

# SPRAYTIME®

Published by *The International Thermal Spray Association*

*A Standing Committee of The American Welding Society*

Volume 20, Number 1

First Quarter 2013

## Thermal Spray Wear Coatings Find Growing Markets and Greater Competition

### Background: Chrome Replacement

After a severe recession and in the midst of a still-sluggish economy, the global thermal spray industry finds itself growing robustly, but with a spotty recovery that has emphasized a few solid markets while others languish. In the next few years, the industry's recovery will be further challenged by growing competition from emerging plated wear coating solutions.

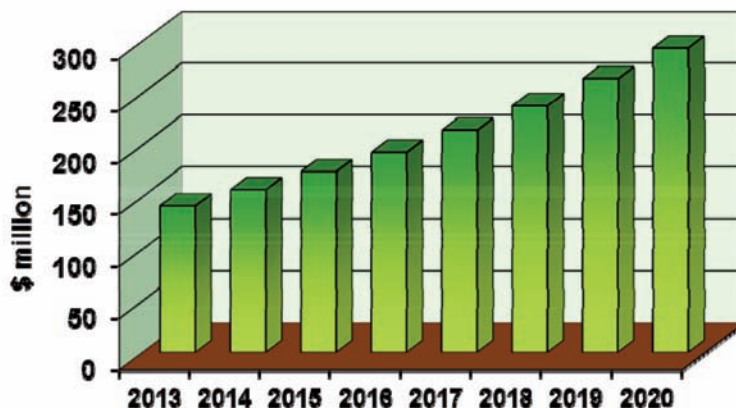
A recent market study by Thintri, Inc. ([www.thintri.com](http://www.thintri.com)), *Markets in Wear Coatings: Hard Chrome and its Alternatives*, highlights the mixed picture for thermal spray in wear coatings. Based on interviews with industry experts and thermal spray suppliers and users, the report paints a promising short-term picture, while presenting a sobering outlook for later in the decade. Thermal spray faces some significant challenges from other coating technologies that may capture thermal spray markets the way thermal spray has captured hard chrome markets.

The Thintri study, an update and revision of an earlier study that was focused on chrome replacement, investigates the array of available and emerging coating technologies including thermal spray, electroless nickel composite plating and others that have shaken the dominance of hard chrome in wear coatings.

Over the last century hard chrome plating grew to fulfill an important role in many industries, including aerospace, oilfield, automotive, hydraulics used in construction and mining, and general industry. It is used not only during manufacture of parts, but in rebuilding parts that were not originally chrome plated in order to restore dimensional

tolerance. The ease and low cost of application combined with the quality of chrome wear coatings has led to chrome's long-standing dominance in wear coating applications. In aerospace alone, chrome has provided wear resistant coatings for such important applications as landing gear, gas turbines, hydraulics and other components.

Figure 1. Demand for Thermal Spray consumables, Hydraulics and Heavy Equipment.



The chief problem with chrome is that the hexavalent form of chromium that is a prime component in the process of hard chrome plating is a known health hazard. Worker exposure to the mist produced during plating has resulted in not only cancers but an array of other medical problems, including irritated, ulcerated and perforated septum, dermatitis, burns and other conditions. It also presents environmental challenges; waste disposal of the toxic bath solutions is difficult under today's pollution control legislation.

Legislation over the past two decades, with its

*Continued on page 4.*

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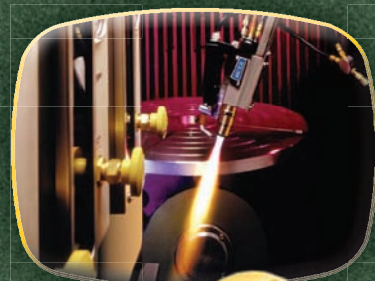




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SPRAYTIME (ISSN 1532-9585) is a quarterly publication of the International Thermal Spray Association.



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Article submissions (subject to acceptance and edit), advertising insertions, address correspondence, subscription request, back issue copies, and changes of address should be sent to:

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## INDEX

### INDUSTRY NEWS

Abakan sub MesoCoat Wins First Prize .....	24
Advertisers Listing .....	31
ASM TSS Journal of Thermal Spray Technology Abstract.....	25
Ardleigh Minerals Introduces Recycling Process .....	11
Calendar of Events.....	28
Camfil Farr Gold Series for Thermal Spray Processes .....	8
Castolin Eutectic Acquires Monitor Coatings Group .....	10
CeralUSA Announces ISO 9001:2008 Compliance .....	14
Free DIN Standards Poster .....	9
Free GTS/Linde Thermal Spray Process Poster.....	25
IPG Launches New Thermal Spray Grind Division .....	15
International Thermal Spray Association.....	18-19
Plackart New Thermal Spray Facilities.....	9
Preventing Cracks in CVN Aircraft Elevators .....	12
Protective Coatings for High Temperature Polymer Composites .....	22
Sharkskin Coatings and Surface Technologies joins ITSA .....	21
Sulzer Metco Announces New Edition to Cascading Arc Technology .....	16
Superior Shot Peening Receives ISO-9001 .....	11
Thermal Spray Wear Coatings .....	1
UniqueCoat Introduces New HVOF Thermal Spray Gun .....	14
Vanderbergh and Associates 10 Year Anniversary.....	11

### PEOPLE IN THE NEWS

Jeff Abelson - Donaldson Torit .....	34
Edgardo Garcia - Wall Colmonoy .....	32
Peter Heinrich Retires .....	34
Harold Lemke - NanoSteel .....	33
Matthew M. Miller - NACE .....	32
Helena M. Seelinger - NACE .....	32
Pete Silcox - Metallisation .....	34
Greg Van Dyke - Centerline .....	33

### IN MEMORIAM

Donald MacKelvie Yenni .....	31
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Continued from page 1.

increasingly strict limits on hexavalent chromium emissions, has driven as many as half the plating shops in the US out of business or out of the country to places with fewer restrictions. Today, the situation has largely stabilized, with most of the remaining chrome plating shops once again reporting profitable conditions

Chrome's desirability has rested in its durability under wear, its ease of application and low cost. However, if it hadn't been for the health and environmental issues that spurred the movement to alternatives, it would have happened anyway to some degree due to chrome's inherent limitations.

