

SPRAYTIME®

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Polish LPG Cylinders Protected by Metallisation Equipment

Vitkovice Milmet S.A. is the only manufacturer of LPG cylinders in Poland and has recently purchased three Metallisation Arcspray 528E production electric arc spraying systems. The steel cylinders, which are mainly used for propane and butane gas, are produced from scratch at the company's site in Sosnowiec and, as with many steel items, are prone to long term damage by corrosion.

Vitkovice Milmet has purchased the arc spraying equipment in response to demands from the LPG cylinder industry for more superior and reliable resistance to corrosion. To provide the level of corrosion protection required, each cylinder needs to be sprayed prior to powder coating or wet painting. Arc sprayed cylinders will be fit for useable service for between 10 and 15 years before routine inspection is required. Metal spraying is a technology that protects or extends the life of a wide variety of products in the most hostile environments.



Normally, LPG cylinders are simply coated with either wet paint or a polymer powder coat, which are both liable to damage through normal wear and tear, leaving the metal exposed and leading to corrosion. As an effective

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Zinc arc spraying machine.

protection from corrosion, Vitkovice Milmet has been considering arc spraying for some time and began investigation into this nearly ten years ago, before the demands of the industry were evident.

In 2007, the Vitkovice Milmet management team visited Metallisation in the UK to see first hand how arc spraying can protect LPG cylinders from corrosion. The team also visited a number of cylinder spraying plants across Europe and Scandinavia to witness the effectiveness of arc spraying gas cylinders. While in the UK, the Vitkovice Milmet team also visited leading automation company, EMS

Surface Technology Ltd (EMS), based in Reading, to evaluate the equipment that would enable the arc spraying process to be fully automated.



Cylinder before coating.

Following extensive evaluation and discussion Vitkovice Milmet chose Metallisation to provide all of the metal spraying equipment, and EMS as the main contractor and supplier of the automation. Vitkovice Milmet's decision to opt for Metallisation was based on the professional approach of the team in the UK, recent references for the same application and the local support service provided by established Metallisation distributor, Sciteex.



Blasted cylinder.

Vitkovice Milmet's initial brief to Metallisation and EMS was to arc spray the cylinders while in a vertical position. This, unfortunately, can create a range of technical problems and can increase the cost of the automation as well as producing an uneven coating. Following lengthy discussions, Metallisation and EMS were able to demonstrate the benefits of spraying the cylinders in a horizontal position, which Vitkovice Milmet agreed to and adopted the principle.

Vitkovice Milmet's target production is to spray 2,100 of the 25lb (11.3kg) cylinders per day across three shifts. The adaptable automation in conjunction with the Metallisation Arc528E systems can spray a range of cylinder

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Zinc sprayed cylinder.

Vitkovice Milmet make the cylinders by first pressing the parts which are then welded together with the fixtures, before pressure testing them prior to applying a surface coating. The surface of the cylinders needs to be prepared to ensure an adequate profile is created for metal spray adhesion. This is done by grit blasting the cylinders

in an automatic blasting machine, which produces a blast cleanliness of SA 2.5. Once the surface has been prepared, the arc spraying can begin.

The cylinders are automatically fed into the arc spray machine, which aligns the guns and rotates each cylinder. One arc spray gun moves across the base and sprays the bottom of the cylinder, a second, fixed gun, sprays the cylinder neck and shroud and a third gun traverses along the length of the cylinder to coat the sides. The machine is also supplied

with dust extraction and dry filtration equipment, to ensure there is no contamination of the coating and to provide a safe working environment.

Each cylinder is coated with an average of 2.4mils (60 microns) of zinc. The base of the cylinder is coated with a slightly thicker coating to provide greater protection in an area normally subjected to greater wear and tear. Once all the cylinders have been arc sprayed, Vitkovice Milmet then powder coat the cylinders to meet its customer color requirements. Cylinders are then fitted with valves, pressure tested, certified and stamped and finally branded with the customers branding using screen-printing.



Applying powder coat.

Vitkovice Milmet chose the Metallisation Arc528E System as it provides a consistently high quality zinc coating and can spray zinc at a rate of up to 100 lb/hr (46kg/hr).

The Arc528E guns, used to spray the base of the cylinders, are connected to two S250, 250 amp power sources. The gun spraying the sides of the cylinders is

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connected to an S450, 450-amp power source, as this needs to spray at a higher spray rate than for the base and neck. Metallisation supplies the zinc in 550lb (250kg) fibre drum production packs.



Baking powder coat.

Robert Kościelny, Production Manager, Vitkovice Milmet, says: "We chose Metallisation and EMS because of their experience and professional attitude throughout this whole process. Over the last few months we have had a lot of contact with both companies and they have proven themselves time and again. The process has worked really



Cylinders with valves installed.

well because they understand what we are trying to achieve, plus the availability of local knowledge and support offered by Sciteex made the decision to choose Metallisation so much easier. Sciteex has proved to be very technically competent when we have needed advice or support. We look forward to ramping up production over the coming months and seeing our new equipment in full action. It's a very exciting time for us. Now we have the ability to coat our cylinders, it will allow us to expand our customer base into markets where zinc coatings are a prerequisite from certain gas suppliers such as Shell and Primagaz."

For further information on surface coatings or Metallisation equipment and processes, please contact Stuart Milton on + 44 (0) 1384 252 464 or visit www.metallisation.com

WHERE IS YOUR ARTICLE?

