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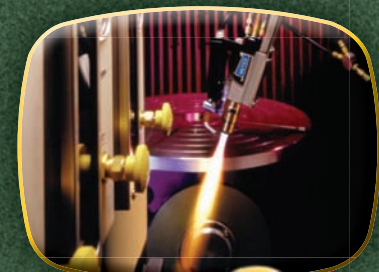




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Cover: Achieving Masking Efficiency with Time and Cost Savings

A cylindrical part, masked with Greenbelt Industries 170-10s silicone coated fibreglass masking tape receives an aluminum flame spray coating. The tape was applied prior to grit blast surface preparation and easily endured both processes, effectively protecting masked surfaces from both the aluminum dioxide grit blast and flame spray coating.

See article page 4.

Photo Credit: Karl Braun



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What is the True Cost of a Thermal Spray Masking Job?

By Tim Connelly



It started as an innocent question, “how much does your masking job cost”? This is a question I asked the purchasing agent of a thermal spray coating company that will remain anonymous. After all, I work for a company that produces masking tapes, fabrics, and compounds. The question seemed innocent enough. The agent paused and said, “...well the employee is paid \$9.00 per hour and your tape cost \$20 per roll...so the job costs about \$30.00”. I found this to be interesting, but not accurate.

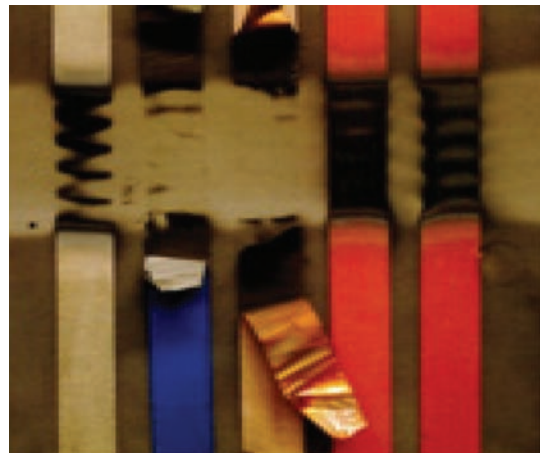
Later in my trip, I asked the same question to a shop supervisor of a different company. He confessed that calculating the exact cost of surface preparation was something that nobody at his company has ever undertaken accurately. In his case, it was time (with shop rate of \$45/hour) plus the cost of masking material...better, but still not perfect.

It is time to take a step backwards, and consider the cost of materials. In this case, thermal spray masking materials. Cost of raw materials can be deceiving.

Approximately two years ago, I visited a job shop in Asia specializing in the repair of industrial components. I met with the Managing Director whose first question for me was (upon knowing my focus), “how much does your masking tape cost”? I told him approximately \$20.00 US per roll. He laughed and thanked me for the visit, but told me I was wasting his and my time. After all, he currently used duct tape that was \$2.50 per roll and it did just fine! Before being pushed out the door I asked him for a favour. Could I see his process? He told me sure, and gave me a personal tour – probably to teach me a lesson.

Observing the Process

Sure enough I saw the Komatsu shafts they were resurfacing – in this case, the parts were to receive an arc spray coating. True to his word, his loyal employees masked the components using layer upon layer of duct tape. After applying layer 8, I asked our host, is this normal? I was told, yes of course this is normal, after all, the tape layers must survive grit blast and arc spray.



Ineffective masking tape can easily fail under the heat and abrasion of thermal spray coating processes.

Our next step was grit blasting. Upon observation, the edges of the tape had become frayed. The part was then subjected to the arc spray application where a significant coating thickness was applied. The duct tape, not being suited to a heat application distorted and frankly, we were left with a mess. My host was not dissuaded. He said this was fine, this was “normal”. I pointed out the edges which



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now resembled cooked bacon...my host was oblivious.

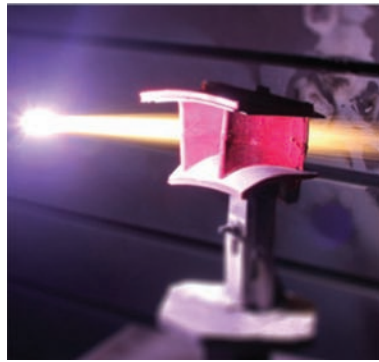
We then witnessed two operators removing the tape – this process took considerable time as the layers had melted into one another. Upon removal of all the tape layers, we saw “left over adhesive” or as we call it, adhesive residue. I pointed this out to our host who said...“oh well, this too is normal, we can simply have an employee or two rub the residue off with solvent and/or abrasives”. I then pointed out the coating line, which again looked badly distorted. I showed my host who said, “Yeah, it would be great if the coating lines were straight...but they never are...but that is okay, because we have a machine shop that can now finish these areas properly.”

Later we had a meeting back in my host's office. I pointed out that our “expensive” tape which is a plasma spray masking tape (silicone coated fibreglass) could be used in a single layer, it would leave no adhesive residue, it would not distort along the edges AND it would save a great deal of time, labour, opportunity cost, and ultimately money. Imagine: no extra labour for adhesive removal, no extra labour for reworking the edges, not to mention that the \$2.50 roll of tape was actually $2.50 \times 8 = \$20.00$. He got the point.

The Lessons Learned

To follow up, my host also explained that he faces other challenges in his market dynamic. Not only are his customers demanding competitive pricing but they are also demanding faster and faster turnaround times. It became evident that his real driver was not necessarily cost, but rather efficiency – together, these factors mean he should focus on cost savings through improved efficiency. This was a good lesson: the cheap product is not always the most cost effective product – it is important to consider the entire coating process (including surface preparation).

So back to the original question, what is the cost of thermal spray masking? Obviously we have the following factors to consider: time, labour, and cost of masking material...but what else? In the case of many OEM and tier-one support companies, we also need to consider the “gains of improved efficiency”. I recently met with an aviation engine repair facility that explained why they were seeking improvements to their masking process. Ten years prior, this facility had exactly 14 days to receive, repair,



A properly masked turbine fan blade component receives plasma spray coating. 170-10S Red masking tape protects non-target surfaces from the extreme heat.

and turn around rebuilt commercial jet engines.

Three years ago, this facility was tasked with the goal of complete turn-around in 12 days. Today, they face a new challenge – 11 days. This facility is clearly under pressure to find the most cost effective and efficient solutions possible. Now consider that a thermal spray coating job is normally 90% surface preparation (a relatively small amount of time is dedicated to spraying). Masking is time consuming and labour intensive – put simply, masking can be expensive.