Chrome plate's properties are generally good, but hardly ever excellent. Chrome's limited hardness and corrosion resistance are increasingly unsatisfactory in today's more demanding wear environments. Chrome coatings suffer from pitting, spalling and other failures under stress. Chrome's slow rates of deposition and long bakes add to cost of ownership and turnaround times. Coating non-uniformity often forces followup machining to meet dimensional tolerances.

#### The Emergence of Chrome Alternatives

Over the past decade, growing awareness of chrome's major liabilities has led to a gradual migration to alternative coating technologies.

The advantages offered by many chrome alternatives have gone beyond simply avoiding the environmental and health

issues associated with chrome plating, and now include significant improvements in performance, lifetime and/or cost. A number of new wear coating methods have reached or are approaching commercialization, and some new technologies are even obtaining approvals for use in aerospace.

In the 1990s thermal spray, a category that embodies a range of different coating technologies, emerged as a promising hard chrome plate alternative. Thermal spray already occupied important markets not related to wear coatings, but in providing an alternative to hard chrome, thermal spray has become indispensable in critical applications like aerospace.

Thermal spray has established itself as the leading alternative to hard chrome in wear coatings by virtue of not only its benign health and environmental impact, but its performance as well. Today, thermal spray has displaced chrome in a large portion of aerospace wear coating applications, and continues to capture market share from chrome in other industries such as oil & gas, heavy equipment and other general industrial markets.

Thermal spray's advantages over chrome plating in many applications include fast deposition rates, the ability to deposit coatings on heat-sensitive surfaces, use of portable equipment, and a very wide range of available coating materials. Most importantly, at least in some situations, thermal spray is often comparable to chrome in cost and can be even less expensive.


For demanding industrial wear coating applications, the most common form of thermal spray used today is high velocity oxy-fuel, or HVOF.

HVOF is suitable for processing large parts. While a plating tank for a large component could be very expensive to set up and maintain, applying a HVOF coating to a large part requires no extra investment in terms of capacity, as long as the part fits in a standard cell. Small parts, like those that could be shoveled, are still processed at much lower cost in a chrome plating tank.

Another important advantage of HVOF, or any thermal spray for that matter, is the reduced processing time compared with plating. Process hours for a typical HVOF application are as little as a fifth those for electroplated hard chrome.

There are of course tradeoffs in using thermal spray for wear coatings, and in some applications it still cannot compete with plated solutions. Surface complexity points up some significant differences between the two methods. Chrome plating easily reaches the entire surface of a complex part, but that is not always the case with thermal spray, where complex geometries can present significant challenges. Therefore HVOF is most competitive on large, relatively simple shapes.

Another limitation of thermal spray relates to line-of-



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sight. Non-line-of-sight (NLOS) geometries and particularly inner diameters less than about 5.91 - 7.87 in. (15 - 20 cm) are a big problem for HVOF. Today about 20 % of aerospace coating applications are NLOS, so the inability to use HVOF on such surfaces has limited the potential penetration of HVOF in chrome replacement to 80 % in that market.

Another big issue with HVOF and thermal spray in general is the significant up-front investment required, including consumables and equipment. However, in taking into account long term economic benefits such as faster turn-around time, greater performance and longer wear lifetime, reduced hazardous wastes, etc., thermal spray can often be economically competitive with chrome, that advantage growing with every new legislative restriction on chrome plating.

Where once it seemed only a matter of time before thermal spray captured 80% of most major chrome wear coatings markets, and which is nearly already accomplished in the aerospace industry, the overall picture for thermal spray and other chrome alternatives has lately grown murkier and more uncertain. A number of respondents in the Thintri study pointed out that some users who switched from hard chrome to HVOF or other types of thermal spray have become somewhat disenchanted.

Issues relate primarily to the cost of migrating to new methods, reflected in the expense of procuring and setting

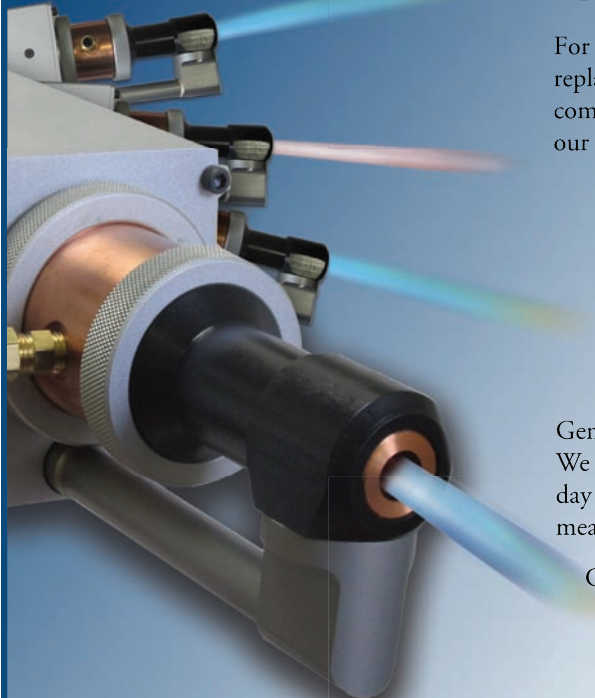
up thermal spray cells, and uncertainty over performance, all made more complicated by the current economic climate. These new users point to higher costs for some coatings compared with chrome, and technical limitations such as inability to coat inner diameters.

