarding the mission of both parties, that is to say, transforming thermal spray from a "band-aid" approach to a prime reliant constituent in many engineering designs. Extensive facilities are available for exploratory research, materials processing, product development and materials testing.

Central to our outreach efforts is the Consortium on Thermal Spray Technology, which was initiated in April 2002. Currently the Consortium includes 12 leading TS-involved companies, from powder and equipment manufacturers to end-users. All members participate and help to formulate the annual pre-competitive research goals which are carried out by senior members of the CTSR staff. An annual 2-3 day workshop is included in membership, and focuses on a specific theme of interest. The Center also offers a one-day introduction to thermal spray class that continues to be very well attended by engineers and scientists who may be new to the industry.



**Coating micromechanics testing lab.**

### **Educational Outreach**

The Center carries out a number of educational outreach initiatives, for undergraduates from Stony Brook and other regional universities, as well as local K-12 teachers and students. Our Research Experience for Undergraduates (REU) and International Experience for Undergraduates (IREU) programs have allowed students to work closely with CTSR and affiliated faculty mentors on focused, scientifically and industrially relevant problems for 10 summer weeks, on Stony Brook campus, or most recently at UCSB or Czech Technical Institute in Prague. Conversely, our Research Experience for Teachers program, begun in 2004, allows a small group of teachers to strengthen their skills in physics, chemistry and materials, and tasks them to create specialized lesson plans, based on new topics, to take back to their schools. With regard to K-12 students, TS is by its very nature a remarkably visible and dynamic process, which we have found has tremendous potential for opening the minds of young people to science and technology. We continue to harness this with field trips to the Center, coupled with age-appropriate laboratory demonstrations and discussions of materials engineering. In addition, local high school students are given the opportunity to work with faculty mentors for semester- and summer-research projects, suitable for pre-collegiate competitions such as Intel, Siemens-Westinghouse, and LISEF.

**For more information**, contact Ms. Lysa D. Russo, Industrial Liaison at the State University of New York at Stony Brook, email: [lrusso@notes.cc.sunysb.edu](mailto:lrusso@notes.cc.sunysb.edu), tel: 631.632.4567, fax: 631.632.7878, web: [www.stonybrook.edu/ctsr](http://www.stonybrook.edu/ctsr)





### Applications at Inotec

Have you ever heard of a company called Inotec Coatings and Hydraulics Inc.? If you are located in Western Canada or the North Western United States, chances are you have! Strategically located in the heart of 80% of the world's oil and gas manufacturing facilities and within 5 hours of all major oil sands operations, the 80,000 sq ft facility is a buzz of activity!



**7-0E-14 Tubesheet: On-Site application of a modified Hastelloy C-276 coating to a tubesheet operating in a hydrogen plant at Syncrude Canada Ltd.**

Thermal spray applications occur everyday, twenty four hours per day, seven days per week. Inotec has 24 pieces of thermal spray equipment ranging from Eutectic and Sulzer Metco flame/wire combustion equipment, TAFE and Thermion Electric Arc systems, Praxair air plasma systems and both TAFE and Sulzer Metco HVOF systems. These systems are utilized in-house as well as on-site. Inotec has developed the reputation as the "Go To" thermal spray company when it comes to corrosion, erosion and wear problems. Not only does Inotec have a large volume of thermal spray processes for the many applications in the industries that they serve but they also have industrial hard chrome plating facilities, electrolytic sulphamate nickel and copper plating departments, a state of the art plasma transferred arc facility consisting of half a dozen semi- and fully-automated cells as well as the honing, machining, grinding and support facilities to be the "One-Stop-Shop". Due to a recent expansion, Inotec also houses a 35,000 sq ft hydraulic cylinder repair facility.

There have been many applications of thermal spray coatings over the years that stand out as leading edge surface treatments. In 1998, Inotec took a TAFE JP5000 on-site and applied a modified alloy C-276 to 600 sq ft of an 8 ft diameter by 90 ft tall amine contactor tower. This tower was being scheduled for derating and one year later was going to be removed from service due to sulfide stress cracking and hydrogen blistering. Due to the innovative corrosion-resistant coating and repair procedures developed by Inotec, the vessel is currently running at full capacity and there has been no material loss or hydrogen impingement since the application occurred. It took nearly six months of planning and developing procedures and policies to be followed by the operations personnel at the plant and the Inotec technicians. The application took less than one week to complete!



**On-site HVOF application of a tungsten carbide alloy to the vane tips of a power boiler ID fan in a Northern Alberta pulp mill.**



**Suncor Energy Inc. picture: The on-site repair of a centrifuge bowl utilizing an HVOF system. Tungsten Carbide application consisted of a coating thickness of 0.050 in. - 0.080 in.**

Inotec Coatings and Hydraulics Inc. began applying tungsten carbide to centrifugal pumps in 1998.

continued page 14

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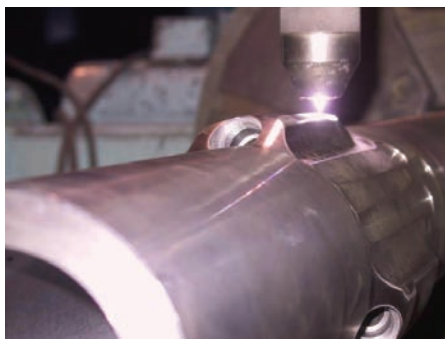
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Two of the major oil sands organizations began working with Inotecs' technical staff developing tungsten carbide applications in the oilsands slurry environments. The largest challenge was applying a coating to a minimum of 0.050 in.-thick in all areas of the pump and then grinding back the coating in strategic areas to develop integral wear rings without generating too much stress in the coating during grinding. The material selection and process selection was critical in this application. These pumps were experiencing between 6000 and 9000 operational hours before the fluid erosion washed the housing to a critical wall thickness. The coated 27 in. centrifugal pumps lasted between 16 and 20 thousand hours. Currently, approximately 40 - 50% of the centrifugal pumps at the oil sands operations are coated with a secondary coating process.



**Norquest Stabilizer:** This is a Plasma Transferred Arc application of a Tungsten Carbide alloy to the stabilizer blade. This process did not distort the threads in the small port hole!

Inotec was asked to develop and apply a ceramic coating to hydraulic cylinder rods. These hydraulic cylinder rods were for a large hydroelectric dam in Eastern Canada. There were two sets of hydraulic rods in total of six each. The first set that was sprayed and finished were 35 ft long and 6 1/2 in. in diameter. The second set was 44 ft long and 8 in. in diameter. The rods were prepped, sprayed and finished to a maximum 16 Ra finish. There are several customers that are currently looking at multiple orders in the next two years depending on manufacturing schedules. The air plasma system application was the first of its kind in Canada and another first for Inotec.

Timely turnaround on rotating equipment repair in the construction/mining/oil sands and oil and gas industry keeps all these industries running at peak percentages. Electric arc spraying applications on heavy hauler truck spindles are one of those applications that helps reduce downtimes. These trucks range in payload from 80 ton to 360 ton and the spindles are under a large amount of stress due to the road conditions in the Athabasca Tar Sands. The majority of the time, a seal area will begin to wear aggressively and then the oil sands works its way into the bearings. The arc spray repairs that are being performed reduce the wear on the seal areas up to 80% which in turn allows the trucks to run longer and reduce the maintenance costs during operation and during scheduled maintenance. With over four hundred heavy haulers in the Fort McMurray area, this type of repair is becoming more consistent.

The pulp and paper industry has utilized the technologies available in several applications from building up trunnions on lime kiln drums with the electric arc systems to applying

HVOF high nickel alloys into black liquor recovery boilers. In both cases, these applications are performed on-site. Inotec has also applied tungsten carbide to power boiler ID fans to reduce the erosion/wear of the blade vanes. This has turned into a continuous process for several pulp and paper facilities in Western Canada.

Another technology that has taken a firm hold is the plasma transferred arc (PTA) welding. It is sometimes called a coating but does not have the same characteristics as a thermal spray or electroplated coating. There is a definite metallurgical bond between coating and substrate. With that knowledge, there is a very large amount of PTA overlays/coatings being applied to the mining equipment in the oil sands. Ground engagement equipment, crusher components, sizing equipment, and hydrotransport piping are just a few of the

applications where tungsten carbide containing coatings are being utilized on a daily basis. Selection of the matrix alloy is critical in these environments. Impact resistance, toughness or high abrasion requirements all have to be taken into consideration during the selection process as well as the type of tungsten carbide (macrocrystalline, crushed and sintered, etc.)

To sum it all up...Inotec is one of a few in Canada or the Western United States that has the capability to put all of these surface technologies together and implement them in so many different ways. We have an in-house laboratory to continue providing quality control during process applications. Inotecs' quality system is certified through ISO 9001:2000. Inotec continues to guarantee and prove to each client that a material selected for a specific environment will withstand the harsh elements it has been specified for...otherwise, Inotec would have not recommended it!

**For more information**, contact Dale M. Homeniuk, Product Development Manager, toll free 1.888.377.0427, email: dalemh@inotec-inc.com, web: www.inotec-inc.com at Inotec Coatings and Hydraulics, Inc., 4263 - 95th Street, Edmonton, Alberta, Canada T6E 5R6



**Volute:** This is a 27 in. centrifugal pump sprayed with a HVOF Tungsten Carbide alloy. The coating thickness was 0.050 in. - 0.080 in. thick.

### **What Is Thermal Spray?**

For a free copy of the International Thermal Spray Association "What Is Thermal Spray?" publication, send an email request to [itsa@thermal spray](mailto:itsa@thermal spray)



## Brooklyn Battery Tunnel Rehabilitation of the Ventilation Shaft by International Metalizing and Coatings (IMC)

The Brooklyn Battery Tunnel opened on May 25th, 1950 at a cost of \$90 million dollars. The 9,117 ft-long tunnel, which remains the longest underwater continuous vehicular tunnel in the United States, carried approximately 41,000 vehicles per day during its first year of operation in 1951. According to the New York State Department of Transportation, the tunnel carries approximately 60,000 vehicles today.

Beginning in the late 1990s, after nearly a half-century of service, the tunnel received the first major rehabilitation in its history. The rehabilitation is comprised of the following projects:

1. During 1999 and 2000, MTA Bridges and Tunnels conducted a \$100 million effort to install a new ceiling and new lighting.
2. In 2001, the Battery Parking Garage received a \$44 million makeover.
3. In 2002, MTA Bridges and Tunnels launched a \$65 million project to rehabilitate the superstructure, roadway and drainage system. The project addressed the deterioration of the roadway slab in both tubes of the tunnel.
4. In 2002, IMC was awarded the contract for electric arc spraying of the underside slab of the roadway.
5. The project's initial stage, which began August 2003, consisted of cleaning air ducts and ventilation shafts to remove soot from automobile exhaust and dust from the Twin Towers' collapse on Sept. 11, 2001. (This portion of the project was performed by other contractors.)
6. IMC started the project in 2004 and approximately 220,000 sq ft of rehabilitated slab was projected to receive 20 mils of 99.9% arc sprayed zinc.
7. Ensuring that traffic was not impacted, each night one tube was closed for work and traffic was diverted into the other tube. IMC's crew had only eight hours per night to work. Each shift consisted of set-up time, application of thermal spray and break down. Scheduling the right amount of work and working around other trades has been the most challenging aspect of this project.
8. The first tube, from Brooklyn to lower Manhattan, was completed in August 2005. The second tube was initiated January 2006 and is scheduled for completion by April 2006.

Founded in 1995, IMC has grown to become one of the largest providers of field and shop applied metalizing applications in the United States. Unique to IMC is its patented metalizing machine that the



1951 cars in tunnel.



Arc spraying in tunnel.

company manufactures at its New Jersey headquarters to exacting specifications for quality, durability and speed of application. The IMC process has obtained certification from the American Bureau of Shipping for zinc and aluminum applications. In July 2005, IMC unveiled the ASMicroMite (ASMM), which measures 24 in. long, 12 in. wide, 12 in. high, and weighs only 20 lb. It is the latest addition to their arsenal in the battle against corrosion. International Metalizing and Coatings is headquartered in Pennsauken, New Jersey, with regional offices in Texas and Guam.

IMC's applications include bridges, ship decks, ramps, bilges, clover leaves, dams, sluice gates, oil refineries, petrochemical plants, brine plants, pipelines, oil rigs, and even amusement parks. A majority of the structures are exposed to extreme marine environments and these industries are turning to metalizing for corrosion solutions. They are realizing the benefits of metalizing including durability, cost efficiency, quality, long-term performance and 20- to 50-year life cycles. All these benefits equate to significant maintenance cost-savings for many industries.



Rebar damage.

significant maintenance cost-savings for many industries.

**For more information**, contact Alexandra "Bella" Wolf, email: [bella@metalyze.net](mailto:bella@metalyze.net), tel: 856.665.0110, fax: 856.665.3450, web: [www.metalyze.net](http://www.metalyze.net)

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## Bay State Introduces New Plasma Power Supply And Control Console

Bay State Surface Technologies, Inc., long time manufacturers of thermal spray equipment and materials, and a recognized industry leader in coating application announces the availability of their new design plasma spray power supply and control console. Responding to the increasing need throughout the thermal spray coating industry for equipment that is state-of-the-art yet versatile, dependable and affordable; Bay State Surface Technologies announces their new generation plasma power supply and control console. By combining more than 40 years of industry experience with today's latest technology, the PS-2004 Power Supply and CP-640-R Control Console provide the most flexible and economical high-quality plasma spray equipment solution available today.

The PS-2004 is an SCR-type power supply which produces a true 80 kW (80V, 1,000 A) of output at 100% duty cycle with < 2% ripple. This means the PS-2004 (when used with the CP-640-R) is capable of supporting even the most demanding high-energy plasma spray parameters and yet with it's unique flexible design can still accommodate most manual based control panels for routine coating applications. Maintaining and expanding upon the original Bay State 1-piece design, the PS-2004 provides both the high frequency



and power supply necessary to both initiate and control the plasma arc in the smallest, lightest package offered today. This is particularly critical for spray operations where manufacturing space is at a premium, and reduces the number of cable connections necessary to interconnect equipment. The versatility of the PS-2004 is showing its ability to accommodate both manual- and PLC-based control consoles.

The CP-640-R Control Console is a PLC-based control with robotic interface capability and a remote operator pendant option that continues the time-tested concepts of compact styling, simplified operation and minimal maintenance available with the CP-620 manual console.

By utilizing longer, more accurate rotameters for gas control and a touch-screen PLC interface with on/off auto-sequencing; parameters have become more controllable while system operation has become very user-friendly.



The CP-640-R is able to achieve and maintain critical gas flow volumes including high-energy/high-velocity parameters. There is a provision for helium to be added through the console as a plasma mixing gas and a separate but attachable hydrogen panel can be added for using hydrogen as a mixing gas as well. Metering and control of powder feed gas has also been improved on the Model CP-640 with provisions for two powder feeding devices using either argon or helium carrier gas. The CP-640 was designed with the utmost attention given to personal safety with a safety-interlocked air purge in the main console and a separate dedicated panel for use with hydrogen that is plumbed entirely with stainless steel.

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The new design PS-2004 Power Supply and CP-640-R Control Console will support any plasma gun on the market today. The versatility of this new power supply and control console are further enhanced by virtue of their physical size allowing maximum flexibility for location in tight spaces. The PS-2004 is the smallest fully capable plasma power supply on the market with self-contained high frequency unit, while the CP-640-R can be wall-mounted or attached to a mobile cart. The CP-640-R design allows for thermal spray system automation and integration including interface with robots, turntables, traverse machines and other application-specific manipulating equipment.

The PS-2004 Power Supply and CP-640-R Control Console provides excellent value for high performance with flexibility and reliable results available on the market today. In support of this new equipment development, Bay State also offers prototype coating development services to provide coating solutions to the most demanding applications across a broad spectrum of industries. As an ISO 9001-2000 and AS9100-2004 registered company, Bay State Surface Technologies is the quality choice for all your thermal spray coating requirements.

