

Protecting Emsworth Locks and Dam



Metallisation's Arc170 equipment has been used in a challenging project to protect the Emsworth Lock and Dam on the United States Ohio River from corrosion. Metallisation's North American distributor, TMS Metalizing Systems Ltd, worked closely with its customer, Oregon Iron Works (OIW) who have thermal sprayed six dam gates with zinc aluminium alloy.

The gates make up the bulkhead, which raise and lower the sluice gate on the dam. This was part of an overhaul project to rehabilitate the dam's gate and mechanical electrical systems. OIW secured the project with Pittsburgh's District Office of the Corps.

The aim of the project was to metal spray the gates with zinc/aluminium coating to protect them from corrosion. Each of the six gates measured 115 ft long and 12 to 14 ft high (35m long, 3.65 to 4.25m high). Consisting of steel t-

bars and angle iron, they created approximately 15,000 sq ft (1,400 sqm) of surface area to be sprayed. The job specifications required 85/15 zinc/aluminium material with a minimum thickness of 16 mils (400 microns). The sheer size and shape of the structure presented OIW with a number of challenges, not least access to all surfaces to be sprayed.

As this was OIW's first thermal spray project, Dave Wixson of TMS Metalizing Systems Ltd, conferred with Ray Coury, Superintendent at OIW and Project Engineer, Devlyn Kozol, to identify the challenges and advise on the best possible approach to the project. The outcome was to opt for two Metallisation Arc170 systems, as it's the only 700A, high production arc spray system on the market with the required supplies package reach of 33 feet (10m).

Once the decision was made to use the Metallisation Arc170, TMS Metalizing Systems arranged on-site training to ensure the sprayers were fully prepared prior



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PLICATION NEWS

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to the project starting. During the length of the project Steve Barker, Metallisation's Operations Director, made several visits from the UK, to provide ongoing support and quidance to OIW. This is part of Metallisation's commitment to its global distributors to trouble-free transition ensure а and installation of new equipment for all companies choosing Metallisation equipment. To coincide with this training and preparation, OIW also enlisted the help of SSPC, the Society for Protective Coatings, to conduct the 'SSPC Thermal Spray Inspection Training Course'. This supported OIW's ongoing commitment to quality and training of its staff.

The push/pull design of the Arc170, allows a 33 ft (10m) supplies package, which enabled OIW to coat the top surfaces without rotating

the gate. The long supplies package meant that the thermal sprayers only needed to bring the spray gun to the top, as the spray wire and the combined drum dispensers and push unit remained on the spray booth floor. This provided valuable access to all areas of the gates, without the need for expensive, time-consuming and potentially hazardous maneuvering of the gates during spraying. The drum dispensers also resulted in lower material costs, as spooling





was not required. To protect the gates from corrosion, as a result of the harsh environment in which they are located, they were sprayed with 1/8 in. (3.2mm) diameter, 85/15 zinc/aluminium alloy wire. The use of this diameter wire also has the benefit of providing a good quality coating at high throughputs with increased deposit efficiency. While remaining flexible and maneuverable over large components, enabling OIW to complete the job in a timely and costefficient manner.

Oregon Iron Works is a steel fabricating company, founded in 1944. They began by fabricating in the demanding hydroelectric, bridge and civil construction industries. They now fabricate and thermal spray a range of surfaces from complex bridges to sophisticated military patrol craft, and work within the marine, aerospace and nuclear industries.

Ray Coury, Superintendent, OIW, says: "We chose to work with TMS Metalizing Systems because of our relationship with Dave Wixson. Dave and the UK Metallisation team know the metalizing process inside out and both were a great support to us in approaching the challenge of the Emsworth Locks and Dam project. Now we have demonstrated our success at metalizing, we will definitely be doing more of this type of project."

For more information, call Stuart Milton on +44 (0) 1384 252 464 or visit www.metallisation.com



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Spraytime

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15 Year Anniversary - SPRAYTIME Fourth Quarter 2007

Cryogenic Nitrogen Gas Cooling for Thermal Spray Coatings

by Ranajit Ghosh Project Manager, Cryogenic Cooling Applications Air Products and Chemicals, Inc.

The current industry trend towards more heat intensive processes in thermal spray applications has exposed the inadequacy of current cooling solutions. It has highlighted the need for better thermal management of coated parts. This article describes a novel cooling approach that uses a 2-phase, cryogenic nitrogen vapor to help eliminate waste, plus improve productivity and part quality.

Current Process

HVOF thermal spray is widely used for coating critical wear parts like landing gear, bearing races, valves and turbine components. Generally, fully or partially molten metal, composite, or ceramic droplets are propelled from a gun or torch onto the workpiece. Multiple passes are required to build up the coating, since each pass only deposits ~ 0.0002 in - 0.0005 in. thickness of material. A significant amount of thermo-kinetic energy is required to deposit a dense coating onto the work surface—and a portion of this energy, manifested as heat, is absorbed by the workpiece. Improper temperature control during thermal deposition frequently leads to coating and workpiece overheating, thermal deformation and degradation of substrate material, and damaging stresses due to a mismatch of thermal expansion coefficients between the coating and substrate. When damage occurs through overheating and thermal stress, delamination of the coatings can occur in service.

Consequently, thermal management of the workpiece is extremely critical during the spray deposition process. Compressed air jets are the primary cooling method for most HVOF thermal spray operations; however, air cooling is usually insufficient and the oxygen, residual moisture and hydrocarbons that may be present in the cooling air can be detrimental to the coating quality. In spray operations involving tighter temperature control, air cooling is usually inadequate and manufacturers are often forced to introduce breaks in the process cycle so that the accumulated heat is dissipated to the ambient environment. The spray gun is moved away from the part but continues firing during the interpass cooling breaks, resulting in wasted feed powder, process gas, and booth time.

Another issue that affects productivity in spray coating operations is the set-up time for masking and de-masking. It is important to mask certain areas of the part, where the coating might not be needed. The coating of these areas might be undesirable (it may interfere with the mechanical working of the component), unneeded, or simply, uneconomical. In these cases, it is critical to provide an effective barrier to coating for these areas. Metal plates (shadow plates) are often used to protect these areas, as are masking tapes.

The desirable aspects of a masking tape are flexibility, ease of application and removal, quick clean-up and extended useful life. There is a wide variety of masking tapes available



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today with materials of construction ranging from fiberglass and metals to polymer and silicone rubbers. Metal tapes are usually difficult to make and install, while the fiberglass and polymer tapes are easy to install but difficult to remove and require extensive post-spray cleaning. Inadequacy of air cooling and build-up of temperature is the primary reason for tape degradation, e.g. thermal decomposition, hardening, or tape embrittlement.