The *SPRAYTIME* Editorial Staff encourages and welcomes your contribution.



SSPI Announces Formation of Superior Shot Peening International

Superior Shot Peening, Inc. (SSPI) announced the formation of Superior Shot Peening International with facilities in Changzhou, China; Mumbai, India; and Singapore.



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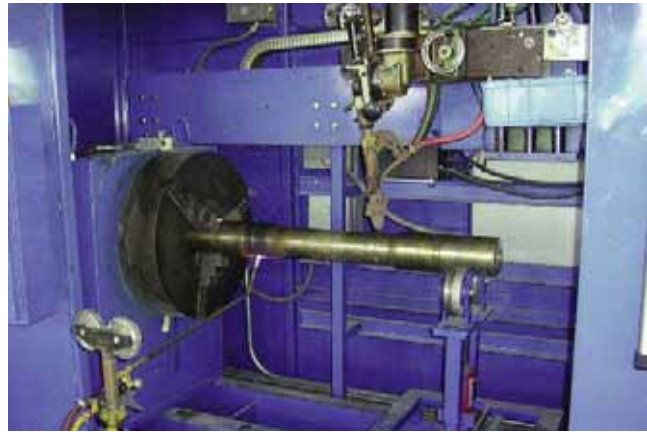
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treatment industry; is expanding to a global position through the formation of Superior Shot Peening International. The initial facilities of this new entity are in Changzhou, China; operational since September 2007;



Mumbai, India; operational since October 2007; and Singapore, operational since May 2007.

These new facilities will bring the same peening, metallizing, hard banding, phosphating, and coating systems that have served a broad base of oil and gas, aircraft, machine builders, and other industrial clients in the US to a broad cross section of industries that require quality, component-life enhancing technologies around the



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Photos in this article are from the SSPI Changzhou facility.

For more information, visit their website www.superiorshotpeening.com

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On the Occasion of the 50th Anniversary of Japan Thermal Sprayers Association

by Akira Nakahira, President



Opening Remarks by Akira Nakahira, President of JTSA

In 1958, the Japan Metallicon Service Contractors Association, an organization of thermal sprayers, was reorganized and renamed to form the Japan Thermal Sprayers Association, which marked the 50th anniversary this year. The year 1958 was a year of recession called "Chronic Recession" after "Jimmu Boom". Following "Iwato Boom", economic fluctuations have been repeated ever since.

Above all, the prolonged recession called the "lost 10 years" after "collapse of the bubble economy" resulted in bankruptcies of many first-section listed companies of Tokyo Stock Exchange including banks, securities, brokers, real estate business and traders to make a very difficult period of time for businesses.

Overcoming the turbulent 50 years, the Japan Thermal Sprayers Association increased its members from 12 to 75. Meanwhile, the thermal spray market of coating job shops has greatly grown from estimated 1 billion yen to about 50 billion yen. Eighty percent or more of the market is occupied by job shop members of the Japan Thermal Sprayers Association, which can be said to be the representative organization in the thermal spray industry in Japan.

Though 50 years have passed since 1958, Japanese thermal sprayers organization dates back to 1919 when a precious metal trader, Kenjiro Ezawa, introduced thermal

spraying technology from Dr. Schoop for the first time in Japan. He developed new arc gun, for which a patent was obtained, and named the technology "Metallicon" by combining English and Latin. He licensed the patent and increased licensee firms for "Metallicon".

In 1947, only 2 years after the end of World War II, the Japan Metallicon Service Contractors Association (JMSCA) was established by 12 metallicon firms, which later developed into the Japan Thermal Sprayers Association (JTSA). Considering the confused social situations after the War, it is surprising solidarity that the metallicon firms organization was established. Generally, there are academic associations of thermal spraying but thermal sprayers are reluctant to disclose their information and job shops organizations cannot be established easily due to mutual sense of caution. The 12 members of the Japan Metallicon Service Contractors Association were licensees of Mr. Ezawa's patent, and probably this organization was made possible because the patentor Mr. Ezawa called for the establishment of the association, and he was the first Chairman of JMSCA.



Executive Committee Members of 50th Anniversary

Overseas, the International Thermal Spray Association (ITSA) is the biggest American thermal sprayers association. Historical speaking, Metallizing Service Contractors (MSC), the predecessor of ITSA was established in 1948, one year later than JMSCA. In considering these facts, JTSA is one of the world's oldest organizations of thermal sprayers. However, this fact is not widely known in the overseas.

It is thought that the establishment of the Japan Thermal Spray Society (JTSS) considerably affected renaming of the Japan Metallicon Service Contractors Association into the Japan Thermal Sprayers Association in 1958.

Prof. Masayoshi Tagaya of Osaka University who established the Japan Thermal Spray Society and assumed the position of its president said "Japanese thermal spray industry is outdated; it should innovate hardfacing and build-up spraying as soon as possible" at the time when hardfacing and build-up spraying, frequently used in Europe and America,



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were not used in Japan due to lack of overseas information during and after the War. It is said that the JTSS was established for the purpose of innovating and popularizing new European-American thermal spraying technologies in Japan.

Such trend in thermal spray technologies, the Japan Metallicon Service Contractors Association also innovated European-American thermal spray technology as advocated by JTSS and changed its name to the Japan Thermal Sprayers Association to alter the image of metallicon that focussed on anticorrosion coating.