Aimtek, Inc., parent company of Bay State Surface Technologies, Inc. was founded in 1973 and is an award-winning manufacturer and supplier of brazing materials, industrial gases and welding equipment. Aimtek was twice awarded the New England Small Business Subcontractor of the Year by the U.S. Small Business Administration and currently supplies products to a variety of industries including aerospace, semiconductor, automotive and utilities. The combination of the Bay State product lines with the Aimtek family of products results in a combined company uniquely qualified to provide quality products and services in the areas of material coating and joining.

**For more information**, please contact us at our toll-free number 1-800-772-0104 or visit our company website at [www.aimtek.com/baystate](http://www.aimtek.com/baystate), and be sure to visit us at ITSC 2006 in Seattle from May 15 - 18.

### New Single-Cartridge Dust Collector Provides High Performance For Small Applications



A new "Gold Series® GS-Mini™" single-cartridge dust collector from Farr Air Pollution Control provides high performance for small (sub-500 cfm) applications such as small grit blasting units or cold spray systems. It may be used as a dedicated dust collector for one process machine or as a bin vent on a silo.

The GS-Mini collector is the latest product in the Farr "Gold Series" line of collectors, which offer exceptionally high strength, durability and ease of service. Its HemiPleat™ filter cartridge provides 99.99 percent filtration efficiency on 0.5 micron and larger particles. The cartridge features a patent-pending, open pleat media that results in greatly extended service life and lower pressure drop compared to standard cartridges - typically double the life at half the delta P. The open pleat design also allows more effective pulse cleaning. A maintenance-friendly Cambar system allows for ease of access to the collector and fast cartridge changeout.

The GS-Mini collector comes with filter, spark-proof fan,

manual pulse system and pressure drop gauge. Options include an automatic timer controller, heavy-duty food grade casters, a quick-release dust drawer, and bin vent configuration.

**For further information**, contact Farr Air Pollution Control at (800) 479-6801; fax (800) 222-6891; or write to Farr Air Pollution Control, 3505 S. Airport Road, Jonesboro, AR 72401; e-mail [filterman@farrapc.com](mailto:filterman@farrapc.com), website [www.farrapc.com](http://www.farrapc.com)



### Flame Spray Technologies and Plasma Powders Announce Partnership



Flame Spray Technologies and Plasma Powders and Systems are pleased to announce that we have joined forces to provide a complete line of products and solutions to the thermal spray industry.

Combined, the two companies offer a line of equipment from a simple manual system to a turnkey installation with a fully automated multi-process system and a materials portfolio that rivals any in the thermal spray industry. In addition, the two companies have an extensive group of independent sales representatives and support technicians that provide global coverage.

According to Terry Wilmert, President of Flame Spray Technologies, Inc., and Peter Foy, President of Plasma Powders and Systems Inc., this worldwide alliance will provide an unsurpassed product line and support to the industry.

"FST offers us an international distribution capability that will expand our product reach significantly", says Foy, "and our exceptionally experienced sales network offers Flame Spray Technologies a great personal sales presence in the Americas."

**For more information on Flame Spray Technologies**, visit [www.fst.nl](http://www.fst.nl) and see advertisement on page 19.

**For more information on Plasma Powders and Systems**, visit [www.plasmapowders.com](http://www.plasmapowders.com) and see advertisement page 21.

**Visit both at** the International Thermal Spray Conference Exposition, booth #221.

**What Is Thermal Spray?**  
For a free copy of the International Thermal Spray Association "What Is Thermal Spray?" publication, send an email request to [itsa@thermal.spray](mailto:itsa@thermal.spray)

## Air Products Expands Supply Options to Industrial Gases Customers

**NEW TECHNOLOGY IS A COST-EFFECTIVE ALTERNATIVE TO TRADITIONAL CYLINDER USE**

Air Products today announced a non-conventional service offering for its small volume industrial gases customers in North America. Called Microbulk Solutions, it is Air Products' newest gas supply option that provides a technically-advanced and cost-effective alternative to traditional cylinder gas packaging in the marketplace.

The Microbulk Solutions package is being showcased from May 15 to 18 at the International Thermal Spray Conference and Expo (ITSC) in Seattle, Washington -- an international delegation of materials and design engineers, research scientists, manufacturers, suppliers and users celebrating 100 years of progress and discussing future challenges and growth opportunities. ITSC is the preeminent global thermal spray event held in North America every three years.



"Our Microbulk Solutions program here was modeled after successful programs in Europe and South Africa. The concept has become more popular in North America, so Air Products has embarked on a strategy to roll it out in more than 20 markets in the United States and Canada over the next two years," said John Tapley, Microbulk business manager. The service has already been embraced by the metals processing industry, and Air Products expects similar acceptance from customers in the biotechnology, foods, electronics and healthcare industries as well.

Air Products Microbulk Solutions' most immediate impact is with the metals industry. With relatively small gas volume requirements, most metals processing operations have historically relied on high-pressure cylinders and dewars -- a labor-intensive approach that too often results in wasted residual gas and has the potential for interrupted supply, cross-contamination and safety issues.

Today, metals processors are relying more heavily on Microbulk delivery services, as well as new on-site storage and blending systems that bring the advantages of bulk supply to operations with less than traditional bulk delivery volumes. Air Products' Microbulk Solutions is the newest entrant in this changing marketplace. Whether it is argon or nitrogen for heat-treating furnace atmospheres; nitrogen or oxygen for laser-assist gases; nitrogen, oxygen, or carbon dioxide for food freezing or packaging; or carbon dioxide,

argon and blends for weld shielding, Microbulk supply can mean efficient, economical and reliable supply for small-volume users.

The service appeals to small-volume customers by virtually eliminating cylinder handling and reducing the number of product deliveries. Its new Microbulk tank trucks provide fast fills into storage tanks that are designed to offer customers a range of flexible supply options. Automatic fill shut-off devices and programmable digital liquid level gauges help customers monitor their inventory, and the tanks' enhanced thermal qualities limit product loss during periods of little or no use.

**For more information** on the service, visit booth 130 at the International Thermal Spray Conference and Expo, or call Air Products customer service at (800) 654-4567 and mention program 366.

Air Products (NYSE:APD) serves customers in technology, energy, healthcare and industrial markets worldwide with a unique portfolio of products, services and solutions, providing atmospheric gases, process and specialty gases, performance materials and chemical intermediates. Founded in 1940, Air Products has built leading positions in key growth markets such as semiconductor materials, refinery hydrogen, home healthcare services, natural gas liquefaction, and advanced coatings and adhesives. The company is recognized for its innovative culture, operational excellence and commitment to safety and the environment and is listed in the Dow Jones Sustainability and FTSE4Good Indices. The company has annual revenues of \$8.1 billion, operations in over 30 countries, and over 20,000 employees around the globe.

**For more information**, visit [www.airproducts.com](http://www.airproducts.com).

## Southwest United Industries to Purchase CEEL



Southwest United Industries of Tulsa, OK is purchasing CEEL Limited of Brampton, Ontario, Canada where installation of HVOF thermal spray coatings and grinding to support the aircraft landing gear industry is a top priority.

Mr. Larry Raycraft established Canadian Electroplating Enterprises Limited (CEEL) in 1978 to service the heavy equipment hydraulic industry. In 1981 the company moved to its present location at 85 Stafford Drive in Brampton, Ontario. Mr. Neil Raycraft purchased the company from his father in 1994 changing the name to CEEL. Currently CEEL provides hard chrome and sulfamate nickel plating services from its 18,000 sq ft facility to aerospace, military and general industrial customers. CEEL is Nadcap accredited and approved by Boeing, Goodrich and Messier-Dowty. Neil Raycraft will remain as Vice President/General Manager of the facility which will retain its current name.

Southwest is excited to enter the Canadian market with the purchase of CEEL, the association of Mr. Raycraft and the outstanding group of customers and employees he assembled over the years.

Southwest's top priority is to install HVOF thermal spray coating and grinding into the CEEL facility with Ti-Cad plating and additional processes to follow. **(continued page 20)**



# HV-50 *HVOF System*

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# AP-50 *Plasma System*

With the **50 Series** equipment *Flame Spray Technologies* introduces a Stand-alone, Single Process, Mass Flow Controlled Plasma or HVOF Coating System with outstanding performance. The system is built to be Reliable and Functional, ensuring High Quality Coatings, Consistent and Repeatable.

The system design only includes First Class Components while using the latest available Technology. The Closed-Loop Mass Flow and Touch Screen Controlled System is easy to operate, bringing flexible and accurate process control at your fingertips. The "50 Series" Equipment is designed at a no-nonsense price level.

- Multiple Gun Technology for HVOF and Plasma
- High and Consistent Coating Quality
- Easy to Operate via Touch Screen
- Improved Safety
- Low and Easy Maintenance
- The "50 Series" Equipment can be integrated with peripheral equipment



HV-50

**GUNS**

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AP-50

**GUNS**

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**Flame Spray Technologies**

**H.C. Starck**



FST and H.C. Starck jointly developed an **AMPERIT®** powder product range for the "50 Series" equipment.

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E-mail: info@fst.nl

Flame Spray Technologies, Inc.  
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Suite 203 I  
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E-mail: FSTincUSA@aol.com

**www.fst.nl**

(continued from page 18)

Southwest United Industries provides nondestructive testing, shot peening, thermal spray coating, plating, grinding, anodizing and painting services to the aerospace industry. It is Nadcap accredited and is certified and approved by all the major aerospace manufacturers. Southwest is also an FAA Repair Station utilizing thermal spray coating, plating, grinding and machining to repair aircraft component parts for airlines and third party maintenance facilities.

Plasma Coating Corporation, a wholly owned subsidiary of Southwest United Industries and located in Gardena, CA provides thermal spray coating (HVOF, plasma, electric arc, combustion powder and wire), grinding, painting, Teflon and dry film lube services to the aerospace industry. It is approved by many aerospace manufacturing companies as well as being an FAA Repair Station. It is scheduled for a Nadcap audit in February 2006.

**For more information**, contact Mr. Bill Emery or Mr. Rick Holder at Southwest United Industries, tel: 918.587.4161, web: [www.swunited.com](http://www.swunited.com) or Mr. Jim Emery at Plasma Coating Corporation, web: [www.plasmacoatingcorp.com](http://www.plasmacoatingcorp.com), tel: 310.532.3064



### St. Louis Metallizing Reaches New Quality Goal

St. Louis Metallizing Company, a Midwestern based full service thermal spray facility, recently passed the AS9100 audit performed by PRI, an ISO audit firm located in Warrendale, Pa. SLM's company culture places high emphasis on continuous improvement especially to their quality control system assuring customers the finest products and services.

In addition to the ISO certifications, SLM also holds certifications from the Federal Aviation Administration (Part 145 Repair Station SJ2R163L) and the European Aviation Safety Authority (145.5671).

St. Louis Metallizing craftsmen have been working with a variety of industries over the past 50+ years to develop effective metal and ceramic coatings applied by thermal spray. These coatings have become very dependable in minimizing wear and corrosion to parts and machine components.

Industries such as aircraft, printing, power, chemical, petrochemical, construction, mining, and pulp and paper

have experienced increased component service life by 50 to 75 percent. As an industry leader, St. Louis Metallizing ([www.stlmetallizing.com](http://www.stlmetallizing.com)) has developed several thermal spray application innovations with deposition rates from 3 to 60 lb/hr to apply metallic and ceramic materials. This results in customers receiving higher quality, better pricing, and faster delivery.

**For more information**, visit [www.stlmetallizing.com](http://www.stlmetallizing.com)

### All Indications Are For Continued Growth in the Thermal Spray Market

## SULZER



**Dr. Friedrich Herold**

President of Sulzer Metco (US) Inc. and Head of Sulzer Metco's Materials Business Unit, Friedrich Herold, reports that 2005 was a successful year for the thermal spray business, and all indications are that the major markets driving the thermal spray business will continue to grow or run at a healthy rate during 2006.

To further accelerate the business growth, Sulzer Metco has launched new customer satisfaction initiatives, which include strategic operational excellence programs aiming at significant improvements in the area of customer service and delivery performance.

Improved manufacturing processes and increased manufacturing capacities will ensure product availability. Our sourcing strategy enabled us to secure the needed supply despite rising prices and supply shortages of key materials, and thus to maintain stock and production levels. Other initiatives focus on responsiveness and organizational effectiveness, which will allow us to react faster to your needs.

Sulzer Metco will also push innovation initiatives and programs, building on a strong basis of long-term technological leadership. This will ensure that Sulzer Metco will have the future enabling technologies that will be needed by our customers to successfully grow their business.

"With the new momentum at Sulzer Metco, we are looking forward to meeting with our customers at ITSC 2006. This will be an excellent opportunity for us to understand your expectations and for you to meet with Sulzer Metco Management and the Sales Team," states Friedrich. He goes on to say, "On behalf of all Sulzer Metco employees, I would like to thank you, our customers, for your business, trust and close cooperation during 2005. In 2006, we hope to strengthen our relationship with you and provide you will attractive and performing solutions for all your thermal spray coating needs."

**To take control of** your surface engineering challenges, contact your Sulzer Metco sales office, visit the Sulzer Metco website at [www.sulzermetco.com](http://www.sulzermetco.com) or email us at [info@sulzermetco.com](mailto:info@sulzermetco.com).

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## INCREASE PRODUCTIVITY

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## International Journal of Microstructure and Materials Properties



Editor-in-Chief, Professor Dr. Janez Grum, announces a new journal publication - *International Journal of Microstructure and Materials Properties* - to help professionals, academics, researchers and policy makers, working in the field of material technology and material testing, physical modelling or simulation of

various processes in the materials, engineering education, to disseminate information and to learn from each other's work.

Volume 1, No. 1, 2005 has been published. To insure an international focus, editorial board members are from Slovenia, UK, USA, Brazil, Austria, Australia, Mexico, The Netherlands, Turkey, Canada, Croatia, China, Czech Republic, Spain, Hungary, Italy, Sweden, Germany, Portugal, and Poland.

**For more information**, contact Professor Dr. Janez Grum, Faculty of Mechanical Engineering, University of Ljubljana, Slovenia, email: janez.grum@fs.uni.lj.si or contact Inderscience Enterprises Order Department, email: subs@inderscience.com, fax: +44.1234.240515, web: www.inderscience.metapress.com

## ITSC 2005 Proceedings

Proceedings from the International Thermal Spray Conference - ITSC 2005 - in Basel, Switzerland are available for purchase. The price is 220 Euros plus shipping.

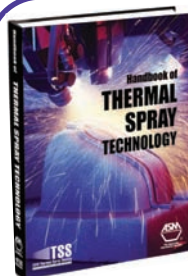
**For more information**, contact Elke Kleine, email: elke.kleine@dvs-hg.de, tel: +49(0)211.1591.161, fax: 49(0)211.1591.250

## Hexavalent Chromium Safety and Health Topics

The United States Department of Labor - Occupational Safety & Health Administration - has issued a Final Standard on hexavalent chromium that significantly lowers the permissible exposure level (PEL). The standard (1910.1026) covers occupational exposure to hexavalent chromium (Cr(VI)) in general industry, construction and shipyards.

Visit [www.osha.gov/SLTC/hexavalentchromium](http://www.osha.gov/SLTC/hexavalentchromium) to view the safety/health topics and the final rule of February 2006.

For those of you attending ITSC 2006, Daryl E. Cawmer of Thermal Spray Technologies will be speaking on this subject Thursday, May 18th in the Economic & Regulatory Session. Please check the final program for final schedule details.



## Handbook of Thermal Spray Technology Highlight

"Chemical vapor deposition is a generic term for a family of processes used for depositing coatings from the gaseous or vapor state (Table 7). Although considered a thin-film deposition process, coatings as thick

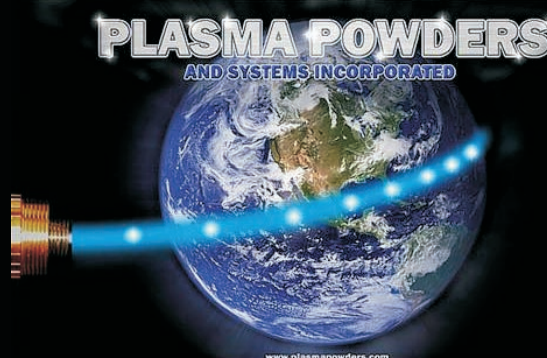
as 25 mm (1 in.) have been successfully deposited by CVD. These processes incorporate the thermal decomposition of fluorides, chlorides, bromides, iodides, organometallics, hydro-carbons, phosphorus trifluorides, and ammonia complexes . . . . ."