A New Approach to Cooling

The search for a more efficient cooling approach to generate better coating properties, as well as to improve the productivity of HVOF spray coating

operations has led to the development of cryogenic nitrogen gas cooling. Although cryogenic cooling methods offer a significant enhancement in the ability to remove heat quickly, they are rarely used in the thermal deposition coating industry due to the risk of non-uniform cooling, which results in variable levels of residual stresses at the substrate/coating interface and consequent issues of coating delamination and spalling. Carbon dioxide (CO_2) cooling has been used by the industry with mixed success. While CO₂ has higher heat capacity compared to nitrogen its heat removal rate is constrained by the smaller temperature differential (CO₂ has a boiling point of -109°F [-78.5°C], while cryogenic nitrogen boils at -320°F [-196°C]). CO₂ also has a tendency to form undesired, solid deposits at the target surface whenever higher cooling rates and correspondingly higher gas flow rates are required.

Cryogenic nitrogen gas cooling has been shown to significantly improve productivity over conventional aircooled processes. Figure 1 shows actual process data comparing the two cooling methods during deposition of a WC-Co-Cr coating on an aerospace landing gear. By eliminating the interpass cooling breaks, the cryogenic vapor cooling system shortened the spraying time by 50%, plus it reduced wasted feed powder and process gases. The nitrogen cooling system also allowed for a much tighter temperature control (\pm 20°F) and a significantly smaller standard deviation in workpiece temperature during coating operation.

Figure 1

Traditional Air Cooling vs. Air Products' Thermal Spray Cooling Technology for Coatings Deposited in 11 Spray Passes



Air Products' novel thermal spray cooling technology delivers exceptional results. This graph shows actual process data for spraying aircraft landing gear with traditional air cooling compared to our nitrogen cryogenic vapor cooling system. With the Air Products thermal spray cooling technology, the part's temperature was maintained within a much tighter range during the spray operation. In addition, it halved the spraying time and the amount of powder and process gases consumed—plus improved productivity.



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Subsequent characterization of the air-cooled and nitrogen-cooled samples show that the bondstrength, hardness and surface roughness of the as-sprayed coatings were essentially unchanged, while micro-porosity was reduced from 0.2 to 0.05%. The nitrogen-cooled sample also retained the substrate hardness (420 HV in the case of heattreated 4340 steel) better than the air-cooled (395 HV) and non-cooled (390 HV) samples. In addition, oxygen pickup and carbon loss in the coating were the lowest for the nitrogen-cooled sample. In limited tests with cryogenic cooling, involving WC-Co-Cr powder, deposition efficiency was shown to increase by an average of 10 to 15% over conventional air cooling and by more than 30% over noncooled samples.

An additional benefit of the cryogenic nitrogen vapor cooling system is the time and cost savings in the masking process. The cryogenic gas provided instant cooling of the hot top layer of the mask, avoiding heat build-up and preventing the heat from reaching the bottom of the tape. As a result, the tape bulk stayed flexible and could be removed quickly after the spray operation with a putty knife, leaving a clean residue-free surface. It could even be reused several times. Figure 2 schematically shows the effectiveness of cryogenic cooling to prevent progressive thermal degradation of silicone-based masking tapes.

The cryogenic nitrogen vapor system efficiently and uniformly cools thermally sprayed coatings by monitoring the temperature of the coating and varying the cooling intensity to match the heat generated in the spraying process. The temperature feedback system can use a variety of inputs, including single-point IR sensors, 2-D thermoimaging IR cameras, and contact thermocouples. The

HVOF

PLC-controlled cooling system maximizes cooling efficiency by automatically switching cooling modes between room temperature, nitrogen gas, liquid/gaseous nitrogen mixed flow, and 100% liquid nitrogen based on user-defined temperature ranges. Discharged from a spraying nozzle or multiple sprayers, the liquid nitrogen is atomized to form rapidly boiling, microscopic droplets that turn into cryogenic nitrogen vapor within a short distance from the discharge point. This prevents undesired "wetting" of the coated surface. In addition, the multi-zone cooling control algorithm used allows individual cooling nozzles to independently switch between the cooling modes based on instant average and time-averaged temperature feedback. Figure 3 shows the thermal profiles at various stages of the coating process. The part temperature history can also be recorded and archived for future audit purposes.

The new Air Products' patent-pending, thermal spray cooling technology (Figure 4) is the industry's only cryogenic nitrogen cooling process. It has provided productivity benefits in a range of HVOF coating applications, involving aerospace parts, construction equipment, and rolls. Nitrogen cooling has also been proven to be an effective and economical solution for heatintensive spraying processes (high pressure liquid fuel HVOF systems and high spray rates). The use of cryogenic vapor as a supplement to existing air cooling and variation of cooling intensity with heat input helps ensure the most economical use of the cryogenic coolant. Cryogenic vapor cooling has also provided important part quality benefits, like preservation of substrate properties, minimized coating oxidation and reduced residual stress gradient between the coating and the substrate.

tape embrittlement reaches

substrate



spraying pass

embrittlement depth

air

(a) Air cooling (b) Cryogenic nitrogen vapor cooling

masking tape, insulating

coating, conductive



Figure 3: Thermal profiles at various stages in the coating process, showing effective temperature control of the coated surface with cryogenic cooling (a) Start of spraying pass (b) End of spraying pass



Figure 4: Air Products Nitrogen Spray Cooling System Air Products' cryogenic spray nozzle installs easily on any thermal spray gun to help cool parts twice as fast as air cooling alone, which allows thermal spray operators to work faster and more efficiently with less wasted powder, process gas, and booth time.

For more information, contact Air Products and Chemicals, Inc., 7201 Hamilton Boulevard, Allentown, PA 18195, USA Tel 800-654-4567, code 557, Fax 800-272-4449, email gigmrktg@airproducts.com, web www.airproducts.com/metals



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opening where a fixed arc gun coated the weld area. The robot rotated the muffler during the coating operation. In another application, hydroxylapatite is applied to small medical implants. This application uses a robot to pick an implant from a tray and position it in front of a fixed plasma gun. The arrangement and tooling insured that the robot did

Gates

is the job description?

production operation?

MC THERMAL SPRAY EQUIPMENT

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Interviewing The Manipulator,

The Job Description

"The first rule of any technology used in a business is that

Before "hiring" a manipulator, we need to fully understand what is expected of it; how will it add to productivity; what

What will the manipulator control; the gun, the workpiece

In the majority of thermal tpray applications, the manipulator controls the gun. The piece being sprayed is fixed, mounted to a turntable or mounted to a lathe. The primary question is where will the system fit within the

In one application, where the welded end-pipe on truck

mufflers needed an electric arc coating, it initially appeared

that the manipulator should control the gun. However, when the production operations were considered, it turned out to

be best to use a robot to pick the fabricated mufflers off of

the production line and poke the muffler end through an

or will a manipulator be required for both?

automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency". Bill

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not become coated during the operations.

Another unique application is where two robots are used for coating aerospace parts; one controls the plasma gun while the second controls the part during the coating operation. Again, the robot programming had to take into consideration the direction of spray to avoid coating of the part handling robot.

In all of these cases, the application is very specific. These systems would generally not be suitable for a thermal spray job shop.

What is the weight to be manipulated?