This year, 50 years have passed for JTSA. This year also marked the turning point of the Japanese thermal spray industry.

Twenty years later in 1978, JTSA began to be managed as a nationwide unified organization and keep records of meetings and activities. Since then, the purpose of JTSA was clarified by article of incorporation and the organization was gradually integrated. Today, there are 3 branches in Kanto (East), Kinki (Middle) and West Japan, and 5 committees on spraying for Anti-Corrosion, Hardfacing, Safety and Health, Promotion of JIS/ISO Thermal Spraying and Public Relations, which are actively performing their respective duties.

For specific challenges, the association achieved great results through occasional Supporting Industry Committee and the Committee for Commemorating 50th anniversary.

Based on the past achievements, JTSA marked this year a great turning point with the 50th Anniversary. It is a good chance, to review the past, recognize the current status, and create the vision for the future.

Japanese thermal spray coating market is estimated to stand at about 90 billion yen in the fiscal 2006, composed of in-house production market of major firms and coating job shops' market which have the same shares of 45 billion yen each.

The categories of the job shops' market include industrial machinery (24%), semiconductors and LCD(19%), steel (15%), paper, pulp and printing(13%) and others.

In February this year, Thermal Spray Technology was designated as "Specified Manufacturing Technology under the Act for Sophistication of Manufacturing by Small and Medium Businesses" and developments by job shops were authorized to receive the government's assistance by subsidy. This is the right time for the 50th anniversary and active utilization of the "Supporting Industry Program" will activate new developments by job shops and surely serve to expand their market.

On October 3, the commemorating ceremony and celebration party for the 50th anniversary of Japan Thermal Sprayers Association was held in Westin Miyako Hotel in Kyoto. It was an utmost pleasure that many people representing societies, associations and organizations both from Japan and abroad attended and offered congratulations.

On this occasion, I would like to list the challenges of Japan Thermal Sprayers Association:

1. Improve presence of the Japan Thermal Sprayers Association through international conferences, exhibitions, ISO committee and other occasions, and exchange information with overseas sprayers and sprayer organizations to promote globalization of the Association.
2. Promote development of new applications taking good advantage of the "Supporting Industry Program" and achieve continuous developments for the future of member companies.

With dreams and hopes, we would like to proceed to make thermal spray industry more vital and attractive than ever.

For more information, contact Akira Nakahira, President of JTSA at Tocalo Co.,Ltd., email: akira-n@tocalo.co.jp, Tel: 078-411-5561, Fax:078-452-8178

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NIOSH Hexavalent Chromium Recommendation

Barbara Kanegsberg, BFK Solutions LLC

In 2006, The Occupational Safety and Health Administration (OSHA) lowered the PEL for hexavalent chromium, Cr(VI), from 52 to 5 micrograms per cubic meter. The National Institute for Occupational Safety and Health (NIOSH) recently published a Recommended Exposure Level (REL) for Cr(VI) of 0.2 micrograms Cr(VI) /m³ TWA (time weighted average) for an 8-hour day, during a 40-hour work week, with the recommendation for employers to use "all reasonable efforts" to reduce the Cr(VI) exposure below that level through engineering controls and work practices. An extensive discussion of the proposed NIOSH REL, one that is more than 20 times lower than the PEL recently set by OSHA, is found in the "Criteria Document Update, Occupational Exposure to Hexavalent Chromium," an External Review Draft dated September, 2008. NIOSH is conducting a public review of the document. Even if OSHA(Federal) makes no additional changes to the PEL, it might be reasonable to consider potential action by Cal/OSHA. Written comments can be received through January 31, 2009; a public meeting will be held on January 22, 2009 in Cincinnati, OH.

Note that OSHA does not always adopt NIOSH RELs for a new PEL.

For additional information, please go to <http://www.cdc.gov/niosh/topics/hexchrom/>

Barbara Kanegsberg, BFK Solutions, is an independent consultant in critical cleaning processes and surface quality. **For more information**, contact Barbara at Barbara@bfksolutions.com

Just Published:

Tungsten Conference Proceedings

The 2008 International Conference on Tungsten, Refractory and Hardmaterials was held June 8-12 in Washington, D.C. The meeting, the seventh in a series of conferences sponsored by the Metal Powder Industries Federation in cooperation with the Refractory Metals Association and APMI International, and co-chaired by Animesh Bose, Robert Dowding and John Shields, Jr., continued the tradition of successful meetings that began in 1992. Over 175 attendees from approximately 40 countries participated in more than 80 presentations at the conference, which was held concurrently with the 2008 World Congress on Powder Metallurgy and Particulate Materials.

The 80 papers contained in these proceedings reflect a broad range of topics including several standalone sessions on nanomaterials and their processing, evidence of the increasing importance of this area.

Proceedings include the following sections: Foreword; Technical Program Committee; Tungsten Lamp Wire; Health and Environment; Refractory & Hardmetals Processing; Novel Consolidation; Nanocrystalline Tungsten and Hardmetals; Tungsten and Hardmetal Mechanical/Physical Behavior; Tungsten-Copper Materials; Molybdenum; Refractory Metals; Tungsten Composites; and Luncheon Presentation.

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International Thermal Spray Launches New Website

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SPRAYTIME issues are included in this website with content search capability.