This is the reason why facilities must find the most cost effective methods for

masking with the goal being to mask faster and more accurately. A variety of masking methods should be explored because often the best solutions may involve a variety of masking materials including: tape, metal masking, silicone rubber profiles and compounds – in some cases, all at the same time. In terms of thermal spray masking tapes, it is important to note that there are subtle differences (and not so subtle) between various masking

tapes. Depending on the masking tape manufacturer and style, there can be a wide range of breaking strengths, adhesion properties (to stainless steel and Face-to-Back), heat resistance, abrasion resistance, and flexibility etc.

Always Choose Good Quality Masking Materials

Considering the variables from tape style to tape style, the correct selection of masking tape is crucial in terms of providing masking efficiency.

Consider a standard plasma spray masking tape constructed of silicone coated fibreglass fabric complete with silicone adhesive. A standard tape uses a flat standard fibreglass weave. If you are the operator preparing for masking, you need to consider the abrasion of the prep blasting and spray particles. If you are using a relatively



Surface preparation is typically 90% of the time consumed for a thermal spray job.



HVMC High Velocity Masking Compound provides an effective thermal spray barrier in hard to reach places.

True Cost of Thermal Spray Masking continued from page 5.

resistance allows for more precise masking and sometimes fewer layers of tape (reduced tape consumption).

Now again consider the pressures facing companies today for quicker turnaround times. If the operator can mask a component in ½ the time, and avoid unnecessary clean up, then the result should be major cost savings and improved efficiency.

Don't Forget About the Opportunity Cost

The real measure of overall cost savings comes from a true application audit and product audit to determine the cost of various masking techniques. Opportunity cost should also be considered. For example, if a stronger thermal spray masking tape is selected, and considerable time is saved in the process, what can the operator and/or facility do with the gained improvement? Take on new jobs? Perform needed maintenance? Selectively take on higher margin projects?

Die-cut tapes save time and reduce the risk of repetitive strain injuries that may occur when employees are cutting profiles by hand.



A part is masked with pre-cut tapes prior to the coating process.



The same part is shown above after receiving the spray coating.

Health and Safety In a Cost Savings Paper?

So far, we have discussed process efficiencies and cost savings. Another consideration with cost benefits is health and safety. Normally "health and safety" and "cost savings" are not contained in the same sentences, but in terms of thermal spray masking they can be! Consider the following scenario. One of the most costly and frustrating situations surrounds repetitive masking – masking the same profile over and over (sometimes hundreds or thousands of times). Obviously, metal masking "jigs" would be a good solution – but unfortunately, not every profile lends itself to metal masking alone. Quite often, thermal spray coating operators find themselves using tape. It is not uncommon to cut out the same profile repeatedly. A good solution is rotary die cut masking profiles or pre-cut plotter profiles all produced using plasma spray masking tape. If

complex shapes are pre-cut, the operator can mask faster (peeling the profiles from rolls or sheets like a label pad). While this may be great for efficiency what does it have to do with health and safety? You need to consider the large amount of cutting done by operators with sharp razor blades and utility knives: cuts lead to time off for operators and expense to employers. Die cuts or pre-cuts save time and money while improving employee safety. A win/win situation.

How Do We Calculate the Cost of a Thermal Spray Masking Job?

So back to the original question, "How Do We Calculate the Cost of a Thermal Spray Masking Job"? The answer will vary from company to company, but some constant themes will remain. The cost can be calculated by considering time, labour, masking material consumption, opportunity cost, improved efficiency gains, and health and safety. To begin with the cost calculation, the easiest way may be to look at a production job while recording all of the costs related to that one specific job.

Take into account the amount of masking material used as well as the cost of masking material per job. Record the time involved in masking (in minutes or hours); the shop labour rate must be recorded here as well. Another consideration that must be taken into account is the clean-up time after the coating is complete. Is there adhesive

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residue that must be manually removed? Is there a coating line that must be machined away or otherwise physically eliminated? Combining all of this information will calculate the very basic costs of the masking job.

The next step is to confirm how many masking jobs the facility has per work shift and multiply that by the number of shifts in the facility per day. The subsequent consideration would be the number of work days per week in the shop. From here it is simple to calculate the costs per month, quarter, and year.

To take this approach one step further and determine an area for potential cost savings consider alternate masking processes, whether it be as simple as changing the tape used all the way up to different methods such as masking compounds and die cuts. Using tape as our example, try comparing one manufacturer's product (the current process) versus another manufacturer's product (new potential process). Comparing the two costs side-by-side represents a very basic ROI calculation.

While cost savings may be discovered at this level, these numbers only tell a portion of the story. The time necessary to complete the job must be added into the equation. Again with side-by-side comparisons, track the time required to perform each masking and unmasking job (with the existing strategy versus the new potential strategy). The questions that need to be answered are: How much time was saved per job, work shift, day, week, month, quarter, and year? Secondly, what is the time savings worth (Could the facility take on more work)? What is the value of these additional jobs? This of course is the opportunity cost.

By considering all the factors above, it is now possible to define the true cost of masking. Masking is a critical process inherent to producing a thermal sprayed part to acceptable levels of cost and quality. By understanding its real cost a value added approach can be utilized to gain real improvement in margins, quality and delivery

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ROI Calculator for Thermal Spray Masking Jobs

Customer: _____
Prepared by: _____ Date: _____

	Current Process	GBI Process
Quantity (Jobs)	2	1
Cost per Roll	\$14.00	\$38.00
Masking Time Per Job (Minutes)	30	15
Clean up Time Per Job (Minutes)	10	1
Number of Jobs Per Work Shift	5	5
Number of Work Shifts per day	2	2
Number of Work Days per Month	22	22
Labor Rate	\$20.00	\$20.00
Total Cost Per Job	\$44.93	\$29.93
Total Cost Per Work Shift	\$224.67	\$138.67
Total Cost Per Work Day	\$449.33	\$277.33

Potential Cost Savings per Month	\$3,960.00
Potential Time Savings per Month (Hours)	45.00
Potential Cost Savings per Quarter	\$11,880.00
Potential Time Savings per Quarter (Hours)	135.00
Potential Time Savings per Year (Hours)	750.00
Potential Cost Savings per Year	\$47,520.00

The purpose of this ROI Calculation is to evaluate current masking costs based on known conditions and evaluate cost savings generated by GBI product and value added capabilities. All information is strictly confidential between the Company and Greenbelt Industries.