Ironically, some of the disappointment in thermal spray stems from an initial overestimation of the capability of alternatives like thermal spray. While some markets have continued their migration from chrome to thermal spray, others now resist the move. Meanwhile, new coating methods are emerging that deal with the limitations of both chrome and thermal spray, and could offer new options for wear coatings.

Disruption occurring within the thermal spray industry today involves a battle for market share among types of thermal spray. For example, HVOF's dominance in demanding wear applications is under direct threat by high energy plasma thermal spray, which is actively capturing markets from HVOF.

Plasma spray in general is considered a cheaper, more low-end process, in that coating quality is usually inferior to that of HVOF due to greater porosity. High energy plasma spray, by raising the temperature and particle velocity, goes a long way to overcoming those quality issues. The technique offers a lower-cost option to HVOF, for those willing to work with a somewhat more complicated process, and with a smaller palette of available coating materials.

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While high energy plasma will not replace HVOF in its major markets, it is capturing part of HVOF's market share. Promoters of high energy plasma are ambitiously targeting nearly all of HVOF's major markets. At the very least, high energy plasma will reach an equilibrium with HVOF that will represent some sort of market loss for the latter.

In any case HVOF remains the prime choice in replacing hard chrome plating in wear coatings thanks to its superior performance, (sometimes) favorable economics and flexibility. In recent years the aerospace industry, as well as sectors like oil and gas, heavy equipment and other industries, pursued a migration away from hard chrome and toward thermal spray and a few other alternatives. The effect of this movement on the overall volume of the chrome plating industry is fairly small, in fact plating shops see little threat to their business from hard chrome alternatives, but growth in markets for alternatives has been strong, albeit with some inconsistencies.

A number of experts in the thermal spray industry interviewed for the Thintri study believe that while significant markets remain to be captured, the "low hanging fruit" has largely been taken. Over the past decade, the move to alternatives in large, well-paying and easy applications like landing gear and hydraulic cylinders began quietly but continued a solid advance. What remains are large but highly segmented markets where potential users have to be convinced of the cost effectiveness of thermal spray, and may see little incentive to switch. Other

available applications are those where thermal spray has not done well, such as inner diameters, which are now the target of competing methods like electroless plating. Continued success for chrome alternatives in general will depend on penetrating a large number of smaller, more difficult markets.

Accordingly, those marketing chrome alternatives will have to bring resources to bear on diverse applications, where potential users may have little or no familiarity with chrome alternatives and need to be convinced of the long term cost savings and performance advantages in applications where there may now be little supportive data.

The still-high cost of thermal spray and its technical limitations has led some potential users to consider other alternatives. As it happens, a number of those alternatives have entered the marketplace, or will soon. Electroless nickel composite plating, electroless nickel-boron, nanocrystalline cobalt-phosphorus coatings, physical vapor deposition (PVD) and others have demonstrated competitive characteristics and are either fully commercialized or nearing commercialization. While none has the potential to displace either chrome or thermal spray from their largest markets, and will be primarily confined to strictly segmented markets, the total target markets for these emerging alternatives are likely to be significant, and will impact all traditional wear coating methods.

Ultimately, the greatest competitive threat to both thermal spray and conventional, hard chrome is the imminent arrival of a hard trivalent chrome coating. Trivalent chrome is another way of providing a chrome coating without using the problematic hexavalent chromium, but instead uses the chemically distinct trivalent chromium. Trivalent chrome brings little or no health or environmental issues, and in recent years has been shown to produce a satisfactory chromium wear coating. While much work has been undertaken to develop a viable hard trivalent chrome coating (decorative chrome coatings do not present serious issues in a practical sense), such efforts were stymied by difficulties in making the coatings thick enough for practical wear applications. Most of the problems appear to have been worked out, and respondents to the Thintri study, whether they are involved in the chrome or alternative coatings business, expressed full confidence that over the course of this decade, a fully commercially viable hard trivalent chrome wear coating will provide serious competition to conventional hexavalent hard chrome, thermal spray, and other chrome alternatives.

Faraday Technology, the main developer and promoter of hard trivalent chrome coatings, is already in the process of obtaining approvals for aerospace repairs. The entry of such a process has the potential to seriously disrupt the balance of markets owned by the various wear coating technologies.



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But, the picture gets more complicated still. A number of the materials used in chrome alternatives are now being flagged as potentially serious offenders themselves. For example, some new wear coatings use cobalt salts, which have recently been added to the list of prohibited materials on Europe's REACH list. Addition of the materials to such lists won't mean banning metallic cobalt per se, limitation on the use of cobalt salts will force processing off the continent and present obstacles to full commercialization, particularly if the perception of hazard becomes widespread.

#### The Outlook for Wear Coating Markets

Where once aerospace was a dominant wear coating application, and of course is still a critical segment for thermal spray, it has been somewhat stagnant, while in contrast, the oil & gas sector has taken flight, with growth rates exceeding 17% per year in consumption of consumables like thermal spray powder. One respondent for the Thintri study claimed the oil & gas portion of his business had increased ten-fold over the last two years.

Hydraulics, as in mining and heavy machinery, is also growing at a healthy rate (Figure 1., page 1).