The weight to be manipulated needs to include not only the gun but a portion of the weight of the connecting hoses, mounting fixture, cables and sensors. One robotic system for coating a weld zone in large hydro turbines required a HVOF gun mounted on a three-foot extension to allow coating between the blades. The robot had to be sized to handle the weight of the cantilevered gun, gun extension, hoses and cables.

Some production shops use one robot for a variety of guns. Each gun is attached to keyed guick-disconnect mounting half with the mating half on the robot. This not only allows for rapid changeover of the gun but also precise positioning of the gun on the robot. The weight of the guick-disconnect needed to be included in the manipulator payload requirements.

What motion is required?

Roll coating shops often use only a single-axis gun con-

troller that traverses along a lathe. Many job-shops require only a two-axis manipulator that provides an X-Y motion in front of a turntable with a fixed standoff. For coating of complex shapes, especially where the part to be coated is fixed, a five- or six-axis robot is usually be required.

What range of motion is required?

Not only is it necessary to consider the size of the largest area to be coated, it is also necessary to consider what range of motion will be required for the thermal spray operations. For example, a robot for coating the face and cheeks of steel rolls will need to extend well past the face of the roll. In this case, a drawing of the robot in the extreme coating positions was needed to verify suitability.

What speeds will be required?

Manipulator speed is generally not of major concern when coating of parts mounted on a turntable or lathe. The surface speed needed for coating is achieved by the speed of the turntable. Speed capability of the manipulator becomes a significant factor when the part to be coated is fixed, especially when HVOF coating is applied. In such cases, robot speeds up to 275 ftm may be required. Such speeds are possible with present day robots but safety becomes a major issue to insure that no one is around the robot during high speed motions.

Next time, The Qualifications of the Manipulator. For more information, contact series author, Dale Moody via email dalermoody@aol.com



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Thermal Spray Pavilion Tremendous Success

The first International Thermal Spray Association (ITSA) Thermal Spray Pavilion at the **2007 Fabtech International and AWS Welding Show** was extremely successful. The crowds were huge, the questions never-ending, and the 27 pavilion exhibitors had numerous opportunities to educate attendees on thermal spray processes and benefits.

The Show hit record breaking attendance. 31,354 people came through the doors at McCormick Place. The show covered more than 481,427 net sq ft of floor space, utilized by another record setting 1004 exhibitors.

Attendees come from all corners of the world -This year's show was comprised of 89.5% domestic visitors, 4.4% from Canada and 6.1% international. Within the U.S., the largest draw of attendees came from IL, IN, IA, MI, OH, WI, MN, PA, TN and CA. Of the 6.1% of international visitors, the largest number traveled from Mexico, Columbia, Japan, Brazil, Italy, China, India, Venezuela, France and the United Kingdom.



The event keeps growing to address the needs of all types of contract manufacturers and OEMs, including the addition of 27 companies exhibiting in the Thermal Spray Pavilion. "The Thermal Spray Pavilion at the FABTECH International & AWS Welding Show was a tremendous success," said Marc Froning, chairman, International Thermal Spray Association (ITSA) and manager of Engineering & Development for BASF Surface Technologies. "The Pavilion area was highlighted very well and the traffic was continuous. It was the perfect opportunity to illustrate the benefits of coatings."

Audience Profile - A variety of job functions were represented at the show including 29% being corporate executive/top-level management or Job Shop Owner, 19% manufacturing engineers or product design & development and 14% with titles of manufacturing production.

Role in Buying - Attendees came to the show to not only view but to purchase a range of forming, fabricating and welding equipment. 80% of the visitors who attended the show indicated that they are involved in some way in their company's purchasing plans.

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The International Thermal Spray Association booth highlighted a Pratt and Whitney Canada PW300 Turbofan cut-a-way engine. This is one of the industry's signature turbofan engines in the mid-size jet market. Thousands of attendees came by to see the PW300 engine which proved to be a valuable educational tool for thermal spray as 50% of engine parts are thermal sprayed.



Sunday was "Thermal Spray Day" at the Innovation Theater. Companies presenting were Center Line Ltd, "Cold Spray Technology and Equipment"; Nation Coating Systems, "Pump Repairs-Using Welding and Thermal Spray"; Polymet Corp., "Welding vs. Arc Spray: A Comparison of Wire and Deposits"; State University of New York at Stony Brook, "The Consortium of Thermal Spray Technology"; and Sulzer Metco, "The History and Future of Thermal Spray 'From the Frying Pan to the Stars'".

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Volume 3 includes chapters on resistance spot and seam welding, projection welding, flash and upset welding, and high-frequency welding. In addition to the chapter on friction welding, a developing technology, friction stir welding appears for the first time in the *Welding Handbook*.

The most recent developments in beam technology are discussed in the greatly expanded chapters on laser beam welding and cutting and electron beam welding. A diverse array of processes are presented in chapters on the ultrasonic welding of metals, explosion welding, diffusion welding and diffusion brazing and adhesive bonding of metals. The chapter on thermal and cold spraying has been significantly expanded. The last chapter in the book covers various other welding and cutting processes, including two emerging processes, magnetic pulse welding and electro-spark deposition. Contemporary water jet cutting is discussed in detail.

The book is written, updated, and peer-reviewed by highly respected technical and scientific experts appropriate to the topics of the fifteen chapters. It is illustrated with 420 line drawings and photographs, and has 45 tables, three appendices and a comprehensive index.



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SPRAYTIME Circulation Reaches 7000

SPRAYTIME thermal spray industry newsletter has reached a circulation of over 7,000 copies. This is an increase of 17% over last year. To view the distribution quantities by zip code areas, please see page 31.

For more information, contact the International Thermal Spray Association via email itsa@thermalspray.org

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NanoSteel Named One of 15 "Companies to Watch" by **Advanced Materials & Processes Magazine**



The NanoSteel Company, an industry ANOSTEEL leading producer of nano-structured steel alloys for industrial applications,

announces that it is one of 15 winners in Advanced Materials & Processes (AM&P) magazine's "Companies to Watch in Materials Science and Engineering" competition which recognizes exceptional contributors to innovation in the materials industry in a feature article in the July 2007 issue.

NanoSteel was selected by AM&P because its patented Super Hard Steel (SHS) iron-based alloy technology, the cornerstone of the company's thermal spray and weld overlay coating products. These innovative materials are unique in their ability to form extremely refined property-enhancing, nanometer-sized grain structures that provide performance benchmarks well beyond conventional steels, nickel-based superalloys and a range of hard materials used to mitigate wear and corrosion in general industry

"Recognition as an innovative company by AM&P magazine is a high honor for NanoSteel," says Dave Paratore, president/CEO. "We are proud to be recognized for our efforts in advancing the technology and practical applications of iron-based alloys and continue to focus on using this technology to solve customer issues related to extending component life cycles."

The NanoSteel Company, Inc., headquartered in Providence, R.I., develops and markets a range of patented Super Hard Steel nano-structured materials that can be applied with a variety of widely-available industrial processes, including thermal spraying, welding and laser cladding. NanoSteel's proprietary alloys cost-effectively solve or alleviate many of the problems that have a destructive or costly impact on industry today, including wear, corrosion, erosion and high temperature oxidation.