The ROI Calculator available from PTFE Group can assist in more accurate and consistent tracking of the costs associated with thermal spray projects.

improvements and set the stage for increased capacity and capability, key factors in our globally competitive world.

Often overlooked, masking is a costly time consuming business typified with repeating quality issues and time consuming use of labor. PTFE Group have developed tools and resources to support understanding of the true cost of masking. Using a data driven approach leads to best product selection and establishment of best practice leading to lower cost of production, improved quality, delivery and capacity. Use the right tool for the job!"

Compare methods, calculate time saved, and reduce job cost.

Reduced job cost means...

- Higher Margin
- Faster Throughput
- Better Quality
- Increased Capacity.

About the author: Tim Connelly is the Global Product Manager for Adhesive Products at PTFE Group of Companies and is a contributor to the SPRAYTIME

newsletter. Tim is a member of the advisory group for the American Welding Society C2 Committee related to thermal spray masking and a member of the ASM Thermal Spray Society. In addition, Tim has shared his industry expertise as a guest speaker at the International Thermal Spray Association's annual technical meetings. Green Belting Industries is a member of the International Thermal Spray Association.

PTFE Group of Companies includes Green Belting Industries Limited (Canada), Greenbelt Industries Inc. (US), Mapelli SRL (Italy), and Biscor Limited (UK) with plants and offices in each of these country locations. The Group manufactures specialty coated fabrics, belts, and tapes.

For more information, contact author Tim Connelly via email tconnelly@greenbelting.com.

Become a Member of the International Thermal Spray Association

Your company should join the International Thermal Spray Association (ITSA) now! ITSA is now a Standing Committee of the American Welding Society expanding the benefits of company benefits. As a company-member professional industrial association, our mission is dedicated to expanding the use of thermal spray technologies for the benefit of industry and society.

ITSA members invite your company to join us in this endeavor. See pages 16-19.

Scholarship Opportunities



Since 1991, the **International Thermal Spray Association Scholarship Program** has contributed to the growth of the thermal spray community.

ITSA offers up to three Graduate Scholarships of **\$2,000.00 each**.

Applications accepted April 15 through July 15 ONLY.

Visit www.thermalspray.org scholarship area for details.

DeWAL Industries Publishes Swatchbook With 8 Unique Tapes For Plasma Spraying.

DeWAL Industries, Inc., a leader in the manufacture of PTFE and UHMW-PE films and tapes, is offering thermal sprayers a free swatchbook with samples of eight very different tapes manufactured specifically for plasma spraying. The swatchbook contains samples of some of DeWAL's many single-ply, double-ply and HVOF tapes for thermal spray applications.

The new DeWAL swatchbook includes tapes used by Pratt and Whitney, GE and Rolls Royce.

Like all DeWAL thermal spray tapes, these are free of carbonizing materials for grit blast, ceramic, plasma, arc

and HVOF spraying. DeWAL tapes ensure aggressive adhesion, sharp edges and clean separation, regardless of thermal spray angle or temperature.

The swatchbook includes samples of DeWAL's single-ply plasma tapes, including silicone rubber coated glass in numerous colors, foil/glass laminates, and both single-coated and double-coated glass fabric.

The swatchbook also includes samples of double-ply thermal spray tapes, including glass fabric laminate and combinations of silicone, rubber, glass and foil.

HVOF tapes in the swatchbook represent several types of laminates: heavy duty silicone rubber/glass laminate, heavy aluminum foil/glass laminate, silicone rubber with heavy aluminum foil, and silicone rubber with copper foil laminate.

DeWAL plasma spray tapes are only part of DeWAL's extensive offering of hundreds of high quality films and tapes. DeWAL manufactures pressure-sensitive films and tapes, porous films

and tapes, laminates, and all kinds of custom films and tapes used from aerospace to the ocean bottom. DeWAL precision films and tapes improve hose linings, abrasion layers, permeation barriers and overwraps. They provide wire and cable engineers opportunities to meet stricter cable construction requirements. They protect products while the products are being manufactured and are found in finished products as well.

DeWAL swatchbooks for downhole, electrical/electronic and mechanical applications are also available.

More about its diverse product line, including applications and data sheets, can be found at www.dewal.com which even addresses compliance with the requirements of various U.S. and international governments and agencies.

For more information, contact Susan Dunn, marketing, at DeWAL Industries, Inc. 800-366-8356, extension 318, in North America, or 001-401-789-9736 from Europe, Asia, Africa or Australia/New Zealand. Email correspondence can be addressed to usa1@dewal.com. Since its founding in 1974, DeWAL Industries has become a leader in the manufacture of skived PTFE and UHMW-PE film. DeWAL manufactures pressure sensitive tapes from PTFE, UHMW-PE, polyimides, and PTFE-coated glass fabric. DeWAL is known for electrical, mechanical and plasma films and tapes, including porous, laminated and die cut films and tapes manufactured to the tightest tolerances.



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

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CAMFIL To Acquire HANDTE

German Environmental Company to Become Part of Camfil Air Pollution Control

Camfil Air Pollution Control (APC) announces that its parent, Camfil (Stockholm, Sweden) has signed an agreement to acquire 100 percent of Handte Umwelttechnik GmbH in Germany and Handte's operations in Switzerland, the Czech Republic and China. The acquisition, pending approval from the authorities in Germany, is expected to close in the first quarter this year. Handte will be part of the Camfil APC business unit, which specializes in industrial dust and fume collection.

Handte (www.handte.de/en) is the leading German manufacturer and provider of environmental engineering products, filter technology processes and air pollution control applications. With more than 120 years of experience, the company is a recognized specialist in exhaust air purification for a wide range of manufacturing industries.

Camfil APC president Lee Morgan states: "Handte has a full line of dust collectors, mist collectors and wet scrubbers that strategically complement the Farr Gold Series® cartridge dust collection line. The integration of these product lines will broaden our portfolio and strengthen the company's industrial air pollution control offerings to customers in the U.S. and internationally." Key applications for these products include metalworking and machining,



automotive, foundry, mining, and dry processing industries including chemical, food and pharmaceutical.

Camfil APC is a leading global manufacturer of dust collection equipment and is part of Camfil, the world leader in air filters and clean air solutions.

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In Memorium

Joachim Heberlein (1939-2014)



Professor Emeritus

The Mechanical Engineering Department mourns the passing of Emeritus Professor Joachim (Jockel) V. R. Heberlein on February 17, 2014 after a long battle with ALS.