Even though the aerospace market itself has been flat for a number of years, industry experts believe that a wave of repairs will arise soon that will boost demand for thermal spray services and powder for several years.

The remainder of the decade will be years of opportunity and uncertainty. Continued economic recovery will bring increased sales of thermal spray consumables to markets other than oil & gas, construction and aerospace. On the other hand, the competitive landscape is not entirely positive. Not only will high energy plasma place a competitive threat to HVOF, but thermal spray overall faces the near-certain ascendancy of a hard trivalent chrome coating, as well as other plated solutions like electroless nickel composite.

Where chrome once dominated due to its almost universal applicability, the emerging consensus is that no single wear coating technology will dominate as hard chrome once did. The specific needs of individual applications are now so varied and demanding in the tradeoffs of cost, ease of use, performance, lifetime, etc., that no single coating technology can fully address the needs of more than a segment. In that sense, the wear coatings market is a dynamic and exciting one, although perhaps stressful for its participants.

#### About Thintri, Inc.

Thintri, Inc. is a full-service consulting firm specializing in market research and custom consulting, covering topics in materials, aerospace, electronics and semiconductors, telecommunications, manufacturing, imaging, security and many other markets.

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### Company Profile

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Thermico required a new extraction system to handle the dust and fumes from the plasma and HVOF spray systems that were being installed in their new premises. Owing to their long-term relationship with Camfil Air Pollution Control (APC), Thermico approached Camfil APC for the purpose of proposing a solution to meet the requirements of this demanding application.

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### Solution

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A Farr Gold Series® GS40 heat dust extractor located at Thermico's factory, in Dortmund, Germany.



A view of the heat exchange system installed above the dust extractor.

Following discussions, Camfil APC also included an energy saving setup that incorporated a heat exchange system. In summer, fresh air is provided through the supply air system while the warm air from the factory processes is simply exhausted to the atmosphere, therefore contributing to keep the factory cool.

In winter, the heat exchange system is switched. The warm air from the dust collector is passed through the heat exchanger which heats up the incoming fresh air before discharging into the building, thus saving on winter heating costs. In fact, the system was tested during the winter and it was so effective that Thermico will not have any need for additional winter heating.

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**See advertisement page 2.**

### Plackart Announces Three New Thermal Spray Facilities



Russia-based thermal spray specialist, Plackart, started three new thermal spray job shops in 2012. These are located in Sankt-Petersburg, Nizhniy Novgorod and Tatarstan. This is in addition to facilities already worked in Moscow, Perm and Tyumen.

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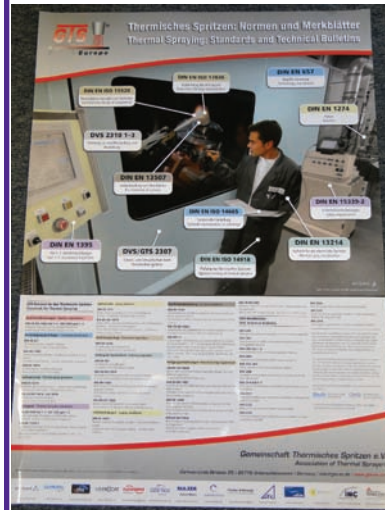
GTS – the Association of Thermal Sprayers – has produced this spectacular new poster of **"Thermal Spraying: Standards and Technical Bulletins"**.

The poster identifies DIN Standards for Thermal Spraying and the DVS Technical Bulletins. The stan-

dards/bulletin names are in German and in English.

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

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## Castolin Eutectic Acquires Monitor Coatings Group

Castolin Eutectic announced its acquisition of privately-held Monitor Coatings Group. With facilities in the UK, Singapore and China, Monitor Coatings is a technology leader for surface engineering in extreme environments.

Serving customers in the oil and gas, steel, power and aerospace industries, Monitor Coatings has earned its reputation and market position on technology solutions that offer the highest level of performance available in the market today and operates to the highest quality standards recognized throughout the world, including ISO9001, AS9100 and NADCAP accreditation.

In the oil & gas industry, directional drilling has opened up affordable access to even the remotest sources of oil. The techniques involved pose new challenges in material wear. By developing ultra-dense, high wear-resistant coatings based on a novel thermal spray and densification process, Monitor Coatings has developed unique high-tech processes that offer ultimate protection for that drilling equipment. This technology prolongs the life of drilling tools and provides sustainable, durable equipment to the market, thereby significantly reducing costs and minimising the environmental impact.

This acquisition will come to reinforce Castolin Eutectic's own position as a leader in wear protection for a wide range of industries. Castolin Eutectic is an integrated manufacturer of welding, brazing and coating consumables; it operates a network of service workshops in 25 countries and employs over 1,400 technicians and experts worldwide in welding, brazing and coating technologies.

"Castolin Eutectic and Monitor Coatings create the leading

force in industrial wear and corrosion protection. With this step we further strengthen our technology and service activities – core to our growth strategy,” said Siegfried Schabel, CEO of MEC Group.



"Partnering with Castolin Eutectic gives us the ability to grow faster and serve our customers even better. Castolin Eutectic's strong international presence and know-how, together with Monitor Coatings' innovative technology will bolster the offer to our combined client base." says Dr Bryan Allcock, CEO and founder of Monitor Coatings Group.

Castolin Eutectic and Monitor Coatings processes are at the forefront of technological development in thermal spray and hard-facing coatings. These include: High Velocity Oxy-Fuel (HVOF), thermo-chemical conversion coatings (densification), air-plasma and low-pressure plasma coatings (including ceramics such as thermal barrier coatings and Nano-particle derived coatings), arc spray

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# INDUSTRY NEWS



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**For more information**, visit Castolin Eutectic web site [www.castolin.com](http://www.castolin.com) and [www.monitorcoatings.co.uk](http://www.monitorcoatings.co.uk)



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### Superior Shot Peening Receives ISO-9001 Accreditation

Providing our customers industry leading service has been the driving force behind the rapid global expansion and recent ISO-9001 accreditation of Superior Shot Peening.