For more information, visit www.nanosteelco.com

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CenterLine-SST Receives NRC-IRAP Support for Cold Spray Research



CenterLine (Windsor) Ltd. and its **CENTERINE** newly created Division, Supersonic Spray Technologies (SST) in

Windsor, Ontario, Canada, is pleased to announce that it has received research funding from the National Research Council of Canada, Industrial Research Assistance Program (NRC-IRAP). Subject to the terms of the agreement, CenterLine (Windsor) Ltd. will receive approximately \$200,000 over one year in support of CenterLine's internal research and development expenses related to key aspects of CenterLine's low-pressure cold spray technology.

Dr. Julio Villafuerte, head of research and development at CenterLine, says that "the NRC-IRAP support represents a significant milestone as the company endeavours to reach new markets by creating innovative products, processes, and services". CenterLine is a leader in welding and joining for the automotive and mass transportation industries. Working directly with CenterLine, NRC-IRAP will provide a range of both technical and business-oriented advisory services, along with financial support to help the enterprise grow.

CenterLine (Windsor) Ltd. created the SST Division in 2003 to develop and commercialize low-pressure cold spray equipment. The low-pressure cold spray technology was invented in Russia in the 1980s; it is a solid-state, lowtemperature spraying process, in which the spray powder is accelerated to supersonic velocities by an air or nitrogen supersonic jet. Upon impact with a substrate, the solid particles experience rapid plastic deformation that disrupts oxide films while promoting bonding. Low-pressure cold spray is capable of providing corrosion protection, dimensional restoration, metallization of ceramics, and other applications, without the undesirable effects of elevated process temperatures such as oxidation, tensile

residual stresses, and/or metallurgical transformations.

For more information, please contact Julio Villafuerte, Centerline Windsor SST, email julio.villafuerte@cntrline.com or visit website www.supersonicspray.com

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15 Year Anniversary - SPRAYTIME Fourth Quarter 2007

American Welding Society Acquires Weldmex – Largest Welding Trade Show in Mexico

The American Welding Society (AWS) announced today that it has entered into an agreement with Trade Show Consulting (TSC) to purchase Weldmex, the largest welding trade show in Latin America. TSC is a trade show and conference production company which specializes in launching manufacturing shows throughout the U.S. and Mexico. AWS is the world's largest nonprofit organization dedicated to advancing the science, technology and application of welding.

Under the terms of the agreement, AWS will maintain primary ownership of Weldmex, and assumes the rights to organize, promote, produce and manage Weldmex under the new name, AWS Weldmex. In addition, TSC will continue to provide support services in the production, marketing and management of the show.

"We are very pleased to join Mexico's premier welding event and expand AWS further into the Latin American market," said Ray Shook, AWS Executive Director. "Mexico's welding and fabrication industries have experienced impressive growth and the country remains an important trading partner with North America. We believe that AWS Weldmex will broaden AWS' reach and provide exciting additional benefits and opportunities to our more than 50,000 members."

The annual AWS Weldmex event attracts more than 5,000 welding equipment users, manufacturers and suppliers from Mexico, Central America and the United States. Currently in its fifth year, AWS Weldmex is scheduled to take place on January 29-31, 2008, at the new Centro Banamex in Mexico City. Categories of equipment, processes and accessories to be exhibited at AWS Weldmex 2008 include a variety of arc welding products, plus brazing, punching, bending, resistance welding, robotics, industrial gases, laser cutting and welding, soldering, tubing and piping, plasma cutting, and stamping.

For more information on exhibiting at AWS Weldmex 2008, please contact AWS exhibition sales director Joe Krall at 800-433-9353, ext. 297 or jkrall@aws.org. The American Welding Society (AWS) was founded in 1919 as a multifaceted, non-profit organization with a mission to advance the science, technology and application of welding and allied joining and cutting processes, including brazing, soldering, and *thermal spraying*. Headquartered in Miami, Florida, and led by a volunteer organization of officers and directors, AWS serves more than 50,000 members worldwide and is composed of 22 districts with 250 sections and student chapters. *For more information on AWS*, visit www.aws.org

WHERE IS YOUR ARTICLE?

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HELP WANTED

Sr. Process Engineer - Pilot Projects

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Instructions for completions of SPRAYDUCO puzzle:

Use logic along with the process of elimination to fill in a spray parameter in each blank cell. Parameters (9 total) can appear only once in each column, row or 3X3 block. For example, the blank cell in the second row and the seventh column can only be "I" since an "I" already exists in the first and third rows, making this the only available cell for an "I" in the second row. The difficulty level ranges from novice (easiest) to Journeyman to Master (hardest). This one is novice.

	Spray Parameters	
$\mathbf{I} = Current$	V = Voltage	W = Power
Ar = Argon	He = Helium	H = Hydrogen
N ₂ = Nitrogen	C = Carrier	X = Standoff

To receive a copy of the puzzle solution, send an email request to itsa@thermalspray.org

WHERE IS YOUR ARTICLE?

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15 Year Anniversary - SPRAYTIME Fourth Quarter 2007

FARR APC Publishes Dust Collection Capabilities Brochure

A new 24-page brochure from Farr Air Pollution Control (APC) showcases the company's extensive capabilities in the

design and manufacture of dust collectors for a wide range of processes. It describes how Farr APC dust collection systems solve dust challenges for the following industries and applications: blasting, chemical processing, custom OEM, fiberglass and FRP, food processing, laser and plasma cutting, metal grinding, mining, paper pharmaceutical, scrap,



rubber grinding, seed processing, thermal/flame spray, welding and woodworking.

The brochure also includes an overview of the popular Farr "Gold Series®" cartridge collector, which carries a 12-year warranty and comes equipped with award-winning HemiPleat® filter technology. Cartridge filters for retrofit solutions are also described.

To view or download the brochure online, go to www.farrapc.com. **For a free copy of the printed brochure**, contact Farr APC at 800.479.6801; fax 800.222.6891; or write to Farr APC, 3505 S. Airport Road, Jonesboro, AR 72401 USA; e-mail filterman@farrapc.com.

The Dutch Association for Thermal Spray Technology, VTS

by Will Herlaar, President

Dutch Association for Thermal Spray Technology. In the Netherlands thermal spraying has been known since 1945 and certainly after the start of Metco in 1947, with their office along one of the famous canals in Amsterdam. Thereafter the number of applications increased and as a result the market grew.



It is said by some that there was already a small machine shop in Amsterdam using Metco E-type guns spraying Zn for corrosion protection as early as 1936! I could not trace that. In 1970 some people got together and founded the Dutch

In 1970 some people got together and founded the Dutch Society for Flame Spray Technologies, VVV, which name was changed in the late 1980s into Thermal Spray Technologies, VTS. Membership is at present 16 companies of which 14 are job shops.

Metco dominated the Dutch thermal spray market for many years, but with the coming of the Internet, ease of travel and the sense of the Dutch to look for bargains others noticed the possibilities there too.