Professor Heberlein was born in Berlin in 1939. He received his diploma in physics in 1966 from the University of Stuttgart. In 1967 he came to the University of Minnesota, where he received his Ph.D. in mechanical engineering in 1975, advised by Professor (now Emeritus) Emil Pfender.

Then, after working for fourteen years at Westinghouse R&D Center in Pittsburgh where he served as Manager of Applied Plasma Research, Lamp Research and Nuclear and Radiation Technology, he rejoined the Minnesota M.E. Department in 1989 as associate professor. He was promoted to professor in 1994 and was appointed Ernst Eckert Professor of Mechanical Engineering in 2000. He retired at the end of 2012.

Professor Heberlein published over 140 journal papers, received 13 patents, and coauthored with Pierre Fauchais

and Maher Boulos the recently published textbook *Thermal Spray Fundamentals* (Springer, 2013).

He advised or co-advised almost 30 Ph.D. students, an equal number of M.S. students, and advised seven students through completion of their diploma theses at several European universities. He was an internationally recognized authority on the subject of thermal plasmas of the type used for industrial applications such as thermal spray coatings, plasma cutting, electrical circuit breakers, and materials synthesis. He was particularly known for his pioneering studies of arc-electrode interactions. He had many interactions with industry, including research collaborations with Hypertherm on plasma cutting, Eaton Corp. on electrical circuit breakers, and Nitto Denko Technical Corp. on nanomaterials synthesis.

Professor Heberlein played a leading role in the international plasma community, notably through his involvement for many years on the Subcommittee on Plasma Chemistry of the International Union of Pure and Applied Chemistry (IUPAC), leading to the founding in 1999-2000 of the International Plasma Chemistry Society (IPCS).

Professor Heberlein was the lead writer of the statutes of foundation and bylaws of the Society, which oversees the organization of the biennial International Symposium on Plasma Chemistry (ISPC). Professor Heberlein was conference chair of the 8th ISPC, held in Minneapolis in 1995.

As one measure of his tireless devotion to the Society, he served from 1995-2008 as treasurer of the IUPAC Subcommittee and then the IPCS. He was awarded the 2009 Plasma Chemistry Award, the highest award of the Society,

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given to one individual at the biennial ISPC for lifetime achievement. The award was presented at ISPC-19, held in Bochum, Germany. Professor Heberlein was also active in the Thermal Spray Society of ASM International and he was elected to the Thermal Spray Hall of Fame in 2004.

Professor Heberlein was an enthusiastic supporter of international collaboration. He made numerous visits and had fruitful collaborations with colleagues and plasma laboratories in Germany, Italy, Japan, and other countries. He actively arranged exchange programs that allowed students at foreign

A representative of the ASM International Thermal Spray Society (ASM/TSS) stated, "It is with great sadness that I inform you our good friend Jockel Heberlein passed away peacefully at his home on February 17. Jockel contributed greatly to TSS having served as chair of the Journal of Thermal Spray Technology Editorial Committee for ten years (1996-2006) and chair of the TSS Awards Committee for seven years (2004-2001). He was also a past member of the TSS Program Committee (2001-2012), TSS Nominating Committee (2009-2010), TSS Academic Advisory Council (2011-2012), and ITSC 2003 organizing committee. He was inducted into the TSS Hall of Fame in 2004, was named ASM Fellow in 2001, and received a number of other awards including the ASM Allan Ray Putnam Service Award in 2009 and the TSS President's Award in 2013. *Jockel's lively spirit and amazing energy will be missed by all.*"

Mrs. Heberlein has asked that, instead of flowers, friends consider a donation to causes that were important to Jockel. These are:

- the Joachim and Yuko Heberlein Scholarship Fund, Department of Mechanical Engineering, University of Minnesota;
- the Olivet Congregational Church in St. Paul, MN.;
- the ALS Association of Minnesota;
- the Fairview Hospice in Minneapolis.

If you would like to send a personal note to the Heberlein family, please use the following address: 6 Shore Rd, North Oaks, MN 55127, USA

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DeWAL Industries Celebrates 40th Anniversary

Forty years ago two young entrepreneurs set up shop in a small Rhode Island town, converting polymer resins into precision films and tapes.

Combining their names, Hugo DiClemente and Edward Walsh named the company DeWAL Industries, Inc.

Today DeWAL Industries employs over 150 professionals at its headquarters in Narragansett, Rhode Island, and has sales locations in Canada, China, Germany, Mexico, Russia, Shanghai, South Korea, Switzerland, Taiwan and the United Kingdom.

DeWAL manufactures about 150 high performance polymer films and pressure sensitive tapes, plus countless custom films and tapes in skived and unsintered PTFE, skived UHMW-PE, expanded PTFE, and porous and filled PTFE and UHMW. It manufactures FEP and polyimide tapes and laminates with foil, silicone and fiberglass.

DeWAL films and tapes are found in dozens of industries, including wire and cable, plastics and rubber, electrical and electronic, packaging systems, downhole drilling, automotive, thermal spray, caps and closures, chemical processing, and general manufacturing. A DeWAL polyimide product may well be in the living room television set, under



(left to right) **Warren DiClemente, Ned Walsh, David DiClemente, and Eric Walsh**

the dashboard, or in the satellite overhead. PTFE and UHMW-PE could be in the sump pump or the conveyor belt, in the hair dryer or the fracking drill.

How has DeWAL grown to be such a leader in the manufacture of high performance polymer films and pressure sensitive tapes?

"We offer the highest quality resin blends and the most precise manufacturing technology," says Ned Walsh.

"Our films are among the longest and widest splice-free lengths anywhere," says Warren DiClemente.

"We are known for extraordinary commitment to solving our customers' problems," says David DiClemente.

"With good relationship with our vendors and great workers at every level of DeWAL," says Eric Walsh.

With all these combined, DeWAL Industries, Inc., sets off on its second 40 years.

For more information, visit www.dewal.com

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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 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.



Chairman Mosier

A company-member association, ITSA invites all interested companies to talk with our officers, and company representatives to better understand member benefits. A complete list of ITSA member companies and their representatives can be found at their website www.thermalspray.org

ITSA Mission Statement

The International Thermal Spray Association, a Standing Committee of The American Welding Society, is a professional industrial organization dedicated to expanding the use of thermal spray technologies for the benefit of industry and society.

Officers

Chairman: **Jason Falzon**, FW Gartner Thermal Spraying

Vice-Chairman: **Bill Mosier**, Polymet Corporation

Corporate Secretary: **Kathy Dusa**

Executive Committee (above officers plus the following)

Richard Grey, Genie Products, Inc.