From "Chemical Vapor Deposition", in the *Handbook of Thermal Spray Technology*

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**EMAIL: info@plaspowders.com**

**WEBSITE: www.plaspowders.com**

## Gemini Protecting Against Corrosion

by Metallisation Limited

Metal or thermal spraying is a technology, which protects and greatly extends the life of a wide variety of products in the most hostile environments and in situations where coatings are vital for longevity. Metal spraying is carried out in a wide range of anticorrosion and engineering markets, including oil and gas, construction, petrochemical and marine. Corrosion is a major problem for these industries and Metallisation understands the complexities of corrosion and how best to protect against it.

Without expert knowledge of corrosion, what causes it, how to protect against it and how to select the most appropriate systems and coatings, the consequences can be costly from a commercial, time and safety viewpoint. The corrosion of steel piping is a continual battle for many industries. It is estimated that pipe corrosion is one of the biggest threats to industrial buildings. Corrosion of the pipes presents itself as rust,



Gemini installation with coated and uncoated pipes.

which is the result of an electrochemical reaction that reverts the metal back to its natural form as metal ore.

Anticorrosion applications are not simply about treating the surface, it is essential that the surface to be coated is prepared professionally to enable the metal sprayed coating to adhere and provide protection in excess of 20 years. Surface preparation, by grit blasting, is usually done to ISO cleanliness standard SA 3 and a sharp profile of around 100-125µm (0.004-0.005 in.) before the surface is then coated with aluminium or zinc. A sealer and topcoat may be applied, depending on the location and use of the surface being treated.

Independent research (European Standards and the American Welding Society 19 year report) has shown that metal-sprayed coatings can provide corrosion protection for more than 20 years, to first maintenance, in the harshest of environments.

A major player in surface preparation and protective coating applications, Gemini Corrosion Services Ltd, based in north east Scotland, uses Metallisation Arcspray and automation equipment. Metallisation

has been synonymous with surface coatings since 1922. From its beginnings as a company providing an answer to corrosion problems on structural steelwork, successive generations of highly respected principals have led Metallisation to its current position, where it is respected as an expert in the technology of surface coatings.

Gemini provides high quality, cost effective solutions to the oil industry for surface preparation and coating of pipes and fabrications, both topside and subsea. One of their specific services is the spraying of risers and casing joints for the oil and gas industry. To further strengthen their production facilities and services offered to their customers, Gemini purchased two Metallisation 528E/S450 systems, dispensing 2.3mm (0.091 in.) aluminium wire from 60kg (132 lb) production packs (drums).

This bulk method of wire dispensing grants the advantage of longer spraying times, therefore reducing stoppages to changeover wire. These systems were integrated by



Gemini installation spraying pipe.



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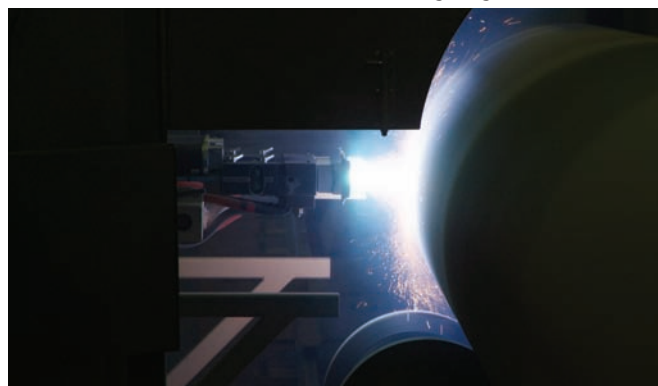
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Metallisation into an automatic pipe handling system that rotates and traverses the pipes past the guns. The spray equipment, computer controlled pipe manipulation machine plus an acoustic spray booth to contain noise and spray dust were all supplied by Metallisation as a turnkey package. Gemini started production use of their facility in January 2006.

A typical pipe of 1.16m (3.8 ft) diameter and 12m (39.4 ft) length takes around 110 minutes to spray a coating with a nominal 220µm (0.009 in.) thickness coating, which is around 40-50% quicker than when sprayed by hand. This includes 15 minutes handling time for loading and unloading. Approximately 39kg (86 lb) of aluminium would be used. The superior control over coating thickness also means less raw materials are used, which has a positive impact on the utilities used and the volume of waste going to landfill.



**Gemini installation side view of spray guns.**

The Arcspray 528E systems provide a high quality surface coating with minimal porosity and a consistent film thickness as the automated gun is retained in one position, while the pipe spraying machine accurately rotates and traverses the pipe at the same time. This means less dust inclusion and results in a smoother surface finish in preparation for sealing or painting.

In the electric arc spray process, the raw material, a pair of metal wires, is melted by an electric arc. The molten material is atomised by a cone of compressed air and propelled towards the work piece. This spray solidifies when it hits the surface of the work piece to form a dense coating, which protects against corrosion or reclaims/repairs components. Sprayed coatings may also be used to provide wear resistance, electrical and thermal conductivity, or for freestanding shapes.

Major advantages of the arc spray process are that the coatings are available for almost immediate use, with no drying or curing times; there is no risk of damaging the component; the deposits possess a higher degree of bond strength than most other thermally sprayed deposits; the use of only compressed air and electricity mean more economic coatings.

The turnkey package, that included an acoustic spray booth, has been connected to an existing extraction system. The design of the system with stationary pistols means that the extraction is optimised and therefore very efficient. The surrounding environment is much improved, particularly the quality of the air in which the coating technicians are working.

Peter Taylor, Director at Gemini Corrosion Services, says: "We know that Metallisation is an expert in the field of surface coatings and we are pleased to see real, measurable

results from the new equipment. Production levels, the environment and the health and safety of our staff are key to the business objectives of Gemini. Metallisation has delivered what we expected."

**For more information**, contact Stuart Milton at Metallisation, email: [sales@metallisation.com](mailto:sales@metallisation.com), tel: +44.1384.252.464, web: [www.metallisation.com](http://www.metallisation.com)

## **Thermal Spray Protects the Future of Burj Al Arab Hotel in Dubai**

*by Metallisation Limited*

Metal or thermal spraying is a technology, which protects and greatly extends the life of a wide variety of products in the most hostile environments and in situations where coatings are vital for longevity. Metal spraying is carried out in a wide range of anti corrosion and engineering markets.

Metallisation has been synonymous with surface coatings since 1922. From its beginnings as a company providing an answer to corrosion problems on structural steelwork, successive generations of highly respected principals have led Metallisation to its current position, where it is respected as an expert in the technology of surface coatings.

Metallisation has many diverse clients around the world from the USA, the Middle East, Far East and Australasia, actively supported by trained distributors. The common denominator for all of Metallisation's clients is to provide surface coating technology for protection and longevity of equipment, structures, vessels, pipelines and storage tanks.

One such client is Anti Corrosion Protective Systems (APS), based in Dubai, that has been using Metallisation Arcspray equipment for the last ten years across a variety of projects, including the anti corrosion protection of the world famous Burj Al Arab Hotel in Dubai. APS, founded in 1978, offers a wide range of specialist coating services to the construction, oil, gas, power and water industries throughout the Middle East, the Caspian region, India, Pakistan, the Near East, Far East and Pacific Rim regions.

APS has vast experience in metal spraying projects across a diverse range of companies and industries, some of those projects include:

### **Burj Al Arab Hotel**

APS chose the Metallisation Arcspray equipment as the preferred system to protect the Burj Al Arab hotel, after being awarded the contract from the Jumeirah Group to spray the vital structural components of the hotel frame to protect against corrosion.

In total, 10,000m<sup>2</sup> (108,000 ft<sup>2</sup>) of steel-work was arc sprayed, over an intermittent six-month period. The items

**continued on page 26**





# UNITED STATES PATENT OFFICE.

MAX ULRICH SCHOOP, OF ZURICH, SWITZERLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO METALS COATING COMPANY OF AMERICA, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

APPARATUS FOR SPRAYING MOLTEN METAL AND OTHER FUSIBLE SUBSTANCES.

1,133,507.

Specification of Letters Patent.

Patented Mar. 30, 1915.

Application filed February 19, 1914. Serial No. 819,722.

To all whom it may concern:

Be it known that I, MAX ULRICH SCHOOP, a citizen of the Swiss Republic, residing at Zurich, in Switzerland, have invented certain new and useful Improvements in Apparatus for Spraying Molten Metal and other Fusible Substances, of which the following is a specification.

The object of this invention is to effect improvements in the art of coating surfaces or articles of various kinds with metal and other fusible substances, by projecting the substance in a molten state, in the form of a spray.

According to my invention the melting is effected by means of electric current passing through two electrodes consisting of pieces of wire or filament of the substance in question, these two electrodes being fed toward each other at the requisite rate.

An embodiment of the invention is shown in the accompanying drawing, in which—

Figure 1 is a front elevation of my apparatus, and Fig. 2 is a sectional view taken on the line 2-2 of Fig. 1, showing the operation of the electromagnet employed.

In the drawing, *a* and *b* designate two feed tubes, which terminate in nozzles and are preferably made of iron, the tube *b* forming the armature of an electromagnet *c*. Through these tubes two wires *w*<sup>1</sup>, *w*<sup>2</sup> are fed by means of feed rolls *d*, so that the ends of the wires, issuing from the nozzles, cross each other as shown in the drawing. The two feed tubes, and the wires issuing therefrom, form parts of an electric circuit, other parts of which are shown at *P*<sup>1</sup>, *P*<sup>2</sup>, and current flows in this circuit, as indicated by arrows. The coils of the electromagnet also form part of the circuit. The tube *b* is elastically supported, so that it can vibrate, and the tubes are placed at an angle of about 90° to each other, with the wires making slight frictional contact where they cross, and with the nozzles spaced apart only a few millimeters. When the electromagnet *c* is energized it attracts the tube *b* and by this means slightly withdraws the wire electrode *w*<sup>2</sup> from the wire electrode *w*<sup>1</sup>. A blast pipe *n* has its nozzle directed toward the place where the wire electrodes cross, in order to direct a stream of air or other gas on to the electrodes. The blast apparatus may be

used for driving a turbine whereby the wire feed mechanism is actuated.

The action of the apparatus is as follows:—Current flowing through the circuit, while the electrodes are in touch, energizes the electromagnet *c*, whereby the electrodes are drawn apart, and a small arc is formed, accompanied by melting of some of the metal. This molten metal is at once driven away, in the form of a fine spray, by the stream of gas from the pipe *n*, which also blows out the arc *in statu nascendi*, so that the magnet allows the electrodes to approach each other again. The magnet is then again energized, and another arc is formed, and so on, the action being repeated with great rapidity, so that a continuous stream of spray is driven from the electrodes and projected on to the surface to be coated.

The potential difference at the electrodes varies, of course, according to the conductivity of the metal or other substance, and the thickness of the filament, values ranging from 40 to 75 volts are generally suitable. The rate of consumption of the positive electrode is somewhat higher than that of the negative electrode, so I use a more rapid feed, or a thicker wire, for the positive electrode.

The vibratory arrangement which I have described may be applied to both the electrodes. Its advantage lies in the fact that it produces a more uniform and localized consumption of the electrodes. If the electrodes are merely fed toward each other, without vibration, there is a tendency for the arc to flicker or to spread and roast the tubes, and in some cases the electrodes tend to become sweated to each other, if a lower potential difference is used in order to avoid an excessive arc.

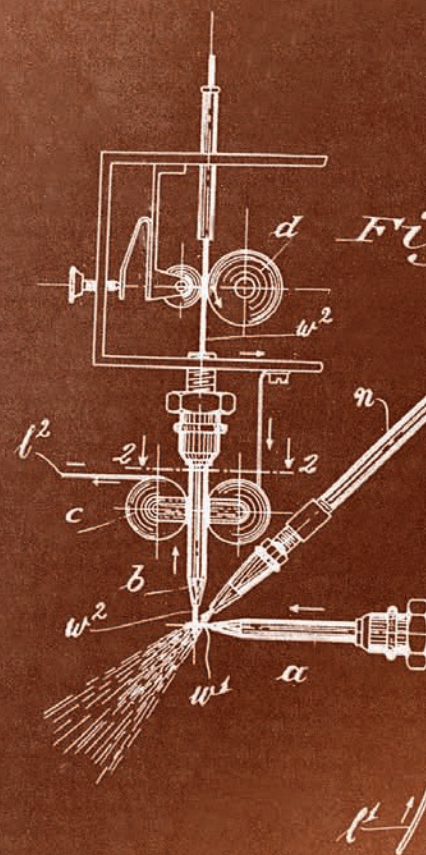
An angle of about 90° for the two electrode tubes is found most advantageous for most purposes, but the angle may vary. The best angle for the blast nozzle is easily ascertained in each particular case, as is also the most advantageous distance of the blast nozzle from the electrodes; in some cases it is best to have the blast nozzle close to the electrodes, but in others a distance of 20 or 30 mm. from the arc is better.

In the case of some metals, especially those of low melting point, part of the metal

# Photograph of

M. U. S.  
APPARATUS FOR SPRAYING MOLTEN METAL  
APPLICATION FILED

1,133,507.



Witnesses.

C. H. Walter.

W. A. Sinden.

# Apparatus for Spraying Molten Metal

Photo Courtesy of International Trade



# Original Patent

SCHOOP.  
METAL AND OTHER FUSIBLE SUBSTANCES.  
FILED FEB. 19, 1914.

Patented Mar. 30, 1915.

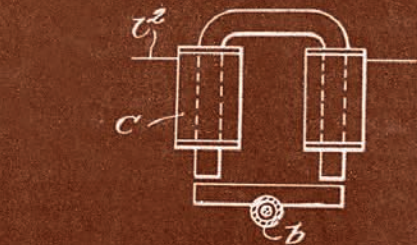


Fig. 1.

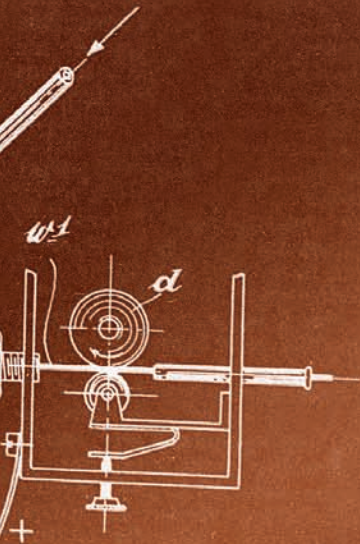


Fig. 2.

Inventor:  
MAX ULRICH SCHOOP  
by *R. W. Haddan*  
his Attorney.

**FREE Thermal Spray Patent Copy** - Copies of this original thermal spray patent - suitable for framing - are available from the International Thermal Spray Association. This is a photograph copy of the original February 19, 1914 application "Apparatus For Spraying Molten Metal and Other Fusible Substances" by M. U. Schoop, patented by the United States Patent Office on March 30, 1915. Send an email request with your mailing address to [kathydusa@thermalspray.org](mailto:kathydusa@thermalspray.org).

2

1,183,507

may be vaporized by the current. The vapor forms a fine condensate, or is projected with the spray against the surface to be coated.

5 What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. In apparatus for the purpose set forth the combination of means for feeding toward each other two fusible electrodes, means for feeding to said electrodes an electric current capable of melting the same, and means for directing a stream of gas toward said electrodes, whereby molten matter is projected from said electrodes in the form of spray.

2. In apparatus for the purpose set forth, the combination of means for feeding toward each other two fusible electrodes, means for feeding to said electrodes an electric current capable of melting the same, means for vibrating one of said electrodes, whereby contact between said electrodes is alternately made and broken, and means for directing a stream of gas toward said electrodes, whereby molten matter is projected from said electrodes in the form of spray.