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Sprayed Particle Diagnostics – Part 4

By Mo VandenBergh – VandenBergh & Associates

The possible uses of particle diagnostics to reduce costs of thermal spray presented in the last three issues of *SPRAYTIME* were classified as the "easy applications":

- Cell equalization
- Cell certification (reduced testing, increased cell utilization)
- Operator training
- Process monitoring.

All of the above applications are based on comparing particle measurements to known measurements of a desired coating. The desired coating is typically supported with coating reports and physical measurements.

In all the applications above, the goal is to allow the operator to recognize the need for minor adjustments or maintenance of the spray process before actually spraying or completing the coating without having to resort solely on coupon results or final product measurements when it is too late to save the part.

While it may be more difficult to assess the overall savings attributed to the use of particle diagnostics in the first three applications, which can be considered problem solving applications, the use of business models can aid in understanding the value of particle diagnostics. What-if analysis of the business model can also suggest improvements in the process that can offer the greatest

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impact to reducing process costs. This is particularly true in the case of process monitoring.

One of the last applications for return on investment of particle diagnostics is its use as a "R&D" tool. Some typical R&D applications might include:

- Process mapping
- Improvement of deposition efficiency
- Development of new coatings (improved density, wear resistance etc.)
- Choice of thermal spray process
- Optimization of parameters, - gas flows, material injection, feed rates and system cooling parameters
- Substitution of materials
- Determining hardware life
- Substitution of hardware
- Substitution of gasses
- Hardware design.

R&D applications, unlike the simple comparison, "easy applications", require a more thorough understanding of the measurement process. To understand the complexity in the use of particle diagnostics in R&D applications will require answers to the following questions. Although this article will not attempt to describe the products and operations in great detail, an introduction to the differences is appropriate for this article:

1. What diagnostic equipment is available?
2. What are the physical setup capabilities and limitations?

3. What characteristics are measured?
4. How are the measurements collected?
5. How are measurements treated?

What diagnostic equipment is available?

There are two major manufactures of particle diagnostic equipment; Oseir Ltd., a Finish Corporation, and Tecnar, a Canadian Corporation. Each has several offerings based on the information sought and the spray process to be investigated. Each process uses two-color pyrometry to measure temperature and each provides a particle velocity and some plume measurements, that is about where the similarity ends. The major differences are in what data are collected, how the data is collected, treated, evaluated and stored. At some set of conditions each will probably yield similar average measurements, but direct comparison of results from one system to another may not be a simple process.

Each measurement device is also unique in whether it is investigating single particles, a small area and volume of particles in the plume, ($<0.05\text{in.}^2$ { $<0.3\text{ cm}^2$ }, $<0.03\text{in.}^3$ { $<0.5\text{ cm}^3$ }), or the entire plume width, variable area and volume, ($1.9\text{ to }0.4\text{in.}^2$ { $2.6\text{ to }12\text{ cm}^2$ }, $0.03\text{ to }2.75\text{in.}^3$ { $0.5\text{ to }45\text{ cm}^3$ }).

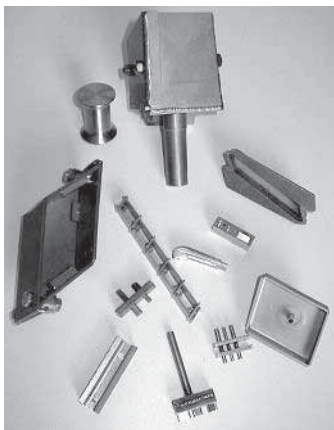
While all the systems can most likely be modified to some extent by the manufacture based on the demand, the following points are, for the most part, generalities. Due to the complexity of the processes and the measuring devices it is beyond the present scope of any single product to provide all the measurements for all the thermal spray processes. The capabilities and mostly the limitations presented may be subject to change as the equipment and software will continually undergo improvements. It is up to the end user to study each system in detail and not delay in getting started with their use, since the basics have been established and there is short payback to their employment.

Both companies offer other measurement systems and or options that may include lasers for measuring cold particle velocities, particle size as well as how particles are injected into the plume. Some offer capabilities of capturing and time stamping spits. Also available are less expensive models designed for monitoring purposes only. This article is only referring to the most versatile equipment used for measuring common thermal spray processes.

What are the physical setup capabilities and limitations? Tecnar offers one equipment setup with the detection device at 7.9in. (200 mm) from and focused perpendicularly toward the center of the plume. Since the device is relatively small it will not require much more room than the required standoff to use it as a monitoring device, as well as a stationary device for measuring the spray on an intermittent basis. It is more favorably positioned in a remote location with the torch being moved to the measurement position. The system requires a different sensor head for plasma and HVOF types of processes.



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continued from page 12

Oseir offers two different configurations with each having a more sensitive version for special requirements. The standard models can each measure most thermal spray processes due to their wide dynamic range. The two different configurations include a larger camera 3.9x3.9x11.8in. (100mm x 100mm x 300mm) that includes servo motors for the adjustment of aperture automatically by the software or manually by the operator at the computer interface. The focus distance can also be remotely changed by the operator. The more sensitive version offers the ability to measure particle size. The second configuration is more compact so that it can travel with the torch as well as be positioned remotely for periodic measurements. Due to the smaller configuration the focal distance and aperture are manually set at the camera. It likewise has a more sensitive version allowing the detection of particles harder to record because of one or a combination of; smaller particles, cooler particles and/or faster particles as might be produced by an HVOF process. The more sensitive camera with different software and with a laser stroboscope can measure velocities of cold particles as in cold spray processes, droplets in suspension sprays or bubbles in fluids.