With large thermal spray facilities at KLM, Chromalloy Holland and DutchAero (formerly Philips) Holland is dense with plasma and HVOF systems as every member of VTS has at least one plasma and HVOF unit in operation. Some of them do prestigious projects, like coating the hydraulic plungers for the lock systems of the Panama Canal for instance. These were done in Holland.

We are therefore proud to be the host for ITSC 2008. To be held in our most southern city of Maastricht. A city founded by the Romans. It is famous for the EEC summits, but for us famous for its restaurants and sidewalk cafés.

As we did at the conference in 1980 (who was there?) in the Hague we once again will welcome you.

For more information, visit see www.dvs-ev.de/itsc2008 See ITSC 2008 article page 25.

For a free copy of the International Thermal Spray Association *"What Is Thermal Spray?"* publication, send an email request to itsa@thermal spray



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CALENDAR OF EVENTS **JANUARY 2008**

21-22 Lake Buena Vista, FL USA Engineered Surfaces for Aerospace & Defense - contact ASM International tel: 440.338.5151, email customerservice@asminternational.org, web: www.asminternational.org

27-30 Los Angeles, CA USA PACE 2008, The Power of Paint + Coatings - contact www.pace2008.com

27JAN-1FEB Daytona Beach, FL USA 32nd International Cocoa Beach Conference & Expo on Advanced Ceramics & Composites - contact Megan Mahan, tel: 614.794.5894, email: mmahan@ceramics.org, web: www.ceramics.org/acc 29-31 Mexico City, Mexico Weldmex Show - contact Joe Krall, email: JoeKrall@aol.com, tel: 1-800-443-9353 ext 297

FEBRUARY 2008

11-13 Bangkok, Thailand First SAMPE Asia Conference & Exposition - contact Society for Advancement of Materials & Process Enginneering tel: 800.562.7360 or 626.331.0616, email: sampeibo@sampe.org, web: www.sampe.org

14-16 New Delhi India - International Trade Fair Joining, *Cutting, Surfacing* - contact christina.kleinpass@messeessen.de, tel: +49(0)201.7244.227, www.messe-essen.de 20-21 Tel Aviv and Haifa, Israel 48th Israel Annual Conference on Aerospace Sciences - contact Dan Knassim, tel: 972.3.6133340, ext 207, web: www.aeroconf.org.il 27-28 Tel Aviv and Haifa, Israel 48th Israel Conference on

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972.3.613340 x207, web: www.aeroconf.org.il **MARCH 2008**

4-6 Monterrey, Mexico Expo Manufactura MEXICO2008 contact Fabtech Int'l, 815.227.8271 or 313.425.3126, web: www.fmafabtech.com, www.sme.org/fabtech

9-13 New Orleans, LA USA 137th TMS Annual Meeting & Exhibition TMS 2008 - contact TMS tel: 724.776.9000, ext. 243, email mtgserv@tms.org, web: www.tms.org

16-20 New Orleans, LA USA NACE Corrosion 2008 Conference & Expo - visit www.nace.org

24-28 San Francisco, CA USA 2008 MRS Spring Meeting & Exhibit - contact tel: 724.779.3003, email: info@mrs.org, web: www.mrs.org

APRIL 2008

9-12 Osaka, Japan Japan Int'l Welding Show - contact Sanpo Publications tel: 81.3.3258-6411, email: hotani@sanpopub.co.jp

10-13 Scottsdale, AZ USA 9th Congress on Future of Engineering Software COFES2008 - www.cofes.com

14-17 Detroit, MI USA SAE World Congress and Expo - visit www.sae.org

MAY 2008

5-8 Pittsburgh, PA USA Iron & Steel Technology Conference/Expo AISTech2008 - tel: 724.776.6040, email: infor@aist.org, web: www.aist.org

17-20 Atlanta, GA USA 112th Metalcasting Congress contact American Foundry Society, tel: 800.537.4237, web: www.afsinc.org

26-28 Buenos Aires, Argentina International Conference on New Developments in Metallurgy & Applications of High Strength Steels - visit www.steelconfbsas08.com

27-30 Moscow, Russia Int'l Trade Fair Joining, Cutting, Surfacing - Mr. Claus-Peter Regiani, email: cp.regiani@messeessen.de, web: www.schweissen-schneiden-russia.com

JUNE 2008

1-5 Algiers, Algeria Failure Analysis of Engineering Materials and Structures - African InterQuadrennial ICF Conference of Fracture (AIQ-ICF) - contact Mimoun Elboujdaini, AIQ-ICF2008, email: melboujd@NRCan.qc.ca

1-5 Wiesbaden, Germany 2nd Int'l conference on Steels in Cars & Trucks - contact Markus Bau tel: +49.241.88970-57, email: bau@sct2008.de, web: www.sct2008.com

2-6 Pine Mountain, GA USA 8th Int'l Conference on Trends in Welding Research - contact contact ASM Int'l tel: 440.338.5151, web: www.asminternational.org, email: customerservice@asminternational.org

2-4 Maastricht, the Netherlands International Thermal



Spray Conference/Expo (ITSC 2008) visit web www.dvs-ev.de/itsc2008 or contact ASM Int'l tel: 440.338.5151, customerservice@asminternational.org,

web: www.asminternational.org

8-12 Washington, DC USA World Congress on Powder Metallurgy & Particulate Materials - email: info@mpif.org, web www.mpif.org

9-12 Chongging, China MRS International Materials Research Conference - contact tel: 724.779.3003, web: www.mrs.org

9-13 Berlin, Germany ASME Turbo Expo 2008 - visit www.turboexpo.org

18-20 Kyiv, Ukraine 4th Surface Engineering 2008 Technical Trade Show - TDS Expo, tel: +380.44.596.91.84.596, olga@welding.kiev.ua 22-26 Austin, TX USA AeroMat 2008 ASM Advanced Aerospace Materials & Processes Conference/Expo - ASM Int'l tel: 440.338.5151, email: customerservice@asminternational.org, web: www.asminternational.org

AUGUST 2008

18-21 Louisville, KY USA - MegaRust 2008 Marine Coatings & Corrosion 🚟 Conference - visit www.nstcenter.com

SEPTEMBER 2008

14-18 Champion, PA USA 11th Int'l Symposium on Superalloys (Superalloys 2008) - contact TMS tel: 724.776.9000 x 243, email: mtgserv@tms.org, web: www.tms.org

29 SEP-1 OCT Mannheim, Germany EuroPM2008 Int'l *Conference* - contact European Powder Metallurgy, tel: +44(0)1743.248899, web: www.epma.com

OCTOBER 2008

6-8 Las Vegas, NV USA FABTECH Int'l & AWS Welding Show

- with a Thermal Spray Pavilion organized by American Welding Society, www.aws.org, Fabricators and Mfgrs Assoc, www.fmafabtech.com,



Society of Manufacturing Engineers, sme.org/fabtech 6-9 Pittsburgh, PA USA Materials Science & Technology 2008 Conference & Exhibition (MS&T'08) - organized by ASM, ACerS, AIST, and TMS tel: 440.338.5151 ext.0 email: customerservice@asminternational.org, web: www.asminternational.org