3. In apparatus for the purpose set forth, the combination of means for feeding toward each other two fusible electrodes, means for feeding to said electrodes an electric current capable of melting the same, electromagnetic means for vibrating one of said electrodes, whereby contact between said electrodes is alternately made and broken, and means for directing a stream of gas toward said electrodes, whereby molten matter is projected from said electrodes in the form of spray.

4. In apparatus for the purpose set forth, the combination of means for feeding toward each other two fusible electrodes, means for feeding to said electrodes an electric current capable of melting the same, electromagnetic means for vibrating one of said electrodes, whereby contact between said electrodes is alternately made and broken, said electromagnetic means being electrically connected in series with said electrodes, and means for directing a stream of gas toward said electrodes, whereby molten matter is projected from said electrodes in the form of spray.

5. In apparatus for the purpose set forth, the combination of means for feeding toward each other two fusible electrodes comprising an elastically supported iron guide tube for one of said electrodes and an elec-

tromagnet to attract same, means for feeding to said electrodes an electric current capable of melting same, and means for directing a stream of gas toward said electrodes, whereby molten matter is projected from said electrodes in the form of spray.

6. In apparatus for the purpose set forth, the combination of means for feeding toward each other two fusible electrodes comprising an elastically supported iron guide tube for one of said electrodes and an electromagnet to attract same, means for feeding to said electrodes an electric current capable of melting same, means for operating said electromagnet whereby contact between said electrodes is alternately made and broken, and means for directing a stream of gas toward said electrodes, whereby molten matter is projected from said electrodes in the form of spray.

7. In apparatus for the purpose set forth, the combination of means for feeding toward each other two fusible electrodes comprising an elastically supported iron guide tube for one of said electrodes and an electromagnet to attract same, means for feeding to said electrodes an electric current capable of melting same, means to electrically connect said electromagnet in series with said electrodes whereby contact between said electrodes is alternately made and broken, and means for directing a stream of gas toward said electrodes, whereby molten matter is projected from said electrodes in the form of spray.

8. In apparatus for the purpose set forth, the combination of means for feeding toward each other two wires comprising an iron guide tube for one of said wires, whereby said wires are brought into contact with each other, means elastically supporting said guide tube, an electromagnet positioned to attract said guide tube, whereby the wire in the tube is removed from contact with the other wire to form an arc gap, means for feeding electric current to said wires and the coil of said electromagnet in series, and means for directing a stream of gas toward said arc gap, whereby material melted off said wires by said electric current is projected in the form of spray.

In witness whereof I have signed this specification in the presence of two witnesses.

MAX ULRICH SCHOOP.

Witnesses:

PAUL ZOLLER,  
CARL GUBLER.

# Metal and Other Fusible Substances





Burj mast fitted.

cont'd. from page 23

sprayed included the heli-deck framework, roof mounted mast and 6 diagonal support braces, each weighing in excess of 200 tonnes (441,000 lb). The surface was first grit blasted to SA 2.5 cleanliness and then sprayed with 150µm (0.006 in.) of aluminium using Metallisation's Arcspray 140 and Arcspray 700 systems. The Arcspray 140 system offered excellent flexibility for hard to access areas, due to its long reach and flexible drive system. The Arcspray

700 system was used to spray large, less complicated areas as quickly as possible, due to its high spray rate. An epoxy sealer and three coat paint system was then applied for aesthetic reasons and finished with a topcoat of 50µm (0.002 in.) of polyurethane. The aluminium coating should guarantee a 15 to 20 year protection against corrosion in the harsh, coastal environment in which the Burj Al Arab stands.



Burj diagonal brace and Arc 140s.

### Major Gas Operation, in United Arab Emirates

As well as protection against external corrosion, metal-sprayed coatings have been applied to the internal surfaces of pipes and vessels. The internal surfaces face corrosion as they are exposed to moisture and oxygen, particularly at the sulphur 'splash zone'.

The sulphur dump drums and pipes, used to store and transfer sulphur in a refinery, were sprayed using the Arcspray 140 and Arcspray 700, for corrosion protection. Again, the surface was blasted to SA 2.5 cleanliness and sprayed with aluminium to a thickness of 350µm (0.014 in.). The aluminium was then sealed with a high temperature

Silicone Aluminium sealer over a total surface of 1681m<sup>2</sup> (18,094 ft<sup>2</sup>). As the coatings were internal and not visible, no painted topcoat was required. The project took over two months to complete.

Various other structures have also been sprayed as part of the project including condensers and other drums, vessels and pipework. Discussions are ongoing between APS and the customer regarding the future projects, which can benefit from metal-sprayed coatings to give long-term corrosion protection.

### Major Offshore Operation in the North Sea

As well as inland applications, APS has used Metallisation equipment to spray offshore installations. Various oil and gas platform structures have benefited from the application of arc sprayed aluminium.

Possibly the most corrosive environment of all is the area on a platform called the splash zone. In this area, the steelwork is subjected to very high corrosion levels due to the elevated level of moisture, oxygen and chlorides (salt). A thick coating of aluminium can be arc sprayed locally to the splash zone, to offer exceptional corrosion protection in this highly corrosive area.

On one particular installation for the North Sea, 2000m<sup>2</sup> (21,500 ft<sup>2</sup>) of splash zone on a platform was grit blasted to cleanliness specification of SA 3, then sprayed with 300µm (0.012 in.) of aluminium using Metallisation Arc140 and Arc700 systems. The coating was finished with 350µm (0.014 in.) of polyurethane paint.

### Major Saudi Petrochemical Process Company

APS recently completed a major project at a new petrochemical processing site in Saudi Arabia. Three of the vessels, totalling 3000m<sup>2</sup> (32,300 ft<sup>2</sup>), were blasted to SA 2.5 and coated with 275µm (0.011 in.) of arc sprayed aluminium. 30µm (0.0012 in.) microns of high temperature silicone aluminium sealer, was applied using the Metallisation Arcspray 700 and Arcspray 140 systems. The Arcspray 140 system was fitted with a 20-meter (66 ft) supplies package and was used for areas of difficult and restricted access. The project took over two months to complete.

### New Product Developments

Metallisation's newest system, the Arcspray 170, offers high throughput with large diameter wires (1/8 in. and 3/16 in.) and is the recommended system for large scale, anticorrosion applications. The Arc 170's proven and patented Synchrodrive push/pull system has no motor in the gun, resulting in a lighter, more manoeuvrable hand-held spray gun, which has a 10m (33 ft) wire dispense distance. The system's robust design also includes the established Constant Geometry (CG) head, which ensures a smooth and consistent spray quality. In addition, the all new 700amp energiser is designed with a harsh environment in mind, with all control electronics sealed from dust intrusion. All these factors combined, result in very high spray rates, superior reliability and excellent time and cost savings. The system can be packaged for workshop and site applications giving clients optimum ease of use in a range of situations.

Graham Young, Managing Director at APS, says: "We have been using the Metallisation 700 and 140 units for the last



ten years and the development of the Arc 170 is welcomed. The timing is perfect and with major projects in hand for TSA in excess of 50,000m<sup>2</sup> (540,000 ft<sup>2</sup>) it could not have come at a better time for APS. The high spray rates of the newly purchased 170 units will certainly help us to deliver high quality production with quicker turnaround times, which means less downtime for our customers. We took delivery in February 2006 of our first 170 and within three days it was on a major site spraying the interior of Abu Dhabi Lining reactor vessels."

**For further information** please contact Stuart Milton at Metallisation on +44 1384 252 464 or Graham Young at Anticorrosion Protective Systems on +971 4 337 2877.

**15-18 Seattle, WA USA Int'l Thermal Spray Conference/Exposition (ITSC 2006), 5th Int'l Surface Engineering Congress & Exposition (ISEC '06), and 17th Advanced Aerospace Materials & Processes Conference/Exposition (AeroMat 2006)** - contact ASM International, tel: 800.336.5152 or 440.338.5151, web: [www.asminternational.org](http://www.asminternational.org), email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org)

### ASM Thermal Spray Society Committees



ASM International's Thermal Spray Society (TSS) has a total of eleven active committees of volunteers working on tasks and projects designed to bring increased value and services to TSS members. Brief summaries of ten key committee's missions and tasks are detailed below. New members are always welcome...anyone interested in becoming involved should contact the committee chair directly.

#### Journal of Thermal Spray Technology Committee

The Journal of Thermal Spray Technology (JTST) is a TSS publication, initiated in 1991 and published quarterly for an annual volume size of ~600 pages. JTST includes peer-reviewed technical papers vetted by global experts; technical notes aimed towards practitioners of the art; a calendar of events; industrial and product news; news concerning people and recent conference events; an abstracting service of recently published thermal spray articles; a summary of the TSS E-mail discussion list; and abstracts of patents related to thermal spray technology.

JTST is organized around two committees - the Editorial Committee chaired by Professor Chris Berndt, which functions as the policy-making body for JTST on behalf of the TSS Board and the ASM publisher, and the International Board of Review, chaired by JTST Editor-in-Chief, Dr. Christian Moreau which is responsible for maintaining the high quality and content of JTST.

JTST Committee membership, unlike other TSS committees, is by invitation only. Anyone interested in joining either of these committees, however, is encouraged to contact either of the two chairs - we are always looking for new members. JTST is the voice of the global thermal spray community. A personal subscription will not only bring personal and professional rewards by keeping readers current with the

latest thermal spray literature, but also ensure the sustainability of JTST for future generations.

Chairs: Professor Chris Berndt, FASM, James Cook University - Australia, email: [christopher.berndt@jcu.edu.au](mailto:christopher.berndt@jcu.edu.au), Dr. Christian Moreau, National Research Council - Canada, email [christian.moreau@nrc.nrc.gc.ca](mailto:christian.moreau@nrc.nrc.gc.ca)

#### TSS Membership and Marketing Committee

This committee is focused on actively increasing ASM/TSS membership and improving benefits for current members through an understanding of the ever-changing thermal spray science and commercial markets. An ongoing responsibility of this committee is to personally welcome both new and renewing members, while developing strategies for recruiting new members to the Society. Working together with the other Thermal Spray Society committees, the Membership and Marketing Committee works on important projects with each Committee by coordinating the resources needed to market valuable products and services.

Based on the Thermal Spray Society vision, this committee's purpose is to: "Develop an overall marketing strategy for the Society resulting in a product and service concept, a pricing strategy, as well as appropriate concepts regarding placement and promotion. Implement concepts in cooperation with other committees and monitor qualitative and quantitative effects of measures in order to achieve an overall financial contribution."

Chair: Mr. Charles M. Kay, ASB Industries, Inc. - Ohio, email [cmkay@asbindustries.com](mailto:cmkay@asbindustries.com) *(continued page 28)*



### Thermal Spray Tapes Reduce Costs and Retain Masking Quality

DeWAL is the industry leader in masking products. DeWAL thermal spray masking tape backings include foil, glass fabric, and silicone rubber impregnated glass fabric. These one-step single application tapes protect your work from grit blast and plasma spray.

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Fax: 401-783-6780 or 800-488-6780

Website: [www.dewal.com](http://www.dewal.com)

### TSS Accepted Practices Committee on Metallography

The Accepted Practices Committee on Metallography is responsible for collecting and presenting recommendations for the metallographic preparation of aerospace thermal spray coatings. With the vast number of spray shops and associated laboratories serving the aerospace industry, the need for and importance of accepted practices across the industry is quickly evident. Through its recommendations this committee helps keep the industry abreast of new developments and techniques applicable to the metallography of thermal spray coatings.

The committee has completed round robin testing on a number of coating families including thermal barrier coatings (TBCs), HVOF hard coatings, dimensional build-up coatings, and anti-fretting coatings. Future efforts will focus on coating families presenting unique metallographic challenges, such as abradable coatings and plasma sprayed hard coatings. The Committee is preparing summary documents for each coating family, and also regularly publishes articles in the Journal of Thermal Spray Technology (JTST) focusing on the metallographic preparation of thermal spray coatings.

Chairs: Mr. George Blann, Buehler Ltd - IL, email: george.blann@buehler.com and Mr. Doug Puerta, IMR Test Labs - NY, email dpuerta@imrtest.com

### TSS Safety Committee

The mission of the TSS Safety Committee is to develop and disseminate safe practices for the installation and use of thermal spray equipment and processes. The charter includes working with and supporting other international bodies, standards groups and/or other experts for the collection and unbiased evaluation of information. After consensus is achieved in the committee, written guidelines are produced. These guidelines are approved by the TSS Board and published on the TSS website. Three Guidelines are currently available, the latest being Thermal Spray Booth Design Guidelines published during 2005.

Membership of the Safety Committee represents academia, users from various industries, and suppliers of thermal spray equipment, materials and services. The committee is always ready to welcome new members and is looking for 2-3 people who can add a much-needed European and/or Asia/Pacific-Rim perspective to its activities.

Chair: Mr. Greg Wuest, Sulzer Metco (US) Inc. - NY, email gregory.wuest@sulzer.com

### TSS Program Committee

The TSS Programming Committee is responsible for organizing various forums for the exchange of information and networking within the global thermal spray community. Those include technical programs and seminars, conference proceedings, regional and international conferences and expositions at TSS-sponsored events or in conjunction and cooperation with other technical or commercial conferences. Upcoming events include the ITSC-2006 conference in Seattle, WA and the ITSC-2007 conference in Beijing, China in cooperation with our partner, the DVS from Germany and the Chinese Surface Engineering Association.. The committee has a truly global membership and is a key contributor to the promotion, proliferation and reputation of thermal spray technology throughout the world.

Chair: Mr. Peter Hanneforth, SpaCom LLC - NY, email: peter.hanneforth@spacom.com

### TSS Awards Committee

The TSS Awards Committee is responsible for coordinating the nominations of deserving members of the thermal spray community for appropriate awards. TSS awards include the Thermal Spray Hall of Fame (HoF) Award; the Thermal Spray Conference "Best Paper" Awards, and JTST "Best Paper" Awards. The committee also coordinates the nomination of members for ASM Awards, including nominations for Fellows of ASM.

Chair: Professor Joachim V. R. Heberlein, FASM, HoF, University of Minnesota - MN, email: jvrh@me.umn.edu

### TSS Outreach Committee

The TSS Outreach committee supports the TSS vision and mission through outreach and public relations programs that enhance the thermal spray industry image as measured by new industry outreach accomplishments, growth of society membership and society member satisfaction. The committee focuses on presenting thermal spray related papers at meetings of other societies, both at the local and international levels, universities and to non-traditional industries in order to broaden the scope and spread the word about thermal spray.

Chair: Mr. Bruce E. Dulin, Osram Sylvania - PA, email: bruce.dulin@sylvania.com

### TSS Information Development & Delivery Committee

The IDD committee is responsible for developing, compiling and disseminating relevant, high-quality, web-accessible information in a timely fashion consistent with the needs of the thermal spray and engineering community. The committee supports efforts in education, gathering of information of topical interest, and the generation of broad-based information of enduring interest and detailed information of immediate interest for specific applications. The information is mainly focused on education, safety and various technical or commercial interests. The committee draws on the global expertise of other societies, TSS and thermal spray end-users, applicators, research and University personnel and vendors to ensure that efforts are relevant to the community and consistent with TSS goals.



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After compilation, the information is disseminated via the TSS web site or flyers, booklets and/or CD's.

Chair: Dr. Jean-Gabriel Legoux, National Research Council - Canada, email: [jean-gabriel.legoux@nrc.ca](mailto:jean-gabriel.legoux@nrc.ca). Vice Chair: Karen L. Sender, Sulzer Metco (US), email: [Karen.sender@sulzer.com](mailto:Karen.sender@sulzer.com)

#### TSS Accepted Practices Committee on Mechanical Properties

The TSS Accepted Practices Committees on Mechanical Properties is working to develop and disseminate accepted practices for the measurement and characterization of the mechanical properties of thermal spray coatings and materials. This involves data collection, the unbiased evaluation of this information, and the generation of useful accepted practices for approval by the TSS Board, and publication. Accepted practices developed include the measurement residual stress in thermally sprayed coatings using the "Modified Layer Removal Method" and evaluation of Young's Modulus and Poisson's Ratio for thermal spray coatings. The committee is currently working on the X-ray measurement of residual stress in coatings and in-situ measurement of elastic modulus and residual stress.