Larry Grimenstein, Nation Coating Systems

Dan Hayden, Hayden Corporation

David Wright, Accuwright Industries, Inc.

ITSA Scholarship Opportunities

The International Thermal Spray Association offers annual Graduate 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 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 the State University of New York at Stony Brook in the Thermal Spray Research Center, 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 historic 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. This newsletter is free and can be viewed online at www.spraytime.org.

Become a Member of The International Thermal Spray Association

Your company should join the International Thermal Spray Association (ITSA) now! As a company-member, professional industrial 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.

New - All ITSA company members are now also Supporting Members of the American Welding Society which includes five individual AWS memberships.

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.

One 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 centerfold 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 Thermal Spray Pavilion and Conference, FABtech Canada, Power-Gen, Society of Vacuum Coaters (SVC), TurboMachinery, NACE and TurboExpo).

For more information, contact Kathy Dusa 440.357.5400 or visit the membership section at www.thermalspray.org.

International Thermal Spray Association Welcomes New Members

Imperial Systems has Joined the International Thermal Spray Association.

Imperial Systems is a dust collection equipment manufacturing business located just north of Pittsburgh, Pennsylvania USA in the small town of Jackson Center. Imperial Systems designs, installs, and services complete systems, all backed by products and replacement parts that are constructed for optimal quality, safety, and value.

We also manufacture industry leading products, engineered for outstanding quality, safety and value. We maintain a large inventory of Imperial Systems manufactured dust collection equipment while guaranteeing shipments for most products within 24 hours of the order. As a customer-driven solutions provider, we've earned credibility and have established strong relationships by exceeding expectations with professional service and attitude.

Imperial Systems has the dust collector to fit your needs.

For more information, visit website www.isystemsweb.com or contact ITSA company representative Jeremiah Wann, jwann@isystemsweb.com

Metallizing Equipment Company has Joined the International Thermal Spray Association.

With experience of over 45 years in this technology, the core business of MEC is manufacturing thermal spray equipments and accessories. There are several patents to its credit. MEC is a ISO 9001:2008 certified company. In 2013, MEC obtained Q1 quality certification from API (American Petroleum Institute) for coating activities in the oil and gas industry. MEC is on the way to get NABL approval which will provide them authority to calibrate thermal spraying equipments.

MEC products are exported to over 40. MEC is a platinum sponsor of the Asian Thermal Spray Association (ATSC) expo 2014 going to be held in Hyderabad, India.

MEC has an in-house thermal spray laboratory with modern equipment and instrumentation including SEM, Spraywatch and CMM (Co-ordinate measuring machine).

For more information, visit website www.mecpl.com or contact ITSA company representative S.C Modi via email: scmodi@mecpl.com



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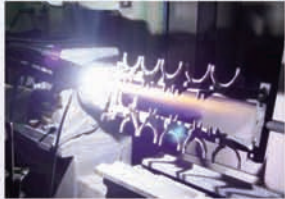
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As an ITSA member, your company has excellent marketing exposure by being listed centerfold in our SPRAYTIME newsletter and many other benefits.

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NEW "Supporting Societies" Membership

The International Thermal Spray Association now has a "Supporting Societies" membership category to establish communication with other associations/societies involved in thermal spray and surface engineering activities worldwide.

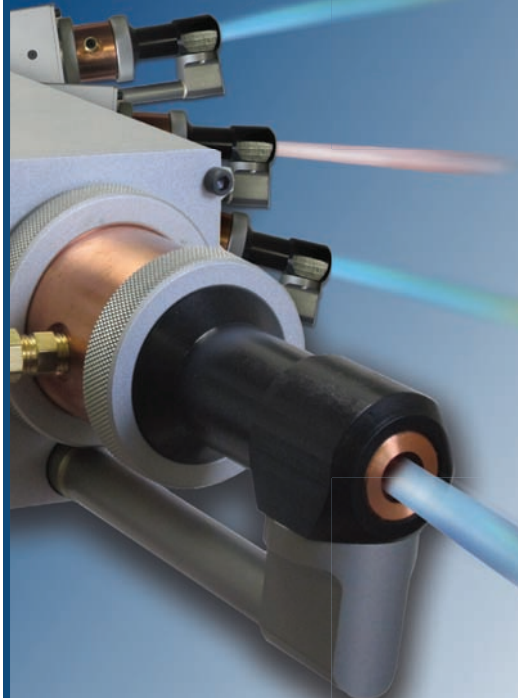
See the Supporting Societies listing on page 15.

This is ideal for membership exchange between organizations. Contact Kathy Dusa at the headquarters office email to itsa@thermalspray.org

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Metallisation 28E ARCTEC Non-slip Coating

Metallisation's durable non-slip coating, 28E ARCTEC, is a reinforced aluminium based non-slip coating. It is ideal for use in pedestrian and industrial flooring areas, bridge decks, escalators, steel floors and panels across a range of diverse industries.

Untreated steel surfaces can become very slippery, especially in wet conditions, and are prone to corrosion. To ensure safe walking and industrial operating conditions, vital to personal safety and corporate productivity, 28E ARCTEC coating provides a durable non-slip anti corrosion coating.

Traditionally, steel structures are hot dip galvanised, or painted, to protect against corrosion. The disadvantage of hot dip galvanising is that the surface can become slippery and it does not easily accept paint without the need for special primers. Painting this type of surface, which is sometimes applied with grit inclusions, also has its disadvantages. The surfaces can degrade quickly in heavy use, resulting in corrosion and an increased slip hazard.



Close up shot of a manhole cover being thermal sprayed.

Many large steel structures, including oil platforms, refineries and bridges, have been routinely protected against corrosion by thermal spray aluminium (TSA), zinc or an alloy of the two. While providing unrivalled corrosion protection in very aggressive corrosive environments, pure TSA is not durable enough to prevent long term wear on floor plates. Ideally, steel structures need a durable coating that protects against both slip and corrosion and that is exactly what the Metallisation 28E ARCTEC coating does.

28E ARCTEC coating is a thermally sprayed coating that can be applied with a rough texture and has excellent non-slip properties, while being extremely hard and resistant to wear. The coating provides:

- ✦ A suitable level of grip, to avoid personal slips or industrial skidding
- ✦ Comparable corrosion protection to aluminium, as used in aggressive environments
- ✦ Easy application by a long-standing process, covered by international standards

The resultant coating is corrosion resistant and because of its durability, site owners can be confident that once

applied, they can forget about rust or slipping for many years.