29-30 Paris, France *Industrial Gas Turbine 0&M Conference* - contact Ruth Martin, tel: +44 207 932 5587, email ruth@qasturbine-events.com

DECEMBER 2008

1-5 Boston, MA USA 2008 MRS Fall Meeting & Exhibit contact MRS tel: 724.779.3003, email: info@mrs.org, web: www.mrs.org

7-10 Bangkok, Thailand PMP-III 3rd Int'l Conference on Processing Materials for Porperties - contact TMS tel: 724.776.9000, email: mtgserv@tms.org, web: www.tms.org **MAY 2009**

3-6 Helsingør Denmark 15th Int'l Conference on the Joining of Materials - contact: JOM tel: +45.48355458, email: jom_aws@post10.tele.dk

JULY 2009

12-17 Ottawa, Ontario Canada 12th Int'l Conference on *Fracture (ICF12)* - visit www.icf12.com

SEPTEMBER 2009

14-19 Essen, Germany International Trade Fair - Joining, Cutting, and Surfacing - visit web: www.messe-essen.de, contact email: christina.kleinpass@messe-essen.de

> Is Your Event Listed? Send your event notice to spraytime@thermalspray.org



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15 Year Anniversary - SPRAYTIME Fourth Quarter 2007

Lineage Alloys Celebrates 10th Anniversary

On November 10, 2007, Lineage Alloys celebrated its 10th Anniversary with a party for the employees. Thermal spray powders have been produced on the plant site at Lineage Alloys, Baytown, Texas for more than 40 years. On November 10, 1997, Lineage Alloys started production under the new name and ownership. Even though the name of the company changed, the employees remained and brought with them their expertise which has been an added asset to Lineage Alloys.



Lineage Alloys started with just the buildings and equipment left by the previous owners. Through many long months of hard work, these employees, under the leadership of Ray Selby and Simon Poon, started production and were able to secure Pratt Whitney approvals on their aircraft powders.

In 1999, Gordon Jones, formally with Alloys International,



DeWAL Industries offers the highest quality, most complete line of thermal spray tapes - aluminum foil, fiberglass fabric, siliconeimpregnated fiberglass, and combinations of these materials.

For wire arc and HVOF, DeWAL double-ply tapes reduce set-up time and withstand the harshest environments. DeWAL tapes can be single-ply or multi-layer.

DeWAL tapes adhere aggressively, ensuring sharp edges, resisting temperatures to 1000°F, and removing cleanly after spraving.

Call DeWAL today, then thermal spray away.



Quality Approvals: GE, Pratt & Whitney, Rolls Royce, etc.

joined Lineage Alloys as their production manager. During this time, Lineage Allovs achieved ISO certification due to a total commitment to quality control under the direction of Robert Jennings, quality control manager.

During 2000 and 2001, Ray Selby retired and Simon Poon left to pursue other business ventures. At this time Gordon Jones was appointed as general manager. David Dugas, also a former employee of Alloys International, joined Lineage Alloys as sales manager. The other original employees of Lineage Alloys are still with the company as well as additional employees who were added through the years to maintain our high demand for our thermal spray powders and our high expectations.

We at Lineage Alloys will continue to be a world class supplier and manufacturer of thermal spray powders to the coating and aircraft industries. We look forward to continuing to serve our loyal customers and look forward to adding new customers to our family. Our goal is to meet the customer's needs with quality powder and on time delivery.

For more information, visit www.lineagealloys.com See advertisement page 23.



Thermal Spray Crossing Borders Maastricht, The Netherlands June 2 - 4, 2008

This outstanding annual event in the world of thermal spray technology is jointly organized by the German Welding Society (DVS), the ASM Thermal Spray Society (ASM TSS), and the International Institute of Welding (IIW).

> For more information, please visit www.dvs-ev.de/itsc2008

Plasmatec Inc. is ISO 9001:2000 Certified



Plasmatec Inc. has achieved ISO 9001:2000 accreditation from SGS, the internationally

recognized leader which provides certification services.

Plasmatec Inc. has always strived to maintain an open channel of communication with its clients. Listening to our clients, tracking customers' satisfaction and supplying them with high guality services and products have been long time commitments for Plasmatec Inc. The ISO 9001:2000 is the formal statement of our policy and guidelines.

Not only does the certification testify to our customer's related concern and culture of excellence, it also represents a milestone in our company.

As we focus on the North American market and explore new (overseas) markets, the worldwide standard is the backbone of our growth and supports our objectives.

As a company, we were obliged to a stringent audit which required a global involvement of the entire Plasmatec team. Our processes have been scrutinized and evaluated to all levels which included management, shop employees, engineering and staff alike.

For each employee, it has been an outstanding opportunity to demonstrate our main concern to offer consistent quality in the services and products we supply to our customers.

S

Though, Plasmatec Inc has always integrated quality into its business system, the standard is not seen as a certificate on the wall.

Our ISO 9001:2000 certificate is the quality framework that our customers deserve and the testimony of our dedication to continual process improvement and proficiency.

The Scope of registration is as follow : powder conception and manufacturing, thermal spray coating services, and distribution of thermal spray consumables.

Plasmatec Inc. was established in 1985 and continues to supply powder, wires, masking tapes, and turn key thermal spray systems through its distribution division. Notably the Plasmatec web site 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.

Since 2003, Plasmatec offers thermal spray coatings services including a complete metallurgical laboratory to quantify and qualify its own coatings. Since 2006, Plasmatec manufactures its own proprietary powders as well as commercially available products in the area of WC, Ni base, ceramics and abradable powders.

For more information, email info@plasmatec.com or visit www.plasmatec.com

Journal of Thermal Spray Technology® A publication of the ASM Thermal Spray Society Abstract: Low Thermal Conductivity Coatings for Gas Turbine Applications N.Markocsan, P.Nylén, J.Wigren, and X.-H.Li

Plasma spraving of thermal barrier coatings (TBCs) on gas turbine parts is widely used today either to enable higherturbine inlet temperatures with consequent improvement of combustion efficiency or to reduce the requirements for the cooling system and increase component life-time. Development of low conductivity TBCs, which allows us to further increase gas turbine efficiency and availability, is an ongoing challenge. In order to get low thermal conductivity values an experimental program was conducted. Yttria partially stabilized zirconia (YPSZ) and dysprosia partially stabilized zirconia (DyPSZ) were used to study the influence of power input in the plasma torch and powder feed rate on coating properties. Microstructure evaluations were performed to evaluate the influence of the spraying parameters on the coating morphology and porosity level. Laser Flash (LF) and Transient Plane Source (TPS) methods were utilized to evaluate the coatings thermal conductivity and a comparison between the two methods conducted as well as a correlation study between coating microstructure/composition and thermal conductivity (TC).

Read the entire article in the December 2007 Journal of Thermal Spray Technology.

For more information, visit www.asminternational.org/tss Editor: Christian Moreau

Associate Editors: Kendall Hollis, Seiji Kuroda, Lech Pawlowski, and Armelle Vardelle



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Join the ASM Thermal Spray Society Online Community Forum

ASM TSS members welcome visitors to register and access the new *searchable* forum, as well as explore the new online community.