Chair: Dr. Andrew Gouldstone, Suny at Stonybrook, email: [Andrew.gouldstone@stonybrook.edu](mailto:Andrew.gouldstone@stonybrook.edu)

#### TSS Training Committee

The TSS Training Committee is responsible for developing, delivering and supporting training materials and programs serving the needs of the thermal spray industry and its personnel. A primary role is the development of educational materials for training and the administering of operator and technologist programs. The committee is currently investigating operator certification and how programs may be developed for different certification levels. The committee is looking for volunteers to join the committee and help in its efforts. Recent committee projects included the Handbook of Thermal Spray Technology, published in late 2004.

Chair: Mr. William J. Lenling, Thermal Spray Technologies, Inc - WI, email: [blenling@tstcoatings.com](mailto:blenling@tstcoatings.com)

#### New Microbraz® Stop-Off Data Sheet



A new data sheet has been released, that, for the first time, covers the full line of Microbraz® Stop-Off products manufactured by Wall Colmonoy Corporation.

Detailed information is provided on the ten different types and grades of stop-off materials, including recommended uses and applications.

Microbraz Stop-Off materials are currently available which are suitable for controlled-atmosphere furnace brazing, torch brazing, molten-salt-dip brazing, thermal spray coating processes, and super-plastic forming operations. Special formulations have been developed to create Microbraz Stop-Off materials for use on many base metals, including reactive metals such as titanium and zirconium.

**For more information**, download Data Sheet 2.2.1 from the website at [www.wallcolmonoy.com](http://www.wallcolmonoy.com) or contact Wall Colmonoy Corporation, 30261 Stephenson Hwy, Madison Heights, MI 48071 USA, tel: 248.585.6400, fax: 248.585.7960.

#### ASME Turbo Expo 2006 To Be Held MAY 8-11, In Barcelona, Spain



ASME Turbo Expo 2006, the major technical conference on gas turbine technology, will be held May 8-11, 2006, at the Barcelona International Convention Center in Spain.

ASME Turbo Expo - Power for Land, Sea and Air will bring together engineers, research scientists, educators and other professionals involved in the design, operation, and maintenance of gas turbines. Combining a papers program and equipment exhibit, the conference will cover engine design, materials, operations and maintenance, noise reduction in turbines, alternative fuels, thermal spraying, combustion diagnostics, micro-turbines, and other topics of interest to the worldwide technical community.

The *International Thermal Spray Association* is an ASME Turbo Expo 2006 Participating Society.

Turbo Expo 2006 represents the 51st year running for the conference that has grown from a small technical meeting to a premier venue featuring an international audience.

**For additional information on the conference**, visit [www.turboexpo.org](http://www.turboexpo.org) (See advertisement page 42.)

**For additional information about the International Gas Turbine Institute**, visit [www.igti.asme.org](http://www.igti.asme.org)

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## Deloro Stellite to Establish a Plant in Montreal to Serve the Aircraft Landing Gear Industry



The Deloro Stellite Group announces a multimillion dollar investment in Montreal, Canada, where the Company plans to open a new high technology HVOF (High

Velocity Oxy-Fuel) coating facility. The new facility will be focused on serving the aircraft landing gear industry. Deloro Stellite has also entered into a strategic alliance with Placage Tecnickrome Inc, a Montreal-based Company who already provides advanced metallic surface treatments to the aerospace industry. This alliance will create the only integrated coating/surface processing facility located in close proximity to landing gear part manufacturers in Canada.

The majority of the world's aircraft landing gear is produced in Canada and Northern USA. However, the absence of a HVOF facility in this region capable of producing qualified coatings has resulted in landing gear manufacturers using geographically distant coatings shops based in the USA.

It has been recognised that this market requires an integrated process house in Canada. The combination of the Deloro Stellite investment at Montreal and the strategic alliance with Tecnickrome creates a first-class, leading-edge, integrated process solution. This comprehensive solution will enable landing gear manufacturers to produce and assemble complete aircraft landing gear systems within the Toronto-Montreal corridor.

The new Montreal facility will consist of multiple HVOF coating cells as well as comprehensive grinding and super finishing capabilities required to finish the tungsten-carbide coatings. The alliance with Tecnickrome completes the suite of complimentary technologies and capabilities which are required for high strength landing gear parts. Operationally this alliance will function as a one-stop shop, which will ensure the benefits of integrated planning and the subsequent production flexibility.

The Deloro Stellite Group is renowned for its range of STELLITE® alloys, and has provided wear and corrosion resistant coatings and alloys for nearly 100 years. The company has HVOF coating facilities in the USA, UK, Germany, and China, and the new coating facility in Montreal will strengthen its existing Canadian operation based in Belleville, Ontario.

Tecnickrome is a leading provider of metallic surface treatments for the aeronautical market, and is known for its

integrated services philosophy. The company offers a variety of plating processes such as chrome, cadmium, Ti-Cad, nickel, as well as the associated heat treatment, shot-peening, and a variety of non-destructive testing techniques.

The new facility will be commissioned during the first quarter of 2006, and the aim is to be fully approved and operational by mid-2006.

**For more Stellite Coatings information**, contact Danie DeWet, email [ddewet@stellite.com](mailto:ddewet@stellite.com) or Curt Glasgow, email [cglasgow@stellite.com](mailto:cglasgow@stellite.com), Stellite Coatings, 1201 Eisenhower Drive N., Goshen, Indiana 46526 USA, tel: (1)800.235.9353, fax: (1)219.534.3417, [www.stellite.com](http://www.stellite.com)

**For more Tecnickrome information**, contact Claude Gagliardi, email [claudio@tecnickrome.com](mailto:claudio@tecnickrome.com), Tecnickrome, 12264 April, Montreal Quebec, CANADA H1B 5N5, tel: (1)514.640.0333, fax: (1)514.640.6457, [www.tecnickrome.com](http://www.tecnickrome.com)



## Praxair and TAFE Develop New Line of Dust Collection Products

Praxair Surface Technologies and its subsidiary, TAFE Incorporated have developed a new line of dust collection products for the thermal spray industry, intended to help customers work toward compliance to the California Airborne Toxic Control Measure (ATCM).

The ATCM specifies what measures companies must take in order to control the amount of nickel and hexavalent chromium emissions generated by thermal spray processes. These measures include among other things the use of dry cartridge and HEPA filter dust collectors, acoustical enclosures and control interlocks to assure proper operation. The Praxair and TAFE products can assist customers to address many of the specific requirements of filter types (HEPA and dry cartridge), containment of thermal spray operations, safety and control and finally reporting and monitoring of dust collection equipment.

The product offerings come in various sizes and configurations to accommodate small to large thermal spray operations and are applicable to other similar control methods initiated by other state agencies.

Praxair Inc., parent company of Praxair Surface Technologies, Inc. and TAFE Incorporated, is the largest industrial gases company in North and South America, and one of the largest worldwide, with 2004 sales of \$6.6 billion. The company produces, sells and distributes atmospheric and

process gases, and high-performance surface coatings and related technologies.

**More information** on Praxair is available on the Internet at [www.praxair.com](http://www.praxair.com) or [prax-air.com/thermalspray](http://prax-air.com/thermalspray).



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## Praxair Surface Technologies Introduces 100MXC™ Nano Composite Wire

Praxair Surface Technologies and its subsidiary, TAFE Incorporated, announce the introduction of 100MXC nano composite thermal spray wire resulting from a recent agreement between Praxair and The NanoSteel Company.

This unique arc spray cored wire is developed as a single-source coating material solution for a variety of applications. Coatings formed from 100MXC wire provide improved corrosion protection over conventional materials, superior bond strengths, and hardness levels similar to some HVOF coatings.

The 100MXC wire is one of several new nanophase thermal spray wires available exclusively from TAFE Incorporated.

**More information** on Praxair is available on the Internet at [www.praxair.com](http://www.praxair.com) or [www.praxair.com/thermalspray](http://www.praxair.com/thermalspray).

## Gartman Technical Services Integrates Shop Management Software (SMS) With Thermal Spray Companies Web Sites

Gartman Technical Services, Inc (GTS) has recently made several improvements and enhancements to its Shop Management Software (SMS). SMS can now produce a variety of data regarding the status of jobs and/or product availability directly to a company's web site. As jobs are received, processed, and completed, data is automatically fed to the company's web site. Customers can be provided account names and passwords which allow them to login to a secured area of the web site to see the status, including shipping tracking numbers, for all of their specific jobs.

SMS can provide a dynamic link to a company's web site to reflect up-to-date product inventory and/or material availability. The job status, product inventory, and material availability can be uploaded to the website instantly or on a programmable delayed basis depending on network configurations. GTS provides full service technology for web hosting and web site development.

The SMS software has further been enhanced to provide "mass" email generation to selective customers and/or prospects with user defined content. SMS has a comprehensive Contact Management facility that includes multiple contacts for any customer. Each contact can have multiple mailing and email addresses, phone numbers, notes, comments, and automated reminders. In addition, multiple search codes can be established for each contact. Customer and prospect data can be maintained for specific parts and subsequently selected for targeted advertising. This system is fully integrated with Outlook and Exchange Server contact data.

SMS is a full featured software application for the thermal spray job shop. It includes all facets of job and work order processing, quotes, purchase orders, inventory management, automated accounting feeds, shipping and receiving, bar coding, scanning, and many more features. Several specialty features are included for the aircraft and printing industries.

GTS is a full service information technology company with its major operations base in Arizona. Their competent certified staff of computer technicians and data base programmers has facilitated an impressive growth rate year after year.

GTS has been providing customized software, hardware, and web services to the thermal spray and metal industries since 1997. GTS continues to provide top quality IT services to many clients and many industries. Another way they are helping is through the GTS quarterly newsletter which can be subscribed to via their website.

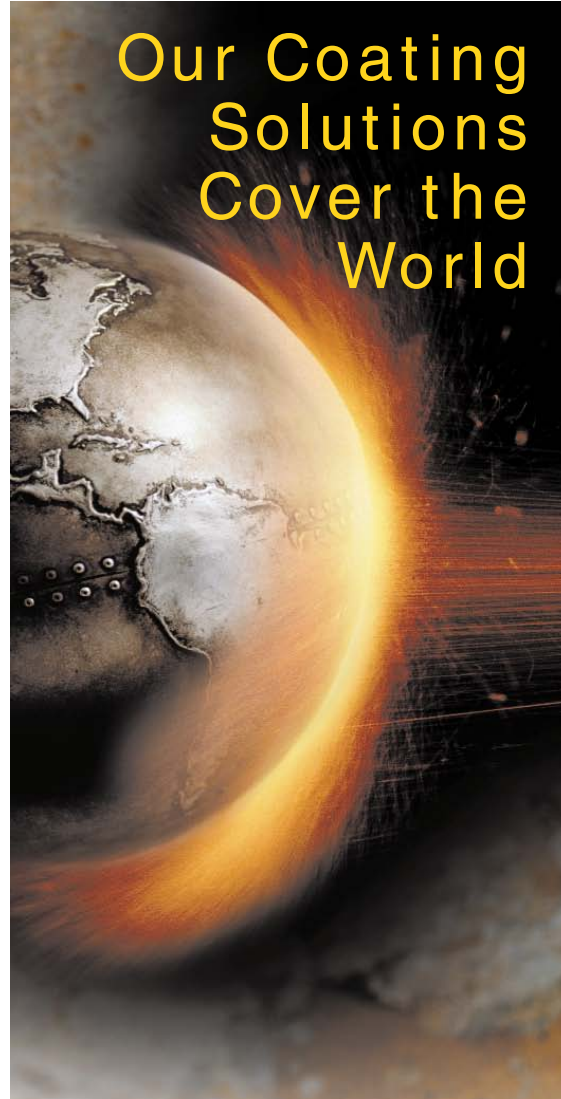
**For more information**, contact GTS, web: [www.gartmantechanical.com](http://www.gartmantechanical.com), email: [sales@gartmantechanical.com](mailto:sales@gartmantechanical.com), tel: 602.788.8121. See advertisement page 20.

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**14 Year Anniversary - SPRAYTIME** First Quarter 2006

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## Sulzer Metco's New TriplexPro™-200 SULZER Plasma Spray Gun Delivers Unprecedented Benefits

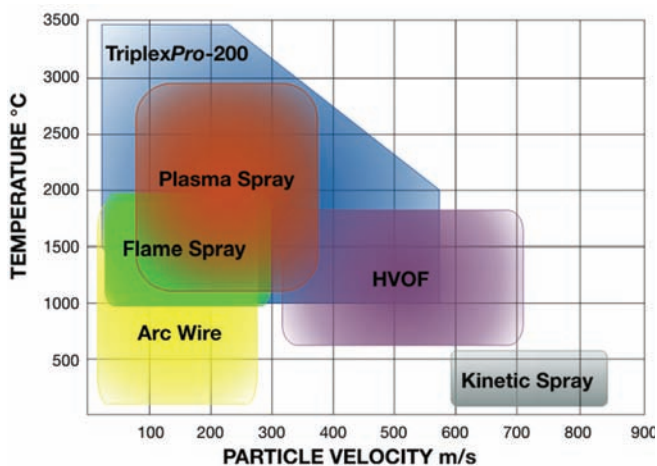
Sulzer Metco's latest plasma spray gun, the TriplexPro™-200, is sure to please the many customers who want to control costs in their plasma spray facility, as well as customers who would like to extend the range of their plasma spray applications.

"TriplexPro-200 is not a 'one size fits all' product concept, but a 'tool kit' consisting of a robust universal gun body, combined with a selection of plug-on devices," says Dave Hawley, Product Line Manager - Equipment for Sulzer Metco.



**TriplexPro-200 can produce everything from high enthalpy flames to supersonic flames; creating new possibilities for plasma spray.**

TriplexPro-200 builds on Sulzer Metco's expertise in triple-cathode, cascading arc plasma gun technology. However, where previous models had limited application in niche markets, TriplexPro-200 is an all-purpose plasma spray product platform that provides the best coating alternative in 80 percent of the existing plasma applications, and opens new operational parameter capabilities not normally associated with plasma technology. The gun is highly effective for everything from abrasives to high-energy



**TriplexPro-200 significantly extends the useful application region of plasma spray.**

plasma. The TriplexPro-200 achieves plume characteristics of high enthalpy, with low gas flows and particle velocities, to supersonic gas flows with high particle velocities, simply by reconfiguring the gun internal components.

Customers will also appreciate the efficiency and economy of the TriplexPro-200. Production throughputs (deposit efficiency vs. spray rates) are as much as 400% better than conventional plasma spray guns, reducing the cost of spray powder and overspray waste. Many parameters require only argon gas, reducing the requirement for scarce helium. Gun consumables can last for 200 hours, or 16 continuous spray shifts, with little to no process drift. When gun maintenance is required, the customer easily performs it in-house, which is an improvement that is very welcomed by lead customers for the gun. Also of note, is that no thoriated tungsten is used in any of components, eliminating the need for hazardous waste disposal.

**To take control** of your surface engineering challenges, contact your Sulzer Metco sales office, visit our website at [www.sulzermetco.com](http://www.sulzermetco.com) or email us at [info@sulzermetco.com](mailto:info@sulzermetco.com).

### New Products from Stronghold Coatings

Larry F. Grimenstein, president of Nation Coating Systems, Inc. (NCS) announces the opening of a new business, Stronghold Coatings, Ltd. The new veteran-owned company will work in the field of composite polymer/plastic and thermal spray coatings. Stronghold Coatings has an R & D spray facility at NCS and soon will be opening a new Metallurgical Lab for development and testing of new products. Focus will be on working in the commercial, aviation and military markets. Projects that are presently being worked on are special composite coating for severe corrosion pump applications. Also a major project is development of low-cost, high-quality HVOF coatings for all industries.