28E ARCTEC is applied using the Metallisation arcspray process with the ARC 140 system. In the arcspray process the raw material, in the form of a pair of metallic wires, is melted by an electric arc. This molten material is atomised by a cone of compressed air and propelled towards the work piece. Upon contact, the particles flatten onto the surface, freeze and mechanically bond, firstly onto the roughened substrate and then onto each other as the coating thickness is increased. Coating thickness can range from around 50 microns up to several hundred microns or even millimetres for some metals. Typically, thermal sprayed corrosion protection coatings vary from 100 to 350 microns.

There have been a number of recent successes with 28E ARCTEC and there are many trials being conducted to evaluate the effectiveness of the coating against more traditional non-slip surfaces. A local UK Council has opted for 28E to coat 150 of its manhole covers. The covers were thermal sprayed with 100 microns of aluminium before being coated with 300 microns of 28E. This is the standard specification for external applications, offering unsurpassed corrosion resistance and durable grip to ferrous items.

28E ARCTEC has also been used on a pedestrian loading platform at a UK airport, as part of its drive to prevent trips and slips in the workplace. The airport has chosen 28E to replace the current chequer plate surface to improve grip, particularly in the wet. As this is also an external application the platform was arc sprayed with 100 microns of aluminium before being coated with 28E.

There are two significant trials of 28E ARCTEC currently being undertaken around the UK. The first is on a very busy ferry terminal roadway. 28E is being trialled to check its durability and wear for this arduous application. To avoid disruption to the ferry service and its passengers, the coating was applied during the early hours and is now being tested on a daily basis.

The second trial of 28E is being undertaken at an industrial site where it is being considered as a replacement for the traditional GRP non-slip plates. 300 microns of 28E has been applied to both the steps up to the access platforms and the platforms themselves. Safety is paramount in this instance due to the size and height of the access platforms. The risk of slipping must be reduced to an absolute minimum, making 28E an ideal solution. As this is an internal application the aluminium base is not required, as corrosion is not an issue.

28E ARCTEC is also not only used on steel substrates. Aluminium manhole covers for roadways in New Zealand are also being trialled with the coating just for its grip and wear properties.

For more information on the 28E ARCTEC wire and coating, visit www.metallisation.com or contact Stuart Milton, Sales and Marketing Manager, +44 (0) 1384 252 464

See advertisement page 13.



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Place of Events

CALENDAR OF EVENTS 2014 MAY 2014

5-7 New Delhi, India *Power-Gen India and Central Asia with Renewable Energy World India, HydroVision India and DistribuTECH India* - visit www.power-genindia.com.

5-8 Chicago, IL USA *57th SVC Annual Technical Conference* - visit www.svc.org

5-8 Indianapolis, IN USA *2014 Iron and Steel Technology Expo* - visit www.aistech.org

6-8 Hartford, CT USA *MFG4 Manufacturing 4 The Future Aerospace, Defense, Medical, Micro* - visit mfg4event.com

6-8 Mexico City, Mexico *FABTECH Mexico* - visit www.fabtechmexico.com

18-21 Orlando, FL USA *2014 World Congress on Powder Metallurgy and Particulate Materials* - visit www.mpif.org

21-23 Barcelona, Spain *Int'l Thermal Spray Conference ITSC 2014* - visit www.itsc2014.com

JUNE 2014

16-19 Orlando, FL USA *AeroMat* - visit www.asminternational.org

16-20 Dusseldorf, Germany *ASME TurboExpo* - visit www.turboexpo.org

17-19 Houston, TX USA *NACE Bring On the Heat 2014* - visit www.nace.org

17-19 Bremen, Germany *WindForce 2014* visit www.zinc.org

18-19 Worcester, MA USA *Cold Spray Action Team meeting CSAT* - visit www.coldsprayteam.com

25-27 San Diego, CA USA *Mega Rust 2014 Naval Corrosion Conference* - visit navalengineers.org/MegaRust2014

JULY 2014

13-19 Malta *ICCE 22nd Annual Int'l Conference on Composites/Nano Engineering* - visit www.icce-nano.org

SEPTEMBER 2014

15-19 Garmisch-Partenkirchen, Germany *14th Int'l Conference and Exhibition on Plasma Surface Engineering* - visit www.pse-conferences.net/pse2014.html

18-22 Orlando, FL USA *PM2014 World Congress* - visit www.mpif.org

22-25 Houston, TX USA *43rd TurboMachinery and 30th Pump Symposia* - visit turbolab.tamu.edu.

OCTOBER 2014

8-9 Hartford, CT USA *Aerospace Coatings Conference and Exposition* - visit aerospace-coatings@asminternational.org

12-16 Pittsburgh, PA USA *MS&T14 Materials Science and Technology 2014* - visit www.asminternational.org

27-30 Charleston, SC USA *ASNT 2014 Conference, American Society for Nondestructive Testing* - visit www.asnt.org/annual

28-31 Medellín, Colombia *LATINCORR 2014 IX Latin American Congress of Corrosion* - visit www.laticorr2014.org

NOVEMBER 2014

11-13 Atlanta, GA USA *FABTECH with a Thermal Spray Pavilion and Conference* - visit www.fabtechexpo.com

2015

FEBRUARY 2015

TBD Doha, Qatar *Middle East TurboMachinery Symposium METS 2015* - visit middleeastturbo.tamu.edu

APRIL 2015

25-30 Santa Clara, CA USA *58th SVC Annual Technical Conference* - visit www.svc.org

26-29 Helsingør, Denmark *JOM-18 18th Int'l Conference on Joining Materials* - contact jom_aws@post10.tele.dk



Scholarship Opportunities

Since 1991, the *International Thermal Spray Association Scholarship Program* has contributed to the growth of the thermal spray community.

ITSA offers up to three Graduate Scholarships of **\$2,000.00 each**.

Applications accepted April 15 through July 15 ONLY.

Visit www.thermalspray.org scholarship area for details.