To subscribe, visit http://tss.asminternational.org, choose networking and forum for instructions.

Thermal Spray Crossing Borders Maastricht, The Netherlands June 2 - 4, 2008



ITSC 2008, the worldwide leading conference of thermal spray, returns to Europe. ITSC is an opportunity for the global thermal spray mmunity to meet.

community to exchange information and conduct business.

This outstanding annual event in the world of thermal spray technology is jointly organized by the German Welding

spray technology is jointly organized by the German Welding Society (DVS), the ASM Thermal Spray Society (ASM TSS), and the International Institute of Welding (IIW).

ITSC 2008 follows the successful path of the previous events in Basel (2005), Seattle (2006) and Beijing (2007). It presents the latest status of application, research and development in the field of thermal spray.

Maastricht is a bustling town of some 180,000 inhabitants. Its twice-weekly market and busy shops attract customers from Belgium and Germany and it draws numerous tourists and businessmen. Current policies emphasize Maastricht's central location in Europe and its European image. In 1981 and 1991 the city hosted the summit meeting of the European Community heads of state. The creation of the "Euregio" area, centered on the cities of Aachen, Liege and Maastricht, is a sign that Maastricht is returning to the central Euripean location it occupied during the reign of Charlemagne.

ITSC 2008 will take place at the MECC Maastricht Congress Centre. MECC Maastricht is a state-of-the-art conference and exhibition center constructed accouring to the "fourthgeneration" concept. Visitors can attend ITSC 2008, dine, and also sleep there. Everything is under one roof.

For more information, please visit www.dvsev.de/itsc2008

See Dutch Association article page 21.



Bringing Technology and Technique Together



Chairman Froning

Thermal Sprav

with the history of thermal spray development in this hemisphere. Founded in 1948, and once known as Metallizing

Service Contractors, the association has been closely tied to most major advances in thermal spray technology, equipment and materials, industry events, education, standards and market development.

A company-member trade association, ITSA invites all interested companies to talk with our officers, committee chairs, company and

representatives to better understand member benefits. A complete list of ITSA member companies and their representatives are at www.thermalspray.org

ITSA Mission Statement The International Thermal Spray Association is a professional trade organization dedicated to expanding the use of thermal spray technologies for the benefit of industry and society.

Officers

Chairman: Marc Froning, BASF Catalysts LLC Vice-Chairman: Dan Hayden, Hayden Corporation Treasurer: **Bill Mosier**, Polymet Corporation **Executive Committee** (above officers plus) Corporate Secretary: Kathy Dusa Past Chairman: *Ed Simonds*, Cincinnati Thermal Spray, Inc. 6-Year Term: John Read, National Coating Technologies 4-Year Term: Scott R. Goodspeed, H. C. Starck, Inc. 2-Year Term: John Hayden, Hayden Corporation

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 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 and complete the short questionairre.

ITSA Headquarters

208 Third Street, Fairport Harbor, Ohio 44077 USA tel: 440.357.5400 fax: 440.357.5430 itsa@thermalspray.org www.thermalspray.org

N E W SPRAYTIME®--Letters To The Editor WRITE US!

SPRAYTIME solicits letters to the Editor for publication in our new column. Letters are solicited that comment on a recent SPRAYTIME article, on a topic of general interest to the thermal spray industry, on a recent event in the industry, or on a recently published letter to the editor.

Send your letter to SPRAYTIME by e-mail to spraytime@thermalspray.org or via fax to 440.357.5430; electronic submissions as a Word document are preferred. Letters must be signed and must give the author's name, affiliation, and phone or e-mail address. The author's name will be published. Letters of fewer than 300 words will be given preference. Longer letters may be abridged by the editor. Please give the headline and issue number if referring to a specific article previously published.

The editor reserves the right to select letters for publication, and due to space and time limitations not all letters will be published nor acknowledged. If you have any questions please contact SPRAYTIME via email spraytime@thermalspray.org, or via phone 440.357.5400.



Bringing Technology and Technique Together

Your company join the International Thermal Spray Association

now! As a company-member, professional trade association, our mission is dedicated to expanding the use of thermal spray technologies for the benefit of industry and society.

ITSA members invite and welcome your company to join us in this endeavor.

Whether you are a job shop, a captive in-house facility, an equipment or materials supplier, an educational campus, or a surface engineering consultant, ITSA membership will be of value to your organization.

The most valuable member asset is our annual membership meetings where the networking is priceless! Our meetings provide a mutually rewarding experience for all attendees both business and personal. Our one day Technical Program and half day business meeting balanced by social activities provide numerous opportunities to discuss the needs and practices of thermal spray equipment and processes with one another.

As an ITSA member, your company has excellent marketing exposure by being listed on our website, in every issue of SPRAYTIME, as well as in our free edition of "What Is Thermal Spray?". ITSA members also receive an additional 10% advertising discount in the SPRAYTIME newsletter. ITSA member companies are also highlighted in the ITSA booth at several trade shows throughout the year (International Thermal Spray Conference ITSC, Fabtech International and AWS Welding Show Thermal Spray Pavilion, Marine Coatings & Corrosion Conference MegaRust Show, Weldmex Mexico, and TurboExpo in 2008).

If you would like to discuss the benefits of your company becoming a member of the International Thermal Spray Association, we suggest you contact Kathy Dusa at our headquarters office or our membership chairman Jim Ryan at james.ryan@hcstarck.com or visit the membership section of our www.thermalspray.org website.

International Thermal Spray Association Welcomes New Members

ARDLEIGH MINERALS INCORPORATED

Ardleigh Minerals, Inc. has joined the International Thermal Spray Association.

Ardleight Minerals is a recycler and supplier of raw materials for the metallurgical, ceramic, cement and agricultural industries.

Since its inception, Ardleigh Minerals has found its niche by providing one-stop-recycling services for producers of byproduct, off-specification, and obsolete materials.

As a supplier, Ardleigh Minerals provides manufactured or application-enhanced materials. Enhanced-manufacturing value can include anything from a physical change in the product to a delivery system change such as bulk to package. Enhanced-application value is obtained by developing new and unique uses for these materials.

Thermal Spray includes: alumina, blast media, filters, flashing, grinding swarf, grinding wheels, maskant, metal chips/grindings/turnings, nozzles, plastic bottles, and shields.

Thermal spray, plasma spray and HVOF powders and dust collector fines include materials and mixtures containing cobalt, copper, indium, molybdenum, nickel, and tungsten.

Ardleigh Minerals actively works with state environmental regulatory agencies to clarify all issues related to characteristic hazardous wastes being classified as nonhazardous materials when recycled. See advertisment page 20.

For more information, contact ITSA company representative Ernie Petrey email epetrey@ardleigh.net, tel: 216-921-6500, web: www.ardleigh.net

See advertisment page 20.

PM Recovery, Inc. has joined the International Thermal Spray Association.