Two new products that have been developed are Dichtol and Liquid Mask. Dichtol is a sealing material for porosity in thermal spray coatings. It has exceptional high capillary action, so it impregnates and seals the coating. Dichtol is resistant to both acids and caustic materials. Its high temperature capability is 250°C (482°F) continuous and there is even a version that will take 500°C (932°F) continuous.

The second new product, Liquid Mask, is now ready to package, sell and send out samples. It is a polymeric material that can be brushed or dipped to provide protective masking for thermal sprayed parts. It has been tested on both electric arc and plasma coatings and works very well. After thermal spray coating the masking is easily removed and gives an excellent protection. It even works on some HVOF coatings, but would have to be tested for each application. Some HVOF coated parts see too much heat and too long of exposure and the masking does not hold up. Equipment such as turntables have also been protected from overspray using this masking material.

**For more information**, contact Larry Grimenstein, email: [ncslgrimen@aol.com](mailto:ncslgrimen@aol.com), tel: 937.746.7632, fax: 937.746.7658, web: [www.nationcoatingsystems.com](http://www.nationcoatingsystems.com)





## Plasmatec Officially Launches Thermal Spray Division to Meet Industry R&D and Customer Demand

Plasmatec Inc., located in Montreal Canada, has established and launched its own Thermal Spray Division to meet industry research and development and production demand. The focus of this division is to develop engineered coatings solutions for the thermal spray industry.

This concept was beta tested beginning in 2004. Plasmatec and a major OEM of aeroturbine engines codeveloped and engine tested a Plasmatec coating on the roots of turbine blades. The results of the test out-performed customer expectations when the Plasmatec coating lasted three times longer than the conventional plasma spray coating.

This kind of result has been possible due to the way the original problem was approached. First a complete analysis of the challenge was identified and mapped out. Once a profound understanding was established, Plasmatec looked to use novel approaches, methods, and equipment. The engineered solution decision was made to use a fourth generation HVOF system named "G4", combined with unique spray techniques. Turn-around time for the customer was a key element to meet engine test schedules.

Plasmatec's in-house capabilities were a major factor in complying with short timeline. Its internal capabilities and staffing competencies include: complete state-of-the-art robotic thermal spray acoustic spray cell (APS, HVOF, HVOF

G4, ARC, HVOF ARC), machine shop for making all of its own tooling, DPV 2000 in flight particle analyzer, complete metallographic laboratory including pull tester. The team includes mechanical and metallurgical engineers, experienced operators, and dynamic management.

A co-patent application between Plasmatec and the OEM has been submitted and a coating specification approval number by the OEM is pending.

Plasmatec has been able to repeat this formula with other customers. It has on-going projects with OEM companies covering industrial applications, land base engine power generation, and aeroturbine engine coating applications.

Due to customer demand for Plasmatec coatings, a two-shift, seven days a week production staff had to be put in place in mid 2005.

Plasmatec Inc. was established in 1985 and continues to supply powder, wires, masking tapes, and turnkey thermal spray systems through its distribution division. Notably the Plasmatec web site [www.plasmatec.com](http://www.plasmatec.com) "STEALS & DEALS" section is now being recognized as the thermal spray industries' equivalent to "e-bay" for selling or buying used equipment.

**For more information** contact Shelby Hacala Vice President at 1-800-642-6695, 514-931-1301 or via e-mail at [shelby@plasmatec.com](mailto:shelby@plasmatec.com) (see advertisement page 40)



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representatives to better understand member benefits. A complete list of ITSA member companies and their representatives are at [www.thermalspray.org](http://www.thermalspray.org)

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Chairman: Ed Simonds, Cincinnati Thermal Spray  
Vice-Chairman: Marc Froning, Engelhard Surface Technologies  
Treasurer: Bill Mosier, Polymet Corporation

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#### **Website Committee**

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### **ITSA Scholarship Opportunities**

The International Thermal Spray Association offers annual Graduate and Undergraduate Scholarships. Since 1992, the ITSA scholarship program has contributed to the growth of the thermal spray community, especially in the development of new technologists and engineers. ITSA is very proud of this

education partnership and encourages all eligible participants to apply. Please visit [www.thermalspray.org](http://www.thermalspray.org) for criteria information and a printable application form.

### **ITSA Materials Camp Student Sponsor**

Commencing in 2001, the International Thermal Spray Association provides an annual \$1,500 student scholarship to the ASM International Foundation Materials Camp.

### **ITSA Thermal Spray Historical Collection**

In April 2000, the International Thermal Spray Association announced the establishment of a Thermal Spray Historical Collection which is now on display at their headquarters office in Fairport Harbor, Ohio USA.

Growing in size and value, there are now over 30 different spray guns and miscellaneous equipment, a variety of spray gun manuals, hundreds of photographs, and several thermal spray publications and reference books.

Future plans include a virtual tour of the collection on the ITSA website for the entire global community to visit.

This is a worldwide industry collection and we welcome donations from the entire thermal spray community.

### **ITSA SPRAYTIME Newsletter**

Since 1992, the International Thermal Spray Association has been publishing the **SPRAYTIME** newsletter for the thermal spray industry. The mission is to be the flagship thermal spray industry newsletter providing company, event, people, product, research, and membership news of interest to industrial leaders, engineers, researchers, scholars, policy-makers, and the public thermal spray community.

For a free **SPRAYTIME** subscription, visit [www.spraytime.org](http://www.spraytime.org) and complete the short questionnaire.

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 Mr. Howard Wallar, [howard.wallar@saint-gobain.com](mailto:howard.wallar@saint-gobain.com)

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 Mr. Friedrich Herold, [friedrich.herold@sulzer.com](mailto:friedrich.herold@sulzer.com)

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 Mr. David Lewisen, [davelewis@thermach.com](mailto:davelewis@thermach.com)

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 PHONE: 360.692.6469, FAX: 360.698.1684  
 Mr. Dean Hooks, [dean@thermioninc.com](mailto:dean@thermioninc.com)

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### Three New Members Join International Thermal Spray Association

The International Thermal Spray Association proudly welcomes:

#### Bay State Surface Technologies



Bay State Surface Technologies, Inc. is a long-time manufacturer of thermal spray equipment and materials, and a recognized industry leader in coating application.

Bay State is a subsidiary of Aimtek, Inc., with plants in Auburn and Millbury, Massachusetts. Bay State manufactures and supplies a complete line of thermal spray equipment, powder, and wire. With over forty years as an OEM in the business, Bay State has long been known for their unique design PlasmaGun™ systems and ceramic powders. Recent additions to the Bay State product line include the new PS-2004 80kW SCR-type Power Supply and the CP-640-R PLC-based Control Console with robotic interface capability.

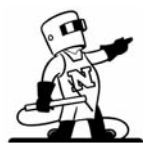
Aimtek, Inc., parent company of Bay State Surface Technologies, Inc. was founded in 1973 and is an award-winning manufacturer and supplier of brazing materials, industrial gases and welding equipment. Aimtek was twice awarded the New England Small Business Subcontractor of the Year by the U.S. Small Business Administration and currently supplies products to a variety of industries including aerospace, semiconductor, automotive and utilities. The combination of the Bay State product lines with the Aimtek family of products results in a combined company uniquely qualified to provide quality products and services in the areas of material coating and joining.

**For more information**, phone 1-800-772-0104 or visit website [www.aimtek.com/baystate](http://www.aimtek.com/baystate) (see pages 16 and 17)

#### Nooter Construction Company



Nooter Construction Company, with over 100 years of safety and quality driven experience, announces the expansion of its construction and mechanical services by providing thermal spray field applications to the refining, power, mining and related industries.



With the electric arc thermal spray process, coupled with proprietary wire products, NCC will now provide an alternative process to protect or repair components and equipment subject to severe corrosion or erosion environments

including those operating at high temperatures.

Nooter Construction is committed to delivering safe, quality, reliable and cost effective projects to its customers. To deliver these objectives Nooter's involvement starts at the beginning, working with customers, its wire manufacturing company, and QA/QC department to provide the highest quality coatings for each specific application.



Company and subsidiary offices include:

- Nooter Construction, St. Louis, MO, 314-421-7600
- Nooter Construction, Philadelphia, PA 215-638-7474
- RMF Nooter, Toledo, OH, 419-727-1970
- Delta Nooter, St. Louis, MO, 314-421-7750
- Delta Nooter, Philadelphia, PA, 215-638-7474

**For additional information** or to discuss specific applications contact Mike Murphy, Construction Manager at 215-638-7474, email: [mjmurphy@nooter.com](mailto:mjmurphy@nooter.com), or [sales@nooterconstruction.com](mailto:sales@nooterconstruction.com), and visit website: [www.nooterconstruction.com](http://www.nooterconstruction.com)

#### Wyatt Field Service Company



Wyatt Field Service Company maintains a distinguished reputation as a leading heavy mechanical contractor serving the refining, petrochemical and pulp and paper industries.

Wyatt is a preferred provider for total project and welding services. Wyatt's outstanding safety record ranks at the top of their industry.

Starting in 2006, Wyatt is additionally offering field thermal spray applications for severe service conditions.

Founded in 1913, Wyatt became a leader in the design, fabrication and field construction of towers, vessels, spheres and storage tanks.

Wyatt Field Service Company became a wholly-owned subsidiary of Nooter Corporation in 1985.

With more than 90 years experience in field fabrication, maintenance and emergency repair, Wyatt offers exceptional field service capabilities from routine welding to major process unit revamps and turn-around projects.

Wyatt Field Service company offices include:

- Corporate Headquarters - Houston, TX, 713-570-2000
- Port Arthur, TX, 409-963-3648
- Corpus Christi, TX, 361-241-6930
- Baton Rouge, LA, 225-749-8033
- Torrance, CA, 310-593-4969
- Puerto Rico, 787-864-4181

**For more information** on our new thermal spray field applications contact: [jjordan@wyattfieldservice.com](mailto:jjordan@wyattfieldservice.com) and visit [www.wyattfieldservice.com](http://www.wyattfieldservice.com)



### 2006 - 2007 ITSA Membership and Technical Program Meetings

May 2006 - Seattle, Washington

October 2006 - Hartford, Connecticut

April 2007 - Phoenix, Arizona



## MEC Receives D&B Rating

Metallizing Equipment Company (MEC), a corporation of 40 years of activity, already having ISO 9001:2000 certification from BVQI, has recently obtained the SE-2A Rating from Dun and Bradstreet (D&B).

MEC has its own modern research and development laboratory recognized by the Department Of Science and Industrial Research, Government of India.

MEC has expertise in producing a range of thermal spray equipment and now has started supply of automatic and custom-built systems for the HVOF, arc spray and flame spray processes for a variety of industries.

MEC will soon undertake high tech thermal spray jobs for which they have obtained KUKA Robot and are ordering a large grit blasting and thermal spray room.

For more information, visit [www.mecpl.com](http://www.mecpl.com) or email [mecpl@vsnl.com](mailto:mecpl@vsnl.com), tel: +91.291.2747601, fax: 91.291.2746359

## Nominations Now Being Accepted for ASM Thermal Spray Society Board



The terms of four current members of the ASM Thermal Spray Society Board will expire in October of this year. The ASM TSS Nominating Committee is currently seeking nominations to fill these four positions.

In accordance with the TSS Rules for Governance, the

Committee is particularly seeking nominees for vice president and three directors from the users community. However, nominations are solicited from all segments of the thermal spray community.

Nominees must be a member of the ASM Thermal Spray Society and must be endorsed by five members. Board members whose terms are expiring may be eligible for nomination and possible re-election on an equal basis with any other nominee.

**Nominations must be received no later than May 15, 2006.** See page 11 for current ASM TSS Board listing.

A nomination form can be obtained via the ASM TSS website at <http://www.asminternational.org/tss>. If you have questions, please contact Chris Berndt, ASM TSS Nominating Committee Chair, email: [Christopher.berndt@jcu.edu.au](mailto:Christopher.berndt@jcu.edu.au).

### *Journal of Thermal Spray Technology*<sup>®</sup>

*"The only English-language, critically reviewed journal reporting on international scientific, engineering and technology advances in thermal spraying."*

(An abstract from December 2005 VOL. 14: NO. 4)

#### **Examination of a Grit-Blasting Process for Thermal Spraying Using Statistical Methods**

*James Day, Xiao Huang, and N.L. Richards*

An experimental study was conducted to develop an understanding of how the grit blasting process, prior to plasma spray coating, affects various properties of the substrate and coatings. A statistical design of experiment approach was used and the results were analyzed using both the linear regression method and average response of factors calculations. The following process variables were studied: grit size (20, 36, 54), blasting pressure (20, 35, 50 psi), blasting duration (4, 6, 8 passes), blasting distance (4, 6 in.), and blasting angle (45°, 90°). Properties such as bond strength, grit contamination, surface roughness, and substrate distortion were evaluated and correlated to the process variables. Based on multiple linear regression results, it was shown that the bond strength can be improved by increasing all of the parameters within the range studied here. No relationship between the surface roughness and bond strength was observed. Grit contamination is mostly influenced by grit size, blasting pressure, and number of blasting passes. The average response method provided indications to the direction of modifying the required properties as a function of process variables. While the average response method agreed mostly with the linear regression predication, some differences are further discussed in the study.

**Read the entire article in the December 2005 *Journal of Thermal Spray Technology*. For more information** visit [www.asminternational.org/tss](http://www.asminternational.org/tss) or contact ASM Customer Service Center, ext. 5900 tel: 800.336.5152 (toll free in United States) or 440.338.5151; fax 440.338.4634; e-mail: [customerservice@asminternational.org](mailto:customerservice@asminternational.org)

A publication of the **ASM Thermal Spray Society**

**Editor:** Christian Moreau

**Associate Editors:** Jan Ilavsky, Seiji Kuroda, Lech Pawlowski, and Armelle Vardelle



**Is Your Event Listed? Send your event notice to [spraytime@thermalspray.org](mailto:spraytime@thermalspray.org)**

## CALENDAR OF EVENTS

### MARCH 2006

**1-2 Haifa, Israel** 46th Israel Conference on Aerospace Sciences - contact Prof. Yeshayahou Levy, tel: 972-4-8292713; fax: 972-4-8292030; e-mail: [levy46th@aerodyne.technion.ac.il](mailto:levy46th@aerodyne.technion.ac.il); web: [www.aeroconf.org.il/conf](http://www.aeroconf.org.il/conf).

**12-17 San Diego, CA USA** Corrosion 2006 - contact NACE Headquarters, tel: 281.228.6200, web: [www.nace.org](http://www.nace.org)

### APRIL 2006

**3-7 Detroit, MI USA** SAE World Congress - tel: 877.606.7323 or 724.776.4970, fax: 724.776.0790, em: [customerservice@sae.org](mailto:customerservice@sae.org), web: [www.sae.org](http://www.sae.org)

**17-21 San Francisco, CA USA** 2005 MRS Spring Meeting - Materials Research Society, tel: 724.779.3003, fax: 724.779.8313, email: [info@mrs.org](mailto:info@mrs.org), web: [www.mrs.org](http://www.mrs.org)

**24-26 San Antonio, TX USA** 3rd Intl Brazing & Soldering Conf. (IBSC) - ASM Int'l and American Welding Society, contact ASM International, tel: 800.336.5152 or 440.338.5151 ext. 5900, fax: 440.338.4634; email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org), web: [www.asminternational.org](http://www.asminternational.org)

### MAY 2006

**1-4 Cleveland, OH USA** Iron & Steel Technology Conference & Expo (AISTech 2006) - contact Assn. for Iron & Steel, tel: 724.776-6040; fax: 724.776-1880; e-mail: [info@aist.org](mailto:info@aist.org); Web: [www.aistech.org](http://www.aistech.org)

**2-4 Long Beach, CA USA** SAMPE 2006 - Society for the Advancement of Materials & Process Engineering, tel: 626.331.0616, fax: 626.332.8929, email: [doris@sampe.org](mailto:doris@sampe.org), web: [www.sampe.org](http://www.sampe.org)

**8-11 Barcelona, Spain** ASME Turbo Expo 2006 - The 51st Annual Technical Congress & Exposition for the Worldwide Gas Turbine Community - visit web: [www.turboexpo.org](http://www.turboexpo.org)



**15-18 Seattle, WA USA Int'l Thermal Spray Conference/Exposition (ITSC 2006), 5th Int'l Surface Engineering Congress & Exposition (ISEC '06), and 17th Advanced Aerospace Materials & Processes Conference/Exposition (AeroMat 2006)** - contact ASM International, tel: 800.336.5152 or 440.338.5151, web: [www.asminternational.org](http://www.asminternational.org), email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org)



### JUNE 2006

**4-9 Sicily, Italy** 11th Intl Ceramics Congress and 4th Forum on New Materials CIMTEC 2006 - contact CIMTEC tel: +0546.22461/664143, fax: +0546.664138/663362, email: [congress@technagroup.it](mailto:congress@technagroup.it), web: [www.cimtec-congress.org](http://www.cimtec-congress.org)

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**12-15 Norfolk, VA USA** *Marine/Offshore Coatings and Corrosion Conference* - visit [www.nstcenter.com](http://www.nstcenter.com) or contact Rose Rittman, tel: 502.638.4435 to call in your registration.