Headquartered in Houston, now with two shops totaling over 100,000 sq ft, Superior has also expanded to China and Romania to meet our customer's needs.

Since 1991 Superior has enhanced its capabilities and now provides a full line of thermal spray processes, shot peening, phosphating, Xylan/Everslik and powder coating where new and repair parts both receive the same attention to detail from drop off to pick up.

The ISO-9001: 2008 accreditation has now confirmed our place as a high quality, detail and service oriented leader in the coatings industry.

**For more information**, visit Superior Shot Peening website [www.superiorshotpeening.com](http://www.superiorshotpeening.com) or call 281-432-0900.

**Where is your article?** We encourage you to send articles, news, announcements and information to [spraytime@thermalspray.org](mailto:spraytime@thermalspray.org).



### VandenBergh and Associates Celebrate 10 Year Anniversary

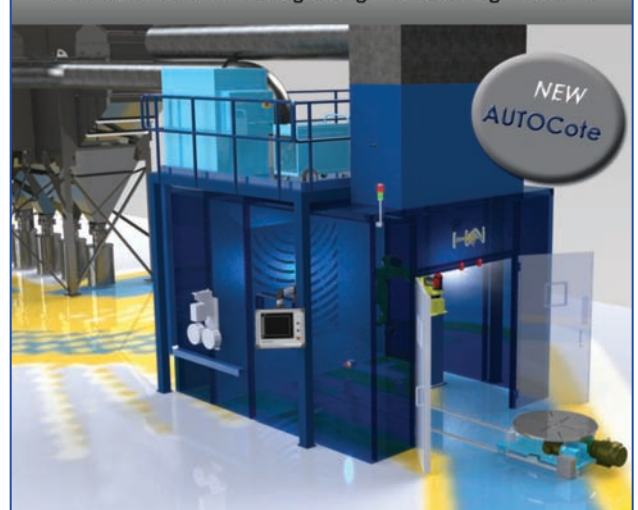
Always on the lookout for quality suppliers and associates to offer innovative and cost effective solutions, V&A, Inc. has added several new products in their anniversary year.

Along with existing product lines and services, V&A now offers the following that will aid in reducing thermal spray costs or provide added capabilities:

- Client support and consulting in the area of materials, applications and marketing through relationship with M&PT (Materials & Process Technologies);
- Thermach – AT-6000 weigh scale for integration with Thermach powder feeders;
- Weight loss measurement system that can be used independently for feed systems weighing 200 lb. or less;
- Oseir's new SprayWatch G – compared to more complicated particle measurement devices, a simple and affordable plume measurement device for the detection of spray variations for a single operation;
- Oseir's new High Watch Camera – quick set up and measurement of cold spray particle velocity;
- Powder Feed Dynamics, Inc. – sales and support of Mark XV series precision powder feeders.

**For more information** or an introduction to services, products and capabilities contact Mo VandenBergh at 317-718-8403, by e-mail: [mo\\_vandenbergh@earthlink.net](mailto:mo_vandenbergh@earthlink.net) or check out the web site: [www.MoVandenBergh.com](http://www.MoVandenBergh.com). You can also request a "V&A's Capabilities Presentation and Discussion" over Go-To-Meeting.

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## Preventing Cracks in CVN Aircraft Elevators to Save \$15 Million for In-Service Ships

Aircraft carriers use elevators for lifting aircraft and other equipment between the hangar and flight decks. Cracks have been found on elevator support structures on several CVN aircraft elevators.

The Navy Metalworking Center (NMC) is leading a ManTech Rapid Response project team that is investigating and testing potential treatments for preventing or significantly minimizing cracking in elevator hitch girders on in-service Nimitz-class aircraft carriers. The technologies will also be applied in the fabrication of these structures on new construction carriers.

The project team will identify several treatment methods and will down-select candidate treatments for further evaluation. Some candidates include peening, weld cladding, and thermal spray.

Effective methods for improving the material properties of the elevator support structures will save

an estimated \$15 million for CVN 74, 76 and 77 through their service lives. Future repairs for CVN 78 and CVN 79 as designed will also be likely.

Because this is a high-priority issue for the Navy, the project results will be implemented by NAVSEA at the earliest possible opportunity for each of the affected carriers.

The project team includes PEO Aircraft Carriers; NAVSEA 05P; NAVSEA 05V3; Naval Surface Warfare Center, Carderock Division; Newport News Shipbuilding; and NMC.

**For more information**, contact Daniel L. Winterscheidt, Ph.D., NMC Senior Program Director, [winter@ctc.com](mailto:winter@ctc.com), 814-269-6840

This article was prepared by the Navy Metalworking Center, operated by Concurrent Technologies Corporation, under Contract No. N00014-10-D-0062 to the Office of Naval Research as part of the Navy ManTech Program.



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**Plasma PS50M-PC -**  
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**MK74-PC -**  
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**PCC - Pistol Control Console**  
Our proven mass flow control system that can be configured to operate a range of plasma or HVOF pistols, powder feeders and power supplies commonly used in the industry. The system can operate liquid fuel or gas fuel HVOF pistols and plasma pistols up to 80kW.