What characteristics are measured?

The Tecnar system provides a measurement for particle temperature, velocity and relative plume intensity

distribution along with the ability to measure plume dimensions based on plume intensity.

Oseir offers the same relative measurements, plume descriptions and relative intensity while it adds a count of particles or the calculation of flux (number of particles/area/time). The system measures individual particle velocities and calculates the average, but for temperature it measures the average of a large number of particles in the same area of the plume.

How are the measurements collected?

The Tecnar products utilize a double filter and sensor design and two slit technology with statistical treatment of the data and two-color pyrometry in determining particle velocity and temperature. Plume information is derived from a separate camera that can view the gun and plume. Plume dimensions can be graphically overlaid and set on the screen for measurement and monitoring purposes.

Tecnar's system offers some simplifying features. All of the decisions as to how and where to set up the system have been made and are fixed except for where, along the plume, measurements are to be taken. The real-time view of the position of gun and plume make it easy for the operator to see if all are in the proper position. Once the system recognizes the plume is at the correct distance, measurement begins. This setup allows for measurement of the same volume of the plume. Different sensors are required depending on the thermal spray process (plasma vs. HVOF)

Oseir's system is based on the computer evaluation of real-time, high speed CCD images of particles in the plume and a patented process of measuring the brightness of the particles across two filters imposed over a portion of the camera chip for calculating the average particle temperature. The real-time, image of particles presents an easy to understand visual feedback to the user. The real-time images of the plume from which particle direction, particle velocity and count are calculated are managed by the proprietary image processing algorithms to identify the individual particles in the images for reliable measurement. Plume characteristics are calculated from the particles measured with the results and limits animated in the program window. The real-time images allow for easy visual determination as to whether or not the gun-camera physical setup is properly set-up and if it matches the profile that can be stored for any given process for future use. Due to the use of only one sensor (the CCD camera chip) no frequent calibration of the system is needed.

The Oseir system gives more freedom with regard to setup by leaving the "best camera position" (viewing area and volume) up to individual interpretation and requirements of the application, with the ability to change the focal distance (distance from the plume) and the aperture along with the distance along the plume. One can look at the plume in total or in portion and even get real-time plume density, particle velocity and temperature distribution across the whole plume. Whatever is in the viewing area is analyzed. While the setup information can be recorded and later returned to, it offers an infinite number of setup



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possibilities which can be added in steps or decisions for those who want limited possibilities and are not interested in expanded capabilities. When setting up the equipment one has to think like a photographer with a semi-automated camera with automatic adjustments as well as manual adjustments for exposure times.

How are the measurements treated?

We should suspect that any time an aspect of thermal spray is represented by a single number, that number is a statistical reference and is usually an average or a mean. In any case, they also have other statistical dimensions such as standard deviation, upper and lower limits, to name a few. All dimensions add depth to the description of the process. What these dimensions are and how they are derived should be understood.

In each system there are at least two tiers of data manipulation, one based on the measurement area, and the second based on the method of treating that data.

Using Oseir "SprayWatch" as an example, calculations made of particles in each image yield an average for each of the measurable characteristics (tier one). In the setup profile, the engineer can choose to use a "running average filtering time" to smooth the measured data curves. Consider this the "averages of the averages" (tier two). The Oseir system can be set within a wide range of averaging time, default setting is for 10 seconds so that each measurement is an average of measurements taken for the previous 10 seconds. The practical range is in most cases between 10 – 60 seconds but not limited to this by the system.

The recoding and display of data using separate sensors is most likely treated in this same, "two tier" fashion, if trend data is displayed in smooth lines, but to what extent and if it is adjustable by the operator is unknown to this author.

As a special note: Plasma, because of the instability of the arc and/or radial powder injection, will show much more variability in measurement than HVOF. If this variability is not detected, it is most likely due to the limits of the measurement area and or the manipulation of the data.

The description of each process is not to suggest that one system is better than the other, but rather an indication that there are advantages and limitations for each, depending on the information required. One cannot assume that a single number or a smooth curve is a sign of a stable process or a capable measurement system or vice versa. In any case a better understanding of the process and applications is warranted.

Installment 5 of this series will continue to look at the differences in the systems by answering two more questions that should be considered to understand systems for R&D purposes:

- What measurements can be collected and stored?
- How can the information be used?

We will look at answers to these questions while at the same time looking at an application.

For more information, or if you have any questions and/or suggestions, please feel free to contact Mo VandenBergh at VandenBergh & Associates, Inc., 5641 Station Hill Dr., Avon, IN USA 46123, tel: 317.718-.403, e-mail Mo_VandenBergh@earthlink.net, web: www.MoVandenBergh.com

Farr APC Launches New Industrial Dust Collection Web Site

Farr Air Pollution Control (APC), a leading producer of industrial dust and fume collectors to clean up manufacturing processes, has launched a fully redesigned web site at www.farrapc.com.

The new content-rich site provides viewers with easy-to-navigate paths to help guide and simplify dust collection decisions.

The site contains comprehensive information on the Farr Gold Series® flagship

line of cartridge dust collectors, as well as HemiPleat® filters and accessories for new and retrofit use on all types of collectors. Product areas of the site include features and technical data, downloadable literature, customer installation photos, videos and more. Visitors to the site can also search by application and can browse Farr APC's extensive library of educational materials including technical articles, case studies, testimonials and industry alerts.