**18-21 San Diego, CA USA** *Intl Conference on Powder Metallurgy & Particulate Materials, (Powdermet 2006)* Manchester Grand Hyatt Hotel - contact Sandra Leatherman, Metal Powder Industries Federation, tel. 609-452-7700, Fax: 609-987-8523, [info@mpif.org](mailto:info@mpif.org), [www.mpi.org](http://www.mpi.org)

**21-22 Manchester, UK** *Exhibition for Coatings, Adhesion, Colour & Corrosion (SURFEX 2006)* - contact Surfex Ltd., Wembly, U.K. tel: +44 (0)20 8908 1086; fax: +44 (0)20 8908 1219; e-mail: [surfex@occa.org.uk](mailto:surfex@occa.org.uk); Web: [www.occa.org.uk](http://www.occa.org.uk).

**25-29 Toronto, Ontario Canada** *First Int'l Congress on Ceramics*. Organized by American Ceramic Society, European Ceramic Society, and Ceramic Society of Japan - Jeanete Rivard, tel: 614.794.5859, web: [www.ceramics.org](http://www.ceramics.org), email: [customerservice@ceramics.org](mailto:customerservice@ceramics.org),

### **JULY 2006**

**4-8 Vancouver, British Columbia, Canada** *Int'l Conference on Processing & Manufacturing of Advanced Materials (THERMEC 2006)* - tel: 604.681.5226, fax: 604.681.2503, email: [thermec2006@venuewest.com](mailto:thermec2006@venuewest.com), <http://thermec.uow.edu.au>

**30 JUL-3 AUG Chicago, IL USA** *39th Intl Metallographic Society IMS Convention* - contact ASM International, tel: 800.336.5152 or 440.338.5151 ext. 5900, fax: 440.338.4634; email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org), web: [www.asminternational.org](http://www.asminternational.org)

### **SEPTEMBER 2006**

**17-22 Hyannis, MA USA** *6th Intl Conference on Fatigue Damage of Structural Materials* - Sophie Peters, email: [s.peters@elsevier.com](mailto:s.peters@elsevier.com), web: [www.fatiguedamage.elsevier.com](http://www.fatiguedamage.elsevier.com)

**18-20 Cincinnati, OH USA** *Materials Science & Tech 2006 Conf @& Expo (MS&T'06)* - organized by ASM, ACerS, AIST, AWS, and TMS, contact ASM Int'l, tel: 800.336.5152 (ext. 5900) or 440.338.5151, fax: 440.338.4634, email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org), web: [www.asminternational.org](http://www.asminternational.org)

**25-29 Vienna Austria** *15th Int'l Federation for Heat Treatment & Surface Engineering Congress* - contact Austrian Society for Metallurgy and Materials, tel: +43(0)3842.45189, fax: +43(0)3842.402.2202, email: [asmet@unileoben.ac.at](mailto:asmet@unileoben.ac.at), web: [www.asmet.at/ifhtse2006](http://www.asmet.at/ifhtse2006)

### **OCTOBER 2006**

**11-12 Worcester, MA USA** *Vacuum Carburizing* - contact ASM Int'l, tel: 800.336.5152 (ext. 5900) or 440/338-5151, fax: 440.338.4634, email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org), web: [www.asminternational.org](http://www.asminternational.org)

**16-19 Cincinnati, OH USA** *Materials Science & Technology 2006 Conference & Exhibition (MS&T 2006)* Organized by ASM, ACerS, AIST, AWS, and TMS. contact ASM Int'l, tel: 800.336.5152 (ext. 5900) or 440/338-5151, fax: 440.338.4634, email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org), web: [www.asminternational.org](http://www.asminternational.org)

**23-25 Ghent, Belgium** *Euro PM2006 Congress* - contact European Powder Metallurgy Assn, tel: +44(0)1743.248899, fax: +44(0)1743.362968, web: [www.euroblech.com](http://www.euroblech.com), email: [eb.enquiries@mackbrooks.co.uk](mailto:eb.enquiries@mackbrooks.co.uk),

**31 OCT - 2 NOV Atlanta, GA USA** *FABTECH Int'l & AWS Welding Show* - organized by American Welding Society, web: [www.aws.org](http://www.aws.org), Fabricators & Mfgs Assoc, web: [www.fmafabtech.com](http://www.fmafabtech.com), Society of Manufacturing Engineers, web: [sme.org/fabtech](http://sme.org/fabtech)



### **NOVEMBER 2006**

**12-16 Austin, TX USA** *32nd Int'l Symposium for Testing & Failure Analysis (ISTFA2006)* - ASM Int'l, tel: 800.336.5152 or 440.338.5151, web: [www.asminternational.org/events](http://www.asminternational.org/events), fax: 440.338.4634; email: [cust-srv@asminternational.org](mailto:cust-srv@asminternational.org),

### **MARCH 2007**

**11-15 Nashville, TN USA** *NAACE Int'l. Corrosion 2007* - contact Cindy Euton, tel: 281.228.6274, fax: 281.228.63.74, email: [cindy.euton@nace.org](mailto:cindy.euton@nace.org), web: [www.nace.org/c2007](http://www.nace.org/c2007)

**26-28 Cambridge United Kingdom** *Fatigue 2007: Fatigue & Durability Assessment of Materials, Components & Structures* -



contact Engineering Integrity Soc UK tel: +44(0)114.262.1155, fax: +44(0)114.262.1120, email: [fatigue@e-i-s.org.uk](mailto:fatigue@e-i-s.org.uk), web: [www.e-i-s.org.uk](http://www.e-i-s.org.uk)

### APRIL 2007

**16-20 Detroit, MI USA** *SAE World Congress* - Contact tel: 877.606.7323 or 724.776.4970, fax: 724.776.0790, email: [customerservice@sae.org](mailto:customerservice@sae.org), web: [www.sae.org](http://www.sae.org)

### MAY 2007

**13-17 Beijing, China** *Intl Thermal Spray Conference & Expo ITSC 2007* - contact ASM Int'l, tel: 800.336.5152 (ext. 5900) or 440/338-5151, fax: 440.338.4634, web: [www.asminternational.org](http://www.asminternational.org), email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org)

**14-17 Montreal, Canada** *ASME Turbo Expo 2007*



- visit [www.turboexpo.org](http://www.turboexpo.org)

### AUGUST 2007

**6-9 Fort Lauderdale, FL USA** *40th Intl Metallographic Society IMS Convention* - contact ASM International, tel: 800.336.5152 or 440.338.5151 x5900, fax: 440.338.4634; em: [cust-srv@asminternational.org](mailto:cust-srv@asminternational.org), web: [www.asminternational.org](http://www.asminternational.org)

### SEPTEMBER 2007

**17-19 Detroit, MI USA** *Materials Science & Tech. Conf & Expo (MS&T'07)* - organized by ASM, ACerS, AIST, AWS, and TMS, and held in conjunction with ASM Heat Treating Society Conf./Expo, contact ASM Int'l, tel: 800.336.5152 or 440/338-5151 (ext. 5900), fax: 440.338.4634, web: [www.asminternational.org](http://www.asminternational.org), email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org),

**17-20 Detroit, MI USA** *24th ASM Heat Treating Society Conf & Expo* - held in conjunction with MS&T'07 - contact ASM Int'l, tel: 800.336.5152 or 440/338-5151 (ext. 5900), fax: 440.338.4634, web: [www.asminternational.org](http://www.asminternational.org), email: [customerservice@asminternational.org](mailto:customerservice@asminternational.org)

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### FREE Thermal Spray Patent Copy

Copies of the original Schoop thermal spray patent - suitable for framing - are available from the International Thermal Spray Association. This is a photograph copy of the original February 19, 1914 "Apparatus For Spraying Molten Metal and Other Fusible Substances" by M. U. Schoop from the United States Patent Office. (See pages 24-25)

Send an email request with your mailing address to [kathydusa@thermalspray.org](mailto:kathydusa@thermalspray.org).

### EMPLOYMENT WANTED

Mr. **Milan Ivosevic**, a graduating Materials/Mechanical Engineer/Scientist with multidisciplinary background and experience seeking a challenging position in the field of Thermal Spray Technology. In addition to his PhD and MS thermal spray experience, Milan has nearly six years of experience assisting in problem-solving and the development of coating systems for various industrial applications carried out at Drexel University's Center for the Plasma Processing of Materials (Supervisor: Dr. Richard Knight).



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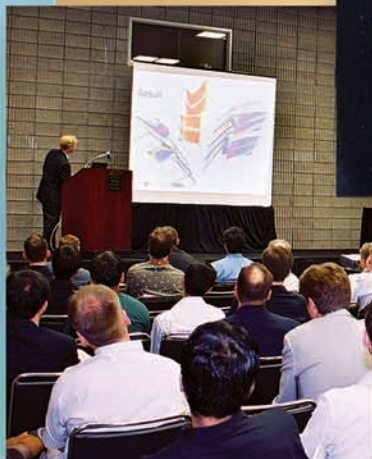
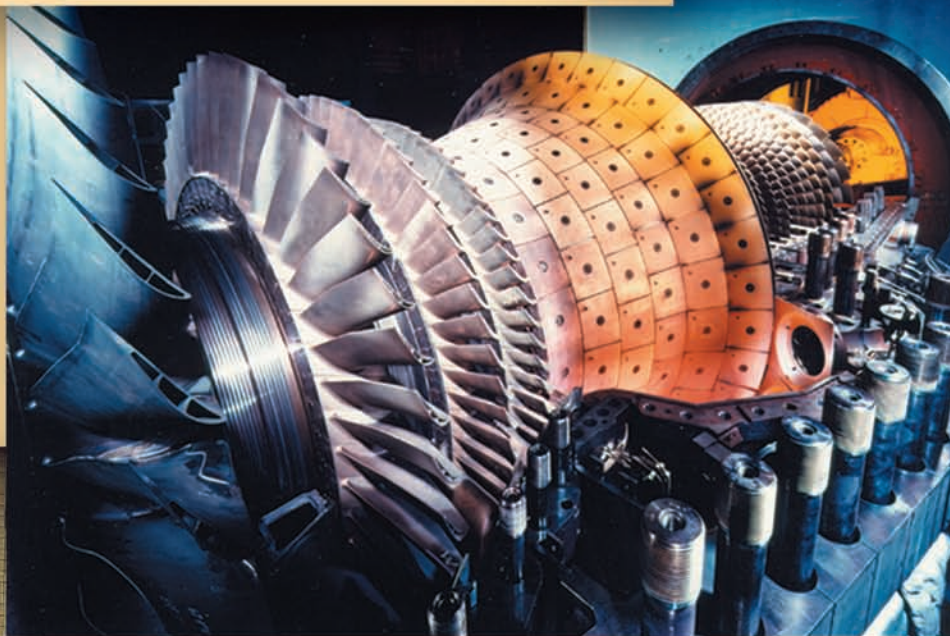
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## Rybicki Selected 2005 Outstanding Professional Engineer by Oklahoma Society of Professional Engineers

**Edward F. Rybicki** has been selected the 2005 Outstanding Professional Engineer by the Oklahoma Society of Professional Engineers.



In thermal spray coatings, Rybicki's area is controlling residual stresses and enhancing wear resistance to improve coating performance and life. He is working with Professor John Shadley of the Mechanical Engineering Dept at the University of Tulsa. Two recent Accepted Practices of ours on evaluating mechanical properties of thermal spray coating have been published by the ASM Thermal Spray Society.

**Edmund F. Rybicki**, Ph.D., P.E., FASME, FAWS, FASM is also the Harry H. Rogers Chair of Mechanical Engineering and Department Chair. He is director of The Erosion/Corrosion Research Center at the University of Tulsa.

**For more information**, visit <http://www.ecrc.utulsa.edu>, tel: 918.631.2996, email: [ed-rybicki@utulsa.edu](mailto:ed-rybicki@utulsa.edu)



### Scholarship Opportunities

The International Thermal Spray Association will award up to two (2) Graduate scholarships worth \$1,500.00 each to be awarded each calendar year and up to three (3) Undergraduate scholarships worth \$500.00 each to be awarded each calendar year

Since 1991, the ITSA Scholarship Program has contributed to the growth of the Thermal Spray Community, especially the development of new technologists and engineers. The International Thermal Spray Association is very proud of this education partnership and encourages all eligible students to apply.

Scholarship applications are now accepted annually **April 15 through June 30 ONLY** for both the Graduate and Undergraduate scholarships.

**For more information**, please visit [www.thermalspray.org](http://www.thermalspray.org) scholarship area for details and a printable application form.



### ITSA Technical Program Open to Public

The International Thermal Spray Association member companies have agreed to encourage non-member attendees at the technical program portion of their membership meetings. ITSA semi-annual membership meetings are typically three-day events with a thermal spray technical program on Friday from 8:00 am through 5:00 pm.

In revising their long-standing "member only" attendance policy, ITSA is responding to interest from non-member individuals wanting to take advantage of these valuable thermal spray educational opportunities.

The October 2006 Technical Program will be held in Hartford, Connecticut. The cost for non-members to attend the ITSA Technical Program is \$300, which includes breakfast and lunch.

**For more information**, contact Kathy Dusa, ITSA Corporate Secretary at [kathydusa@thermalspray.org](mailto:kathydusa@thermalspray.org)

**WHERE IS YOUR ARTICLE?** You and your company have the opportunity to help design the content of this thermal spray community newsletter.

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## Angel of the Desert - Stace Garrity

*Stacy Garrity of Osram Sylvania won over Iraqis while serving with the United States Army Reserves.*

While the world's attention focused on the misbehavior of some U.S. soldiers at the Abu Ghraib prison in Iraq, an Army Reservist on leave from OSRAM SYLVANIA was winning over Iraqis and setting a shining example of American involvement at a different Iraqi detention camp. Stacy Garrity, a product marketing manager in Towanda, Pa., who served 12 months in Iraq, was stationed at the U.S.-run Camp Bucca detention center in southern Iraq, where she carried out her duties so fairly and humanely that she became known as the "angel of the desert."

Garrity, whose rank is major, was so admired and respected by the Iraqis that detainees made her handmade flags and drawings expressing their gratitude. Before Garrity left Iraq in February 2004, children at a local orphanage threw her a party, and many of the children wrote emotional cards saying they would miss her. Garrity's story gained nationwide publicity when it was told on National Public Radio and in dozens of newspapers nationwide as a dramatic contrast to the prison at Abu Ghraib, where photos were taken showing mistreatment of Iraqi detainees by U.S. soldiers. "The majority of the detainees who were released from Camp Bucca thanked me for the good treatment by the guards," said Garrity, downplaying her own role. "I am proud to have served with so many professional soldiers".