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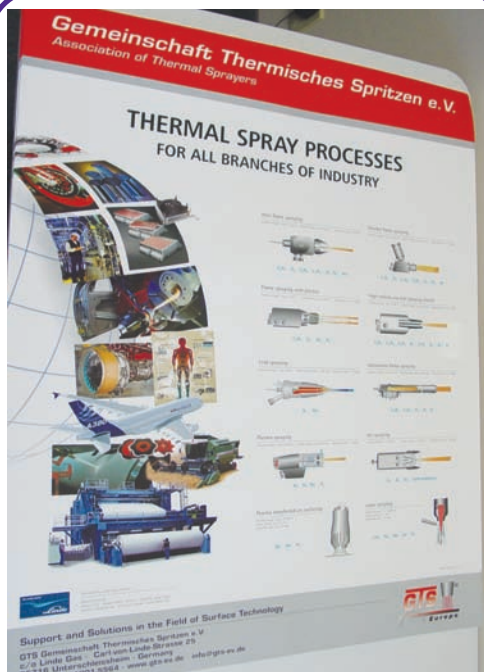
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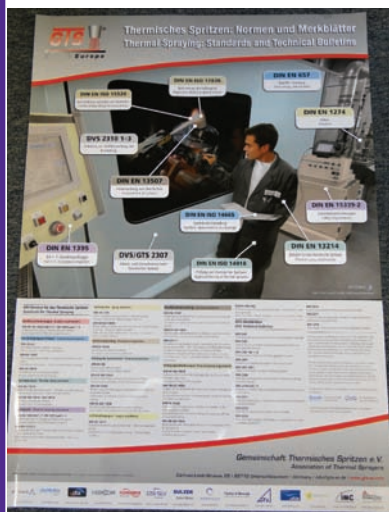
Free Poster

From Linde and the GTS (Association of Thermal Sprayers) illustrates the different thermal spray processes (suitable for framing). Send request for poster via email to itsa@thermalspray.org

Free DIN Standards Poster

GTS – the Association of Thermal Sprayers – has produced this spectacular new poster of “*Thermal Spraying: Standards and Technical Bulletins*”.

The poster identifies DIN Standards for Thermal Spraying and the DVS Technical Bulletins. The standards/bulletin names are in German and in English.



The poster provides contact information for obtaining the complete version Standards and Bulletins.

The International Thermal Spray Association is proud to be one of the sponsors of this project.

Journal of Thermal Spray Technology®

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

Mechanical Property of HVOF Inconel 718 Coating for Aeronautic Repair

Christophe Lyphout, Angelica Fasth, and Per Nylen

The module of elasticity is one of the most important mechanical properties defining the strength of a material which is a prerequisite to design a component from its early stage of conception to its field of application. When a material is to be thermally sprayed, mechanical properties of the deposited layers differ from the bulk material, mainly due to the anisotropy of the highly textured coating microstructure. The mechanical response of the deposited layers significantly influences the overall performance of the coated component. It is, therefore, of importance to evaluate the effective module of elasticity of the coating. Conventional experimental methods such as microindentation, nanoindentation and four-point bending tests have been investigated and their results vary significantly, mainly due to inhomogeneous characteristics of the coating microstructure. Synchrotron radiation coupled with a tensile test rig has been proposed as an alternative method to determine the coating anisotropic elastic behavior dependence on crystallographic orientations. The investigation was performed on Inconel 718 (IN718) HVOF coatings sprayed on IN718 substrates. Combining these experimental techniques yield a deeper understanding of the nature of the HVOF coating Young's modulus and thus a tool for Design Practice for repair applications.

Read the entire article in the February 2014 Issue

Visit www.asminternational/tss

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Become a Member of the International Thermal Spray Association

Your company should join the International Thermal Spray Association (ITSA) now! ITSA is now a Standing Committee of the American Welding Society expanding the benefits of company benefits. As a company-member professional industrial association, our mission is dedicated to expanding the use of thermal spray technologies for the benefit of industry and society.

ITSA members invite your company to join us in this endeavor. See pages 14-16.

Bill Mosier New Chairman International Thermal Spray Association



Bill Mosier is now the International Thermal Spray Association (ITSA) Chairman.

Previously vice-chairman and actively involved with ITSA since 2000, Bill served as Treasurer for nine years and is currently Chairman of the ITSA Membership Committee.

Born and raised in the small town of Coal City, Illinois, Bill went to the

University of Illinois, graduating with a BS in Metallurgical Engineering. To help put himself through school, he worked in the weld lab fatigue testing spot welds, and also for the Army Corp of Engineers - their Civil Engineering Research Laboratory (CERL) - supporting their welding program. Upon graduation, Bill worked at the American Welding Institute in Knoxville, Tennessee for 5 years as a metallurgical/welding engineer. He then worked for Stoodly as a Product Development Engineer in Bowling Green, Ohio where he met and married his wife Kay. They moved to Cincinnati where Bill joined Polymet as the technology and quality manager. From there, he progressed to business unit manager, production manager, general manager and his current position as president

In addition to Bill's ITSA affiliation, he has been a member of ASM International and the American Welding Society (AWS) since his college years. He is a member of the AWS A5 and C2 committees as well as Chair of the C2J Committee

For more information, email bmosier@polymet.us

Jim Ryan Appointed Vice Chairman International Thermal Spray Association



Jim Ryan, a business and sales professional with over 26 years in the surface technology industry, has worked for such major coatings companies as Praxair Surface Technology Specialty Powders, AIM-MRO and H. C. Starck.

He founded Advanced Material Services in September 2009 with a focus on materials for

surface technology, brazing, laser, and value added products specializing in the aerospace, oil and gas, steel,

power and electronics markets.

In March 2014, Jim joined Atlas Machine and Supply as a Strategic Account Representative assisting the development of Atlas thermal spray coatings business.

Jim had served as the ITSA Membership Chairman for over ten years and is now a member of the Education Committee.

Jim has a BS/BA in Marketing from Xavier University.

For more information, email jhryan@atlasmachine.com

Eric Hanson Joins DeWAL Industries



Sales coverage for the West Coast has changed this month for DeWAL Industries' full product line.

Eric Hanson has joined DeWAL's sales team and is the Sales Manager for the west coast of the United States to include the state of AZ. He comes to DeWAL with an extensive background in fluoropolymer films and industrial tapes.

The addition of Eric's time and talents will help DeWAL's existing and future customers by playing an active roll to improve communication and response time to our clients on the west coast and as a pointman with solution ideas for manufacturing challenges.

Since its founding in 1974, DeWAL has become an industry leader in the manufacture of pressure sensitive tapes from PTFE, UHMW-PE, Polyimide, and PTFE coated glass fabric. The company also manufactures skived PTFE and UHMW-PE film, friction-reducing Dynaglide® PTFE-based compounds, and Poro-Tex® and UniPore® specialty products.

For more information, email usa1@dewal.com

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Sulzer Metco's Mitchell R. Dorfman Inducted Into ASM Thermal Spray Hall of Fame



For innovations in thermal spray turbine engine coatings, for exceptional contributions to the thermal spray industry and technical community, and for dedicated mentoring of next generation thermal sprayers.