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The **International Thermal Spray Association** is closely interwoven with the history of thermal spray development in this hemisphere. Founded in 1948, and once known as Metallizing Service



Chairman Froning

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, and company 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.

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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 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 questionnaire.

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

Please visit WWW.THERMALSPRAY.ORG Scholarship area for details and a printable application form.





Become a Member of The International Thermal Spray Association

Your company should 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, 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 Launches New Website

The ITSA website now includes an "employment" and "for sale" area.

SPRAYTIME issues are included in this website with content search capability.

Visit www.thermalspray.org to see our new look and valuable industry information.

ITSA Announces "Supporting Societies" Membership Category

The International Thermal Spray Association is pleased to announce a new "Supporting Societies" membership category. The purpose of this category is to establish communication with other associations/societies involved in thermal spray and surface engineering activities.

This is an ideal method for membership exchange between organizations. If your organization is interested in a membership exchange to belong to the International Thermal Spray Association, please contact Kathy Dusa at the headquarters office via email to itsa@thermalspray.org

International Thermal Spray Association Welcomes New Member

GTS has joined the International Thermal Spray Association.

GTS e.V., the Association of Thermal Sprayers was founded on October 22, 1992. GTS is an association which is accessible to all users of thermal spray coatings and to all thermal sprayers.

The clearly defined objectives of GTS are to ensure and inspect thermal spray quality, to make this quality visible to the outside world by means of GTS certification and to promote and make known the thermal spray technology, in particular by way of joint advertising campaigns, joint public relations activities to promulgate thermal spraying, and support with events in specialist fields such as colloquia, trade fairs, seminars, training courses, etc.

GTS is a well-established community comprising industrial enterprises, job shops, commercial firms and research institutes which all have thermal spraying as their common interest and goal. The GTS objectives are to ensure the quality of thermal spraying, identify and label thermal spray products by means of certification and promote thermal spray technology.

GTS works very closely and successfully with DVS e.V. – the German Welding Society in Düsseldorf -, but has preserved its independence at the same time.

For more information, contact ITSA company representative Werner Kroemmer, email: Werner.Kroemmer@gts-ev.de, phone: +49.89.31001.5203, fax: +49.89.31001.546, website: www.gts-ev.de

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The Programmable Manipulator

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Two points are important regarding programmable manipulators for coating operations. First, by implication, programmable manipulators are generally used in applications where a variety of parts are to be coated. A manipulator dedicated to the coating of a single part is usually not programmable.

Second, programmable manipulators for coating operations are a special breed of manipulators. Palletizing and similar material handling manipulators are designed to move between specific points with only secondary interest in the speed and path followed. On the other hand, coating manipulators are designed to follow specific paths with precise speed control. The end-points are only of secondary interest.

Programmable manipulators can be as simple as a single axis, variable range, variable speed, gun control interfaced with a lathe or turntable. Plasma Powder's Landing Gear Spray System is an example of a single-axis manipulator. On the other hand, manipulation systems can be as complex as a pair of multiple axes robots; one handling the gun and the other the part being coated.

Early, single or double axis (X-Y or horizontal/vertical) manipulators used DC motors and trips or limit switches. "Programming" consisted of setting limit switch positions and setting the speed of the drive.

Many present day manipulators now use variable frequency drives with "soft limits". End points for each path are "taught". Hard stops are still recommended for these manipulators in order to avoid equipment damage in the event an over-travel condition is encountered.

With the capability and cost effectiveness of present day control systems, simple X-Y manipulators can be provided with "memories" to allow for a variety of motion programs to be stored and called-up as needed. X-Y programmable manipulators can be based on brushless variable frequency AC motors with servo-drives and Programmable Logic Controllers (PLCs). The PLC can also serve as the "Master" over the thermal spray system. PLC based X-Y manipulators can include the following features and functions:

- A hand held teach-pendant for programming the controller at the manipulator.

- Keys or a "Joy Stick" to jog each axis of the manipulator through the desired program path.
- Operator adjustable jog speeds.
- Programming capability to teach each position of the gun during the execution of the program. Points are taught by jogging the manipulator to each program point and then pressing a "teach" key.
- Capability to step through a program and to touch-up each position as necessary for the program.
- Capability to program the speed of motion of each segment when traversing between points.
- Capability to define a "Park" position of the gun for loading and unloading the parts to be coated.
- Capability to define a "Gun Light/Shutdown" position.
- Digital output signals to start and stop the thermal spray controller, the powder feeder, a turntable and the dust collection system.
- Digital inputs to recognize that the gun is operating, the powder feed is on, the turntable is operating (a zero-speed sensor) and the dust collection system is operating.
- Capability to identify each program, save it and recall it from the teach pendant.
- Capability to back-up the program on a memory unit.

Next time, Robot Programming.

For more information, contact series author, Dale Moody via email dalermood@aol.com

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.

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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.



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Springfield Announces Certification

Springfield Manufacturing LLC (SMLLC) proudly announces that their Quality Management System has received certification as compliant to ISO 9001:2000 and AS9100-B in accordance with AS9104A, on 01 August 2008. Bureau Veritas Certification North America, Inc., located in Jamestown, NY, has been chosen as SMLLC's partner in the certification process.