**Called up for duty:** Garrity has worked for Towanda since January 1987, one month after she joined the Army Reserves. She was called up for duty and reported to Kuwait in January 2003. When she arrived at Camp Bucca in Iraq two months later, there was little there but blazing heat and blowing sand, though the camp slowly took shape. The work was long and intense. Assigned to the U.S. Army's 800th Military Police Brigade, which ran the camp, Garrity worked 18 to 20 hours per day. They processed thousands of detainees, and Garrity oversaw in-processing and out-processing operations, including the 1,200 relatives who visited detainees every week. She reported back to Washington each day on how many detainees were being held across Iraq and how many had been released, and she served as the camp's liaison to the International Committee of the Red Cross.

### A True American War Hero

The Beverly Hills, California Bar Association chose Stacy Garrity to receive its "Justice and Rule of Law Award" for her service in Iraq. The Association invited Garrity to be its keynote speaker at its installation and award dinner in fall 2004, and approved a \$7,500 grant to local law school students and educators in her honor. The Association called Garrity "a true American war hero" and said, "As a result of her heroic conduct, she won for the United States the respect and support of the local Iraqi population."



**Major Stacy Garrity with squatters outside the camp, where a couple of families with approximately 26 children were living in a bombed-out house. The soldiers delivered a truckload of wood and food.**

Garrity's Army Reserve training helped prepare her. She had served as a Reservist at a camp for prisoners of war in Saudi Arabia during Operation Desert Storm in 1991. Before her deployment to Iraq, she trained extensively from the Army's manual for the treatment, care, accountability, legal status, and administrative procedures for enemy prisoners of war and civilian internees. Once in Iraq, some of Garrity's projects went beyond the scope of her official duties. She helped set up a post office system for detainees and obtained soccer balls and board games to help them pass the time. She and other soldiers gave food and shelter to a local woman and her three children after the family was physically abused by her husband.

Perhaps the best example of Garrity's efforts to foster goodwill occurred after she arranged for the camp to sponsor an orphanage in Basra, southern Iraq's largest city. The soldiers threw a Christmas party for the orphans, and some mentioned the orphanage to local newspapers back home. Soon, hundreds of boxes of clothes, food and blankets arrived for the orphans. Before she left, the children, most of whom were aged 4 to 11, threw Garrity a party to thank her and say goodbye. They gave her cards written in Arabic, which she still keeps in her Pennsylvania home. One said, "Major Garrity, don't say goodbye. My eyes will be full of tears. You're my friend until the end of my life. I will never forget." Garrity said it was important for the children to have a positive experience with U.S. soldiers, since most had been raised to fear soldiers.

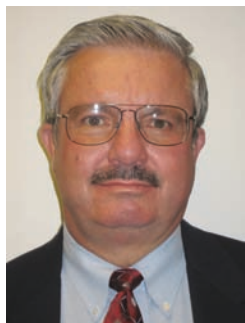
"We wanted them to really understand we were there for them so they could have a better way of life," she said. "You don't want them to grow up to be extremists, potentially threatening peace in the world in the near future."

**Coming home:** Garrity said that what she missed most while in Iraq were her family and the green hills of Pennsylvania. After her service was completed, she returned to work in Towanda, where she is a marketing manager for catalyst products, thermal spray, and green ammunition. She found it difficult at first to readjust to civilian life after the frenzied pace and intensity of living in a battle zone. Garrity said her military service was made easier by the flexibility and generosity of her coworkers in Towanda, including when she left for Iraq with no idea how long she would be gone. Her boss, David Vine, director of marketing and sales for Precision Materials and Components' tungsten, display product and semiconductor markets, assured her that her job would be waiting for her. And colleagues sent her "a ton" of care packages while she was away. "There are many soldiers who weren't as fortunate, to have an employer look out for them like I did," she said. "The way the company treats its service members is exceptional."

**For more information,** visit Osram Sylvania website [www.sylvaniathermalspray.com](http://www.sylvaniathermalspray.com)



## New VP of Aeronautical and Aerospace



The Board of Directors has elected **John Sturch** to the position of Vice President of the Wall Colmonoy Aeronautical and Aerospace group. John, who has more than thirty years of service with Wall Colmonoy, was most recently the general manager of their Oklahoma City Business Unit.

John will be responsible for business development and growth for the Wall Colmonoy FAA licensed repair stations in Oklahoma City and San Antonio.



## New Marketing and Sales Manager

**David Hart** was recently appointed Marketing and Sales Manager for Wall Colmonoy Corporation (WCC) U.S. He will be working from their corporate office in Madison Heights, MI, and will be developing and implementing sales and marketing strategies for the Microbraz® and Colmonoy® product lines. The WCC North American field sales force will be reporting to



David, and he will also have responsibility for marketing and sales for the alloy product business in Latin America and Asia.

David has 25-years experience in the hard facing and brazing industries. He previously held positions in Australia and Canada, as well as in the United States, as sales and training manager and technical director.

David holds an MBA degree from Queens University, Ontario, Canada, and a Graduate Diploma in Materials and Metallurgy from Adelaide University, Australia.

**For more information**, visit [www.wallcolmonoy.com](http://www.wallcolmonoy.com)

## New VP of Research and Development at SMS

**Albert Sickinger** has joined Surface Modification Systems Inc. as Vice President of Research and Development. Albert is well known in the industry as an expert in LPPS technology.

He started his career at MTU, Germany where he was responsible for development of abradable and wear resistant turbine coatings. His next job was at Chromalloy in Orangeburg, NY where he was manager of advanced coating development. Here he worked in APS, LPPS and E beam PVD and was responsible for overlay coating development and production support. His next job was at Electroplasma, which was eventually purchased by Sulzer Metco, as manager of R&D. His responsibilities included new coating and application development, technical sales support for LPPS and teaching and training in LPPS technology.

Prior to joining Surface Modification Systems Inc. Albert was president of Promet Technologies Inc, where he was involved in DoD sponsored SBIR programs for the Air Force and Navy working mostly with shape memory type alloys.

Albert has authored or co-authored over 30 publications

and presentations and has five patents with one pending.

At SMS, Albert will be responsible for all new coating development, technical sales, training, etc. SMS has LPPS, APS, HVOF, electric arc, and combustion systems, as well as diffusion coatings and PVD.

SMS provides specialized coating services for a broad range of industry: turbines, pumps, targets, valves, rolls, etc. SMS has also recently purchased Taroloid; a manufacturer of solid carbide and diamond products. Current advanced coating projects involve optical coatings, thin film wear coatings, high density tungsten alloys and new coatings for valves in PAL service.

A leader in protective coating technology, Surface Modifications Systems Inc. is both an FAA repair station and ISO 9000 accredited.

**For more information**, contact Surface Modification Systems, 12917 Park St., Santa Fe Springs, CA 90670 USA, 562.946.7472, email: [info@surfacemodificationsystems.com](mailto:info@surfacemodificationsystems.com), web: [www.surfacemodificationsystems.com](http://www.surfacemodificationsystems.com)

## FREE Thermal Spray Patent Copy

Copies of the original Schoop thermal spray patent - suitable for framing - are available from the International Thermal Spray Association. This is a photograph copy of the original February 19, 1914 "Apparatus For Spraying Molten Metal and Other Fusible Substances" by M. U. Schoop from the United States Patent Office. (See pages 24-25)

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## Praxair Surface Technologies Names Charlie Muzzey Plant Quality Manager



Praxair Surface Technologies, a subsidiary of Praxair, Inc. (NYSE:PX), has appointed **Charlie Muzzey** plant quality manager, for TAFE Incorporated, Praxair Surface Technologies' thermal spray equipment and consumables business, located in Concord, N.H.

In his new role, Muzzey will focus on guiding plant quality assurance, customer and regulatory compliance as well as quality system improvements.

Muzzey joined Praxair Surface Technologies in February, 2003 as quality engineer. He holds a BS degree from Southern New Hampshire University. Prior to joining Praxair he was employed by Teradyne Connection Systems as a process engineer - quality, engineering supervisor, and as a product engineer.

Praxair, Inc., parent company of Praxair Surface Technologies, Inc., is the largest industrial gases company in North and South America, and one of the largest worldwide, with 2004 sales of \$6.6 billion. The company produces, sells and distributes atmospheric and process gases, and high-performance surface coatings. Praxair products, services and technologies bring productivity and environmental benefits to a wide variety of industries, including aerospace, chemicals, food and beverage, electronics, energy, health-care, manufacturing, metals and others.

**More information** on Praxair is available on the Internet at [www.praxair.com](http://www.praxair.com) or [www.praxair.com/thermalspray](http://www.praxair.com/thermalspray).

## New Associate Editors Strengthen the Editorial Team of Journal of Thermal Spray Technology

**Prof. Armelle Vardelle** and **Dr. Seiji Kuroda** have accepted invitations to become Associate Editors of the Journal of Thermal Spray Technology (JTST). These internationally renowned scientists have contributed to the science and technology of thermal spray by their numerous publications in their respective fields of expertise and by their participation in national and international scientific organizations in materials and plasma science.

**Armelle M. Vardelle** is a Professor at the National Engineering School of Limoges, ENSIL, France, where she is in charge of the research policy for the 4 departments and, co-chairman of the Department of Materials and Surface Treatments. She works also at CITRA, the Engineering Center in Surface Finishing and Coatings. This Center gathers companies and the University of Limoges for technology transfer in thermal spraying, CVD, electroplating and electroless processes. Her main research interests are in transport phenomena at high temperature, modeling of thermal spray processes and environmental



issues related to surface finishing processes.

**Seiji Kuroda** is currently the Director of the Thermal Spray Group at the National Institute for Materials Science (NIMS), Tsukuba, Japan. This group develops coatings required by national projects and also pursues basic studies of thermal spray processes. Dr. Kuroda is also a guest professor at the Tokyo University of Science and the Chiba Institute of Technology. His main fields of interest are monitoring of in-flight thermal sprayed particles; residual stresses in sprayed coatings; dense HVOF coatings for corrosion and wear resistance; long-term corrosion protection by sprayed Zn-Al coatings, and TBCs.



**For more information** on the Journal of Thermal Spray Technology, visit [www.asminternational.org/jtst](http://www.asminternational.org/jtst)

## Stork Cellramic Announces New Business Development Manager of Engineering Coatings



Stork Cellramic Inc., a nationally recognized leader in thermal spray coatings for the printing, converting, and industrial gas turbine industries, is pleased to announce the addition of **Jerry Schmit** as Business Development Manager of Engineering Coatings for their Milwaukee facility.

Schmit graduated from the University of Wisconsin - Madison in 1994 with a B.S. in Mechanical Engineering. Since graduation, he has held several positions with companies that provide equipment and services to the printing & converting industries. From 1994 - 1997, Schmit was a Mechanical Design Engineer for Enercon Industries, manufactures of corona treater equipment. From 1997 - 2000, he held the position of Inside Sales at Faustel, Inc., manufactures of coating/converting machinery. Most recently, Schmit was the OEM Sales Manager for Coating and Converting Resources, a provider of coating and tension isolation equipment for the converting industry.

In his new role, Schmit will be responsible for sales and new business development in support of the continued growth of the thermal spray coatings business within Stork Cellramic.

**For more information**, visit [www.storkcellramic.com](http://www.storkcellramic.com), phone 414.357.0260, or email [storkote.info@stork.com](mailto:storkote.info@stork.com)



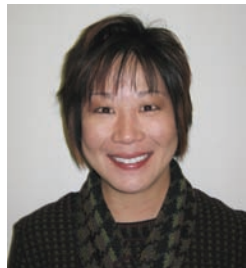
## FREE "What Is Thermal Spray"

Copies of the new twenty-eight page "What Is Thermal Spray?" publication are available at no cost from the **International Thermal Spray Association** headquarters office. Send an email request to [ITSA@thermalspray.org](mailto:ITSA@thermalspray.org) noting the quantity desired and your shipping address.



## SULZER New Head of Sales Americas for Sulzer Metco

Sulzer Metco is pleased to announce the appointment of Ms. **Mae Wang** as Head of Sales Americas.



Ms Wang obtained her BS in Marketing, with a concentration on Industrial Distribution, from the University of Illinois, and holds an MBA from Boston University. She brings to Sulzer Metco strong experience in the materials industry and her sound understanding of the thermal spray industry on both a

domestic and international basis makes her an ideal choice for Sulzer Metco and Sulzer Metco's American sales organization.

"We welcome Mae to the Sales Management Team and look forward to her working with the other Regional Heads and Global Account Managers to maintain and further develop our customer focus." (Dave Winder - Vice President, Head of Global Sales)

Ms Wang will be based at Sulzer Metco's American headquarters in Westbury, N.Y.

**To take control** of your surface engineering challenges, contact your Sulzer Metco sales office, visit our website at [www.sulzermetco.com](http://www.sulzermetco.com) or email us at [info@sulzermetco.com](mailto:info@sulzermetco.com)

## Bay State Appoints Awtar Singh

Bay State Surface Technologies, Inc. is pleased to announce the appointment of **Awtar Singh** as Business Development



Representative for Singapore and Malaysia.

Bay State is a subsidiary of Aimtek, Inc., with plants in Auburn and Millbury, Massachusetts. Bay State manufactures and supplies a complete line of thermal spray equipment, powder, and wire. With

over forty years as an OEM in the business, Bay State has long been known for their unique design PlasmaGun™ systems and ceramic powders. Recent additions to the Bay State product line include the new PS-2004 80kW SCR-type Power Supply and the CP-640-R PLC-based Control Console with robotic interface capability.

Mr. Singh brings considerable experience to the Bay State team, having previously served in the Royal Malaysian Air Force and in the Malaysian defense industry. He currently provides product support for the MRO, aerospace, power generation, and industrial repair and refurbishment industries. Mr. Singh will work out of a regional sales office in Kuala Lumpur, Malaysia.

**For more information**, contact Awtar Singh via email [awtarasc@hotmail.com](mailto:awtarasc@hotmail.com), or toll-free at 800.772.0104, or visit our website at [www.aimtek.com/baystate](http://www.aimtek.com/baystate)



## Richard Cook Joins Polymet Corporation

Polymet Corporation, a leading manufacturer of high performance welding wire and thermal spray wire, is pleased to announce the addition **Richard Cook** as Sales Manager for Industrial Hardfacing Products.

Richard brings over thirty years of experience, having served in product management, technical sales and other management positions for Stoodly and other companies that serve the welding and hardfacing industries.

The addition of Richard will help Polymet better service its growing customer base. He will work closely with both end users and distributors, helping to develop procedures and making process and product recommendations to solve wear problems in the power generation, pulp and paper, cement, oil sands and other industries.

Richard will be relocating to Polymet's headquarters in Cincinnati, Ohio.

**For more information**, contact Richard at [rcook@polymet.us](mailto:rcook@polymet.us), tel: 513-842-1119, web: [www.polymet.us](http://www.polymet.us)



## In Memoriam

### Jack A. Blasingame

Jack A. Blasingame passed away February 22, 2006. Jack served in the U.S. Navy during WWII and was aboard the U.S.S. Boxer in the South Pacific. Jack was very active in several aspects of volunteerism. He was a member of the Clown Jewels as well as being a member of Spring Lodge #1174, a Shriner, a charter member and Past President of the Cheerful Clown Alley, Past President of the Harrisburg Rotary and was a charter member of North Woods Presbyterian Church. His professional accomplishments are quite storied.

**He was Past President of the International Thermal Spray Association as well as Past President of F.W. Gartner Co. where he retired. Following retirement, Jack established Superior Shot Peening, Inc. where he led the company alongside his son as it grew from 3 employees to over 60 today, spanning 16 years.**

He will always be remembered as a man of traditional family values, which he instilled in his children, a man with the most gentle of hearts, always willing to help others. When he laughed, the whole world laughed with him. He never met a stranger and was always kind to all. He was preceded in death by his mother, father, sister and brother, all who loved him dearly. Survivors include his wife of 35 years, Gayle Blasingame; daughter, Mollie Blasingame; son, Van Blasingame and his fiancée, Carla; grandson, Matteus Main.

Condolences may be mailed to the Blasingame family in care of Superior Shot Peening, 13930 Lluthe Road, Houston, TX 77039 USA



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