**MK66E-PC -**  
Wire Flame Spray system

## Manual Spray Systems

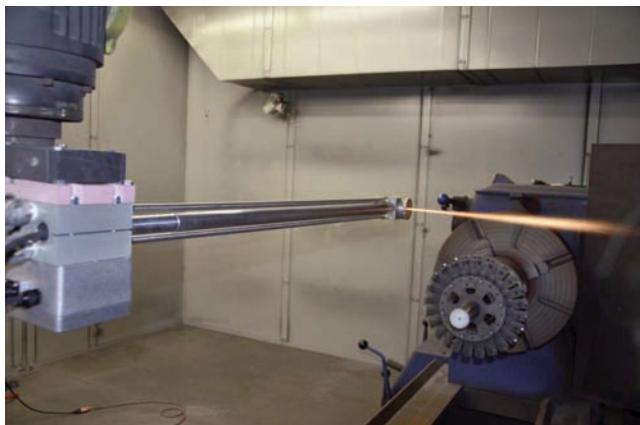
Metallisation's manual systems are suitable for engineering coatings where a combination of manual and tool post mounted spraying is required. Our range includes oxy-acetylene flame spray systems and a full range of hand held or automated arc spray systems from 250A to 1,500A.

## Excellent Customer Service

Metallisation's customer service is second to none, including an exceptional after sales service. With a network of distributors around the globe, and a team of fully qualified and highly experienced service engineers, customers can rely on the highest standard of care, wherever they are in the world.

## New Internal Diameter HVAF Thermal Spray Gun Introduced

UniqueCoat Technologies introduces a new class of HVAF thermal spray gun for coating internal diameters. Named the ID2, the new gun creates particle velocities over 600 m/s. The ID2 gun operates on air and propane or propylene and can spray both metal and cermet powders.



Parts as small as 6 in. (150 mm) ID can be coated. The standard design can spray parts up to 39 in. (1m) deep. Additional length is available.

The new gun works with UniqueCoat Technologies' standard control console. Users who purchase M2 or M3 spray guns can also purchase the ID2 gun to maximize their system's flexibility. The console features unlimited recipe storage, booth integration capabilities, and standard data collection software.

**For more information**, contact David Jewell, Sales Manager, 804-784-0997, website [www.UniqueCoat.com](http://www.UniqueCoat.com)

### Scholarship Opportunities

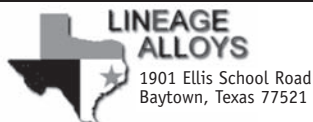


Since 1991, the **International Thermal Spray Association Scholarship Program** has contributed to the growth of the thermal spray community. ITSA offers up to three Graduate Scholarships of

**\$2,000.00 each.**

**Applications accepted April 15 through June 30 ONLY.**

Visit [www.thermalspray.org](http://www.thermalspray.org) scholarship area for details.



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## CeralUSA Announces ISO 9001:2008 Compliance

CeralUSA LLC, manufacturer of environmentally friendly coatings for the aerospace, power generation, and oil and gas industries, announced today that its Quality Management System was recently audited and found to be in full compliance with the International Standards Organization (ISO) 9001:2008 quality system standard. This compliance follows an extensive audit of CeralUSA's sales, design and development, procurement, production, and quality processes. The Moore Norman Technology Center's certified ISO auditors deemed these processes along with CeralUSA's internal documentation fully compliant.

The ISO 9001:2008 standard mandates Quality Management System (QMS) requirements that guide an organization's actions for meeting and improving upon customer satisfaction and quality requirements. By establishing a compliant QMS system, CeralUSA has the process in place to continuously improve service and quality.

"As a young, fast growing company, CeralUSA has always had outstanding fundamentals in the eyes of many business leaders. With this letter of compliance, our customers can be confident that CeralUSA is dedicated to maintaining the highest level of efficiency and responsiveness, with the ultimate goal of 100% customer satisfaction. We regard our ISO compliance as only the first in a line of benchmarks we intend to achieve this year", said Suzanne Bodger, managing partner of CeralUSA.

About CeralUSA: CeralUSA is a Woman Owned Small Business based in Oklahoma City, Oklahoma. In the short time since its inception in 2008, CeralUSA has become well known for its "green" coatings, making waves in the industry with their low-chrome drop-in replacement for legacy carcinogenic aluminum ceramic coatings.

**For more information** about CeralUSA, LLC, write to [info@ceralusa.com](mailto:info@ceralusa.com) or visit [www.ceralusa.com](http://www.ceralusa.com)

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## IPG launches New Thermal Spray Grind Division

Indianapolis based IPG Corp announced a new business division. TS Grind will handle specialized high-precision grinding of thermally sprayed coatings on mechanical parts for the aerospace industry.

"This is a fast-growing area of our business," said IPG CEO, Dave Cox. "We have committed to expanding our operations to meet the needs of our thermal spray coating customers." Thermally sprayed coatings are applied to many moving parts to provide improved wear-resistance from mechanical interactions. Grinding these coatings to very minute tolerances provides the precision required for proper mechanical function. The mission of the new TS Grind division is to focus exclusively on the needs of OEMs, parts manufacturers and coating companies who are in need of high end thermal coated grinding. "TS Grind is more than just a division of the company. It is a way of determining the best way to coat and grind a part so it exceeds its specifications," says Cox.

IPG is a privately-held precision grinding corporation. It has operated in Indianapolis since 1975.