Serving industry professionally, personally, dependably. preserving the environment with integrity. PM Recovery has developed a unique expertise in handling the reclama-

tion, recycling and final disposition of secondary materials. We take pride in environmental responsibility matched with aggressive commercial terms. We make sure you are covered... And the environment is undisturbed.

Principally engaged in the purchase and processing of nonferrous/specialty metals PM Recovery is uniquely positioned to provide generators of industrial secondary materials with environmentally responsible direct material handling of nickel, cobalt, tungsten, molybdenum and all associated alloys. PM Recovery handles solids, turnings, grindings, sludges, mixed and co-mingled materials. Additionally we purchase ferro alloys, copper, zinc and vanadium-bearing materials.

PM Recovery New Castle specializes in the processing of various forms of nonferrous, high temperature and base metal scrap materials including solids, grindings, sludges, residues, mill scale, turnings, flue dusts, filter cakes, pond tailings, and spray coatings. By adding value to these residual materials through proprietary mechanical processing, we transform your scrap into intermediate products maximizing value while eliminating environmental liability.

PM Metals and Carbides processes all forms of "soft" and "hard" tungsten and tungsten carbide scrap. Solid shapes include mining compacts, dies, anvils, mill rolls, end mills, CB drills, tooling inserts, cutters, saw blades, saw teeth. Soft shapes processed include grindings, swarfs, powders, sweeps, sprays, turnings and mixed materials.

PM Recovery Austria provides recycling coverage and environmental services to industry throughout Europe, Asia, the Middle East and the African Continent.

For more information, contact ITSA company representative Paul Sartor, email paul@pmrecovery.com, tel: 860.536.5396, web: www.pmrecovery.com

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EOPLE IN THE NEWS

Ρ

Wall Colmonoy Promotes Rick Rackley Director of Quality



Rick Rackley has been promoted to the position of Director of Quality for the Wall Colmonoy (WCC) Aerospace Group. The WCC Aerospace Group is comprised of the Oklahoma City, Cincinnati, and Davton, Ohio facilities.

Rick had 17 years experience in quality management, before joining the WCC team. He has been the Quality Manager/Safety Officer for the WCC Oklahoma City

facility for the past seven years, and was instrumental in obtaining ISO 9001:2000 certification for that location.

WCC operates two FAA repair station facilities, and is a leading manufacturer in high-temperature, nickel-base brazing and coating allovs.

For more information, visit www.wallcolmonoy.com.

Thermal Spray Crossing Borders Maastricht, The Netherlands June 2 - 4, 2008 This outstanding annual event in

the world of thermal spray technology is jointly organized by the German Welding Society (DVS), the ASM Thermal Spray Society (ASM TSS), and the International Institute of Welding (IIW).

For more information, please visit www.dvs-ev.de/itsc2008

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Neiser ASM International 2007 Fellow



In ASM's 2007 Class of Fellows *Dr. Richard Neiser* was recognized "for pioneering contributions in innovative process diagnostics and modeling to enhance fundamental understanding and improve control technology for thermal spray processes, and for exceptional leadership in thermal spray safety education". Dr. Neiser is currently manager of the Applied Systems and Materials Science Department in the

Systems Assessment and Research Center at Sandia National Laboratories in Albuquerque, New Mexico.

Born and raised in Pittsburgh, PA, he received his Bachelors and Masters degrees in Materials Science & Engineering from Virginia Tech in Blacksburg, VA. Dr. Neiser performed his PhD studies at the State University of New York at Stony Brook, Long Island, NY. For six years he worked at Brookhaven National Laboratory on Long Island operating X-ray facilities for the Naval Research Laboratory and Oak Ridge National Laboratory. Upon completing his doctorate, Dr. Neiser received an Alexander von Humboldt fellowship to study in Germany and performed post-doctoral research at Aachen Technical University and at the University of the Federal Armed Forces in Hamburg. Moving to New Mexico in 1991, Dr. Neiser has worked at Sandia National Labs for the past sixteen years on a broad range of applied engineering projects in the area of national security. He is married and has three children.



Feedback control of particle temperature and velocity of flame-sprayed copper wire is challenging because of the low emissivity of copper and the need to keep the wire well-centered in the flame. This photograph of Rich Neiser looking at the flame illustrates how dim the copper particles are. It was found that gas flows to the torch could be dynamically adjusted to simultaneously hold both average particle temperature and velocity constant.

For more information, contact Rich Neiser at email raneise@sandia.gov

The Dutch Thermal Spray Association, VTS, Appoints Will Herlaar as President

Will Herlaar, having served as a Marine Engineer in his younger years, worked for Smitweld, now Lincoln Electric, as export manager and joined Metco in 1985 as Director for Metco Nederland and Belgium. He was appointed Managing Director of Metco Uk Ltd in 1992. He left Metco after the merger with Sulzer to become Account



Manager a few years later for Flame Spray Technologies in the Netherlands.

He is a member of the Programming Committee for ITSC 2008, which is going to be held in the Netherlands in June 2008

The Netherlands being host of ITSC 2008 in Maastricht certainly will find the spotlights of the Thermal Spray industry on them. The VTS will make sure that a warm welcome will be extended to all of you who will visit this event.

For more information, email W.Herlaar@fst.nl



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NORTH AMERI	CA		ZIP CODE	STATE	Distri	bution	Bahrain	2
United States			955-999	AK		5	Iran	
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010-027	MA	153	970-979	OR		33	Kazakhstan	
028-029	RI	32	900-961	CA		295	Kuwait	
030-038	NH	106	967-968	HI		7	Pakistan	1
039-049	ME	28	Pacific	52	9		Saudi Arabia	3
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070-089	NJ	123						
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Mid-Atlantic	909		C0-C9Z	PE	-	2	Ghana	
430-459	OH	525	60-197	OC (PO)	-	193	Kenva	
460-479	TN	175	K0-P97			164	Nigeria	
400-479	MT	100	R0-F92	MR		104	Republic South Africa	
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270-289	NC	88	Venezu	ela 10			Malta	
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320-349	FL	184	CENTRAL AMERI	CA			Poland	8
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350-369	AL	50	CENTRAL AMER	ICA TOT			Republic of Ireland	
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/50-/99		353	South Ko	rea 25			United Kingdom	19
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15 Year Anniversary - SPRAYTIME Fourth Quarter 2007



Sulzer Metco

Efficiency in Plasma...

Efficiency in HVOF...

Efficiency in Purchasing...

Solutions to Increase Your Bottom Line

There are many ways to measure efficiency, and you probably have any number of target goals to increase it. Let Sulzer Metco help you reach them:

- Our **Triplex***Pro*[™]-200 plasma gun will improve your production efficiency with outstanding deposit efficiencies, reduced gas consumption, faster spray times and hundreds of hours between simple, quick gun rebuilds.
- Our WokaStar™-600 liquid-fuel HVOF gun has improved thermal efficiency and a durable, low-maintenance design for long spray times and high quality, reliable coating results.
- Improve your sourcing efficiency with our portfolio of consumable components and high quality carbide materials for competitive HVOF and plasma spray guns.

Meet your efficiency goals with thermal spray solutions from Sulzer Metco.