Mitchell R. Dorfman currently holds the title of Sulzer Metco Fellow and TBC Competency Leader at Sulzer Metco

(US) Inc. located in Westbury, New York.

He obtained a MS in Materials Science and a BS in Mechanical Engineering from the State University of New York (SUNY) at Stony Brook, NY in 1978 and 1979, respectively. During his 35-year career at Sulzer Metco, Mitch has held many positions in materials engineering, materials manufacturing and technical sales support. He was instrumental in developing and commercializing the HOSP (plasma densification) manufacturing process at Sulzer Metco. In addition, he has developed many materials for the aerospace/industrial gas turbine and general industry market segments. Ceramics for thermal barrier coating applications, ceramic and metal composites for compressor and turbine abradable applications, and carbides for wear applications are just a few areas of his research and development activities in thermal spray technology.

Throughout his career, Mitch as authored over 60 technical papers and holds 20 patents in materials related

to thermal spray technology. In 2003, he received the "Distinguished Alumni Award" from the Center for Thermal Spray Research at SUNY Stony Brook. In 2012, he gave the keynote talk at the International Thermal Spray Conference, ITSC 2012, in Houston entitled "Upcoming Global Opportunities and Challenges in the Thermal Spray Industry" and co-authored a written commentary published in the Journal of Thermal Spray Technology entitled "Challenges and Strategies for Growth of Thermal Spray Markets: The Six-Pillar Plan based on this keynote address."

Mitch has been an ASM International member since 1988. He has held various positions with the ASM Thermal Spray Society (ASM/TSS) over the years, including ASM/TSS President and Immediate Past President, Technical Chair for ITSC 2009, Topical Chairman for several industry conferences, Chairman of ASM/TSS Information and Development Committee and ongoing reviewer of technical papers for the Journal of Thermal Spray Technology. Presently, he is an ASM Board of Trustee and an ASM Fellow.

About Sulzer Metco

Sulzer Metco is a global leader in surface engineering solutions and services, offering a broad range of thermal spray, thin film and other advanced surface technology equipment. Sulzer Metco also offers integrated systems and materials, specialized coating and surface enhancement services, and manufactured components for select industries. Sulzer Metco provides a comprehensive manufacturing, distribution and service network, catering to aviation, power generation, automotive and other strategic growth industries.

For more information, visit www.sulzer.com

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.



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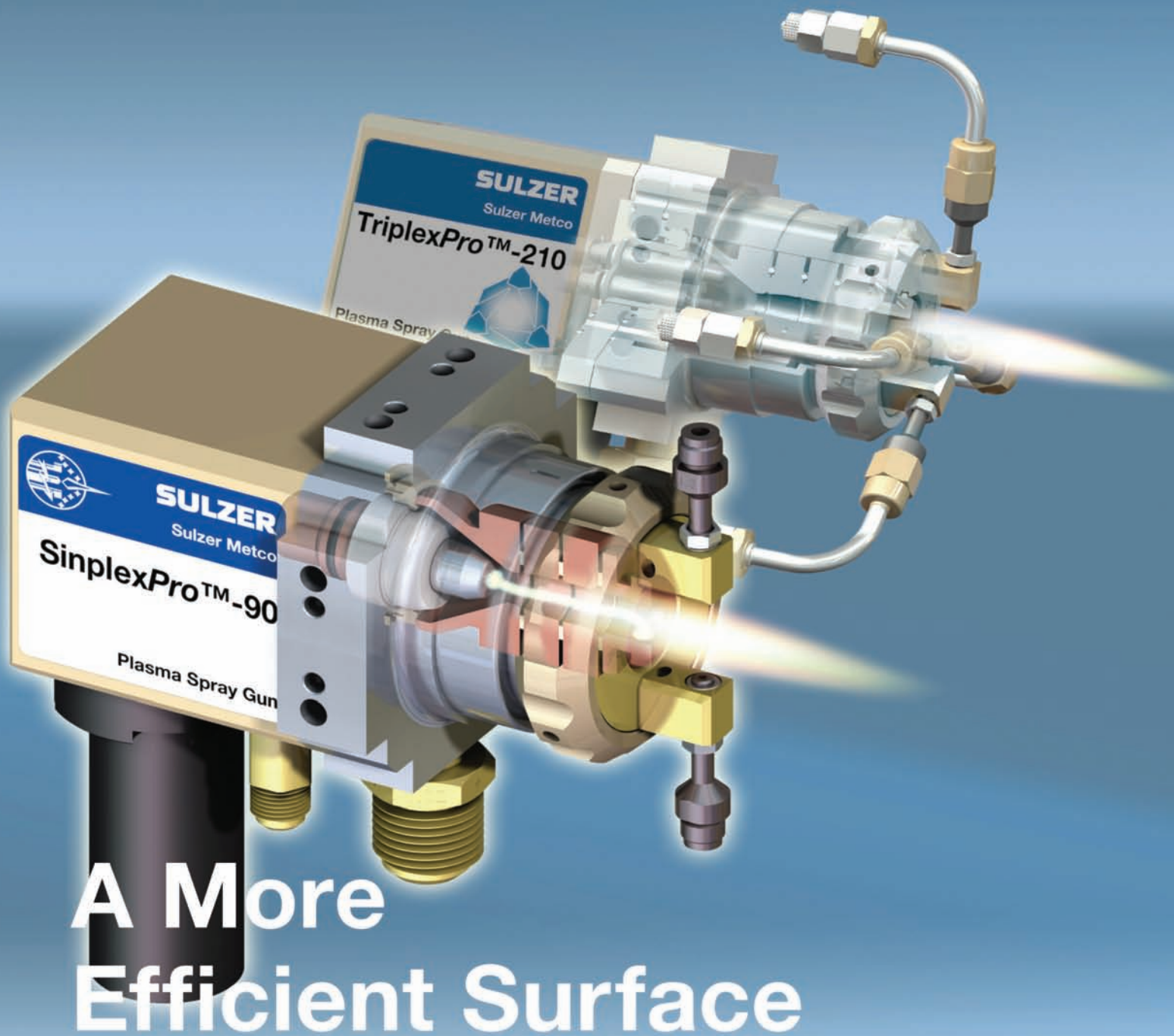
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Want to know more? Don't miss our Cascading Arc paper at the Industrial Forum, or talk to us at **Booth #A05** at ITSC 2014.

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