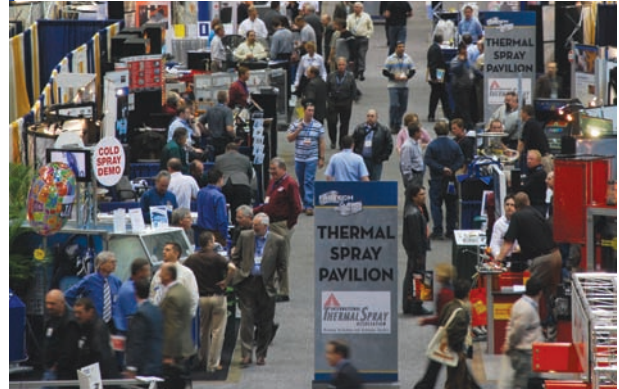
**For more information**, visit the newly launched web site [www.tsgrind.com](http://www.tsgrind.com) or call 317-634-9620.

**Thermal Spray Jobs listed at "For Hire" [www.thermalspray.org](http://www.thermalspray.org)**



North America's largest metal forming, fabricating, welding and finishing event will be held at the North and South Halls of McCormick Place, Chicago, Illinois, USA, November 18-21, 2013. The upcoming event is expected to cover more than 500,000 net square feet and anticipates over 35,000 attendees and 1,200 exhibiting companies.

### Thermal Spray Pavilion



Join the International Thermal Spray Association at the Fabtech Thermal Spray Pavilion this year in Chicago.

**To reserve your booth space**, contact Joe Krall, 800.443.9353 x 297 or email [jkrall@aws.org](mailto:jkrall@aws.org).

**For event information**, visit [www.fabtechexpo.com](http://www.fabtechexpo.com).

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## Sulzer Metco Announces a New Edition to Their Cascading Arc Technology Gun Portfolio

Sulzer Metco has released a new plasma spray gun, the SinplexPro, with cascading arc technology. Previewed in 2012 at the International Thermal Spray Conference in Houston TX, the SinplexPro platform of spray guns promised to give customers the option of adding cascading arc technology to their existing plasma spray system. Today that gun is a reality with product ready for immediate sale.

Building on the success of the TriplexPro spray guns, Sulzer Metco is responding to the overwhelming request from the market to improve efficiency on existing spray systems. SinplexPro is a single-cathode spray gun with cascading arc technology, which eliminates the interdependence of the plasma arc with processing gases and flows. This results in a more idealized state of the plasma jet that provides more uniform heating of feedstock particles.

"While the TriplexPro gives customers the largest gains in process efficiencies and reduced processing costs, the SinplexPro will not disappoint," says Omar

Sabouni, Product Line Manager for Sulzer Metco. "Even though the efficiency gains may not be as high as those for TriplexPro, the efficiency gains achievable with SinplexPro are significant. It has the additional advantage of

integrating seamlessly into the customer's current spray operation at relatively minimal cost." Based on spray testing performed to date, SinplexPro has shown efficiency improvements of 60% to 170% over conventional plasma spray guns, when comparing achievable spray rates and deposit efficiencies.

SinplexPro is offered in two configurations. The SinplexPro-180 sprays at an angle of 0° and the SinplexPro-90 sprays at an angle of 90° relative to the position of the rear gun body. Both models are



designed for machine-mount use. Each SinplexPro gun installation requires the Sulzer Metco CPI-500, which ensures proper ignition of the SinplexPro irrespective of the power supply or system controller used. Customers can easily switch between the SinplexPro and other conventional spray guns without reconfiguration.

Sulzer Metco enhances surfaces with coating solutions and equipment. Customers benefit from a uniquely broad range of surface technologies, coating solutions, equipment, materials, services, and specialized machining services and components. The innovative solutions improve performance and increase efficiency and reliability. Sulzer Metco serves industries such as power generation, aviation, automotive, and other specialized markets.

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

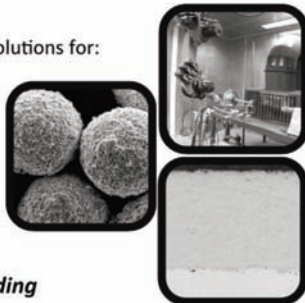
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## Become a Member of the International Thermal Spray Association

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. See pages 14-16.*

*Where is your article?* We encourage you to send articles, news, announcements and information to [spraytime@thermalspray.org](mailto:spraytime@thermalspray.org).



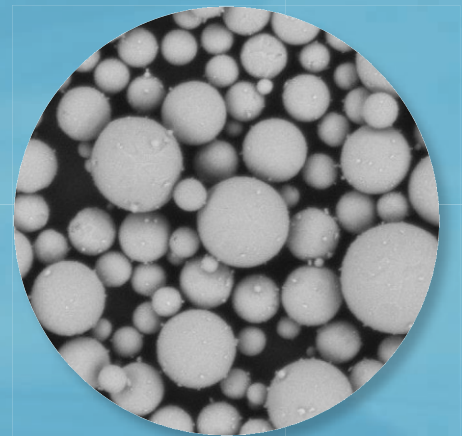
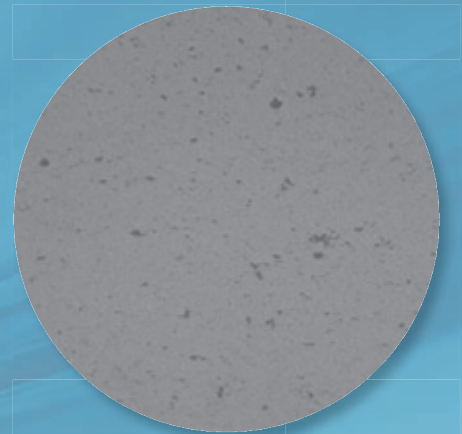
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## ITSA Mission Statement

*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.*

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Mr. Paul Sartor, paul@pmrecovery.com

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www.polymet.us 513.874.3586  
Mr. Bob Unger, runger@polymet.us