This achievement was accomplished by the entire organization working together to develop, maintain and secure the certification. Becoming ISO and AS certified propels SMLLC to the next step in providing exceptional systems and services, meeting the ongoing customer demands for the highest level of quality. This uniquely separates Springfield in the marketplace as a highly qualified major supplier of machining solutions in our targeted markets of flight and industrial gas turbine components.

The SMLLC certification covers: precision multi-axis CNC waterjet drilling, cutting, milling and stripping services for aerospace and industrial gas turbine components.

SMLLC's certification number is US 08000409 and it is renewable on 31 July 2011.



New Houston Facility

Springfield Manufacturing LLC proudly announces the opening of their new manufacturing facility in Houston, Texas. The new facility will be located at 4501 S. Pinemont Drive, Suite 114. The Houston facility will be supporting offload manufacturing from regional industrial gas turbine (IGT) original equipment manufacturers (OEMs).

The SMLLC equipment is made by Huffman Corporation - multiple axis abrasive waterjet systems providing increased precision, reliability and operating convenience for a wide variety of applications. The Houston facility anticipates being operational the week of December 1st.

These systems produce high quality, burr and dust free machining with no heat affected zones for cutting, drilling, milling, hole clearing, non-FIC crack cleaning, and complete stripping and coatings removal (TBC and bond) in any direction for complex shapes in the more exotic metals, superalloys and composites. The SMLLC abrasive waterjet process is a model of single piece flow, lean manufacturing principles and an environmentally friendly green process.

For more information on Springfield Manufacturing LLC, please visit the web site www.springfieldmfgllc.com

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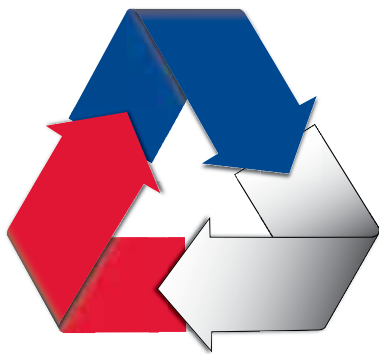


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Abstract: Microstructure and Thermal Behavior of Thermal Barrier Coatings

E. Garcia, P. Miranzo, R. Soltani, and T.W. Coyle

Yttria stabilized zirconia thick coatings were thermally sprayed from two different feedstock powders. Coating characteristics such as density, crystalline phase composition, and microstructure were evaluated. The thermal expansion coefficient and thermal diffusivity were measured as a function of temperature up to 800°C and analyzed in terms of the microstructural features. The ability of available models to relate the measured thermal properties to the microstructural features as characterized by readily available methods was assessed. The importance of pore share and orientation on the thermal conductivity was evidenced. The thermal contact resistance between the substrate and the coating in these samples was estimated from the thermal diffusivity data, and found to change during cooling from 800°C.

Read the entire article in the December 2008

Journal of Thermal Spray Technology.

For more information, visit www.asminternational.org/tss

Editor: Christian Moreau • **Editor Emeritus:** Christopher C. Berndt

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ECKA Opens New Powder Facility Near Birmingham England

ECKA Granules GmbH is a privately held company with its headquarters based in Furth Germany with offices and production plants operating in eighteen countries around the world. It has been supplying high quality metal powders, their alloys, premixes, ingots and semi finished metal products since 1876.



In 2005 it acquired the powder manufacturing facility from the BSA Group in Birmingham, England. After serious fire damage to this plant, ECKA Granules decided to invest the necessary capital and technical resources to build a new ECKA Granules UK MPL state-of-the-art powder producing facility.

The new plant took eighteen months to build. It is located in the town of Wednesbury, nine miles north of the old facility. The plant became operational in August of 2008, with the primary aim to service the thermal surface coating industry, puddle torch, brazing, welding, extruder barrels, filters and other nonstandard and niche applications.

The new facility consists of two gas atomization lines and one water atomization line with a capacity to produce in excess of 3,000 tons per year of nickel, cobalt, and stainless steel powders for the thermal spray, surface coating and welding industries.

The atomization process is fully automated and controlled with the latest technology. This technology allows the production of custom engineered metal alloy powders with controlled chemistry and desired particle size distribution that are required for the specialty and thermal spray industries. **continued on page 24**



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continued from page 22

The production capabilities include air classification, mechanical and ultrasonic powder sieving that give ECKA Granules UK MPL the ability to produce wide range of powders with very narrow particle size distribution and virtually no cross contamination.



Sieving station.

The laboratory capabilities include sieve and laser diffraction particle analysis, chemical analysis and EDAX along with thermal spray capabilities.

In addition to producing the traditional powders for their main markets, ECKA UK MPL, through several DTI and ERSC initiatives, is

actively involved with leading universities in the development of powders for the cold spray technology. Significant resources and investment have been spent in

developing an ability to manufacture products to meet these new challenges, enabling ECKA UK MPL to be at the forefront of these developments.

ECKA UK MPL recently exhibited at the ITSC in Maastricht and launched their new catalogue for surface coatings which is now available for public viewing via the website.

For more information, contact Nic Velloff at ECKA Granules of America at (803) 536-5100 ext.11 or visit us on the internet at www.ecka-granules.com

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CALENDAR OF EVENTS

JANUARY 2009

15-17 Tampa, FL USA *Composites & Polycon 2009* - contact American Composites Mfgs., www.acmanet.org

FEBRUARY 2009

15-18 New Orleans, LA USA *PACE 2009* - contact Society for Protective Coatings, web www.pace2009.com

15-19 San Francisco, CA USA *138th TMS Annual Meeting & Exhibition TMS2009* - www.tms.org

APRIL 2009

13-16 Karlsruhe, Germany *Int'l. Trade Fair for Industrial Coating Technology* - contact FairFair GmbH, www.paintexpo.de

16-18 Orlando, FL USA *International Thermal Spray Association Membership Meeting and Technical Program* - contact ITSA, itsa@thermalspray.org, 440.357.5400

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

4-7 Las Vegas, NV USA *ITSC 2009*

International Thermal Spray Conference & Expo - contact ASM Int'l tel:

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JUNE 2009

8-12 Orlando, FL USA *ASME TURBO EXPO Turbo Expo 2009* - Orlando World Marriott Resort - visit www.turboexpo.org

2-4 Monterrey, Mexico *AWS Weldmex*, Cintemex Exhibition Center, Monterrey, Mexico - visit www.aws.org

28 JUN - 1 JUL Las Vegas, NV USA *MPIF/APMI Conference on Powder Metallurgy* - visit www.mpif.org

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

OCTOBER 2009

19-20 Toronto, Ontario Canada *Canadian Manufacturing*

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Deloro Stellite Announces Danny Blake



Deloro Stellite, a world leader in wear solutions, is pleased to announce the addition of **Danny Blake**, as Area Sales Manager for the Southeast part of the United States. In his new position Danny will be responsible for selling powder, rod, wire, and equipment and will be based out of Texas.

Danny comes to Deloro Stellite with nearly 15 years of experience in the industry of welding consumables. Prior to joining Deloro Stellite Danny held a sales position in Houston, Texas where he was responsible for the sales of welding alloys in the Midwest and Southeastern United States.

Deloro Stellite is a global provider of innovative solutions to challenging wear problems. Backed up by a substantial R&D facility, Deloro Stellite has 13 facilities in nine countries that manufacture sophisticated alloys from cobalt, iron, and nickel and convert them into materials (rod, wire, powder and electrodes) or a cast component. These proprietary metal alloys have outstanding metallurgical and physical properties that are ideally suited to solving challenging wear problems.

Deloro Stellite's expertise in engineering complex solutions to customers' wear problems provides our customers with a technical partner enabling them to produce products with competitive advantage in their own market places that last longer, perform better and are more cost effective.

For more information, please visit www.stellite.com

Huffman Corporation Announces Michael Dulac as West Regional Sales Manager

Huffman Corporation announced today that it has added a key resource to their sales team to address the growth in



the gas turbine manufacturing, aerospace engine and medical markets. **Michael Dulac** from Scottsdale, AZ has joined them as their West Regional Sales Manager.

Michael Dulac will represent Huffman Corporation and Springfield Manufacturing LLC to their customer base in the West

territory starting September 2, 2008. His direct sales area will include AZ, CA, CO, ID, KS, MT, NE, NM, NV, OR, UT, WA, WY and the Canadian provinces of British Columbia, Saskatchewan, Manitoba, Alberta as well as the Mexican states of Baja Norte and Sonora.

Michael brings a wealth of technical sales and business development experience having spent 9 years with ESCO Integrated Manufacturing as Director of Business Development. In addition, Michael has developed his sales capability for more than 20 years. Recently he has worked with a large manufacturer of laser systems as the Sales Director assuring successful realignment of sales and reducing an operating budget by a significant margin while increasing revenue.

Stan Pearson, Business Development and Global Sales Manager said, "Mike's extensive aerospace background having worked with manufacturers of industrial and flight gas turbine components manufacturers will help Huffman to better serve our customers located in the Western Region."

Founded in 1961, Huffman provides manufacturing process technology to the flight, industrial gas turbine, and medical markets. The company's main products are multi-axis superabrasive grinding machine systems, laser powder fusion machine systems, and precision abrasive waterjet machine systems. Located in Clover, SC, a suburb of Charlotte, NC, Huffman is an ISO 9001:2000 and CE-approved supplier with global sales and service.

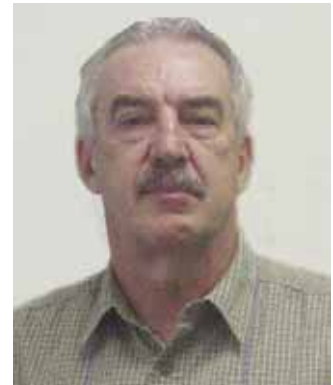
For more information, visit www.HuffmanCorp.com

Your employee should be listed here.

Wall Colmonoy Appointments

Wall Colmonoy announces the appointment of **Daniel M. Nazzarett** from Foundry Manager to Plant Manager of the Los Lunas manufacturing plant for the Alloy Products Group.

Dan holds a BS degree in Metallurgical Engineering Technology from Western Michigan University. He will be celebrating his thirty-three years with Wall Colmonoy this year.



Wall Colmonoy announces the appointment of **Richard Snair** to Assistant Plant Manager of the Los Lunas manufacturing plant for the Alloy Products Group.

Rich has twenty-five years service at Wall Colmonoy, most recently as a Personnel/Safety Manager. He has twenty years of experience in manufacturing improvements, which he gained at his previous position with the United States Air Force.

Rich will be leading programs on lean manufacturing, value stream mapping, and 5S.

For more information, visit the Wall Colmonoy website at www.wallcolmonoy.com



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