**Praxair Surface Technologies** - Concord, NH USA  
www.praxair.com/thermalspray 603.224.9585  
Mr. Richard Thorpe, richard\_thorpe@praxair.com

**Progressive Surface** - Grand Rapids, MI USA  
www.ptihome.com 800.968.0871  
Mr. Bill Barker, wnb@ptihome.com

**Saint-Gobain Ceramic Materials** - Worcester, MA USA  
www.coatingsolutions.saint-gobain.com 508.795.2351  
Mr. Howard Wallar, howard.wallar@saint-gobain.com

**Sulzer Metco (US) Inc.** - Westbury, NY USA  
www.sulzermetco.com 516.334.1300  
Ms. Mae Wang, mae.wang@sulzer.com

**Thermach, Inc.** - Appleton, WI USA  
www.thermach.com 920.779.4299  
Mr. David Lewisen, davelewis@thermach.com

**Thermion, Inc.** - Silverdale, WA USA  
www.thermioninc.com 360.692.6469  
Mr. Dean Hooks, dean@thermioninc.com

## ASSOCIATE MEMBER ORGANIZATIONS

**Advanced Materials and Technology Services, Inc.**  
Simi Valley, CA USA  
www.adv-mts.com - 805.433.5251  
Dr. Robert Gansert, rgansert@adv-mtv.com

**ASM Thermal Spray Society** - Materials Park, OH USA  
http://tss.asminternational.org 440.338.5151  
Randall S. Barnes, randall.barnes@asminternational.org

**State University of New York at Stony Brook**  
Stony Brook, NY USA  
www.ctsr-sunysb.org 631.632.8480  
Prof. Sanjay Sampath, ssampath@ms.cc.sunysb.edu

## SUPPORTING MEMBER SOCIETIES

**DVS, The German Welding Society**  
www.die-verbindungs-spezialisten.de  
Mr. Jens Jerzembeck, jens.jerzembeck@dvs-hg.de

**GTS e.V., The Association of Thermal Sprayers**  
www.gts-ev.de +49.89.31001.5203  
Mr. Werner Kroemmer, werner.kroemmer@gts-ev.de

**IMM, Institute of Materials Malaysia**  
www.iomm.org.my 603.5882.3584  
Mr. Johar Juhari, johar\_juhari@petronas.com.my

**JTSS, Japan Thermal Spray Society**  
+81.6.6722.0096 www.jtss.or.jp  
Mr. Nick Yumiba, jtss@mb8.seikyoku.ne.jp

**MPiF, Metal Powder Industries Federation**  
www.mpif.org 609.452.7700  
Mr. James R. Dale, jdale@mpif.org

**TSCC - Thermal Spraying Committee of China Surface Engineering Association**  
www.chinathermalspray.org +86.10.64882554  
Prof. Huang Xiaou, Xiaou@chinathermalspray.org

Visit us at [www.thermalspray.org](http://www.thermalspray.org)



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



**Chairman Wright**

closely tied to most major advances in thermal spray technology, equipment and materials, industry events, education, standards and market development.

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 [www.thermalspray.org](http://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: **David Wright**, Accuwright Industries, Inc.  
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 Treasurer: **Bill Mosier**, Polymet Corporation  
 Corporate Secretary: **Kathy Dusa**  
**Executive Committee** (above officers plus the following)  
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**Larry Grimenstein**, Nation Coating Systems  
**Dan Hayden**, Hayden Corporation  
**Joseph Stricker**, St. Louis Metallizing Company

### 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](http://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 their headquarters office in Fairport Harbor, OH and 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](http://www.spraytime.org).

### ITSA Headquarters

#### NEW ADDRESS

Post Office Box 1638, Painesville, OH 44077 USA  
 voice/cell: 440.357.5400 • fax: 440.357.5430  
[itsa@thermalspray.org](mailto:itsa@thermalspray.org) • [www.thermalspray.org](http://www.thermalspray.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.

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 along with a multitude of additional benefits.

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 Mexico, Power-Gen, Society of Vacuum Coaters (SVC), TurboMachinery, NACE and TurboExpo).

*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 ITSA headquarters office, phone 440.357.5400 or visit the membership section at [www.thermalspray.org](http://www.thermalspray.org).

**Thermal Spray Jobs listed at  
"For Hire" [www.thermalspray.org](http://www.thermalspray.org)**



North America's largest metal forming, fabricating, welding and finishing event will be held at the North and South Halls of McCormick Place, Chicago, Illinois, USA, November 18-21, 2013. The upcoming event is expected to cover more than 500,000 net square feet and anticipates over 35,000 attendees and 1,200 exhibiting companies.

### Thermal Spray Pavilion

Join the International Thermal Spray Association at the Fabtech Thermal Spray Pavilion this year in Chicago.



*To reserve your booth space*, contact Joe Krall, 800.443.9353 x 297 or email [jkrall@aws.org](mailto:jkrall@aws.org).

*For event information*, visit [www.fabtechexpo.com](http://www.fabtechexpo.com).

## International Thermal Spray Association Welcomes New Member

*Sharkskin Coatings and Surface Technologies* has joined the International Thermal Spray Association.

Sharkskin Coatings and Surface Techniques was formed in 2012 as a natural segway from Maverick Machining's requirement to have some of the parts it produces coated with HVOF technology. This provides the company the ability to offer turnkey parts to their existing customer base as well as nurture new business opportunities.

Currently there are 12 employees dedicated to Sharkskin and the intention is to add more equipment and personnel as business increases.



**Left group, left to right: kneeling – Rob Sylvan, Wayne Martin; standing – Jeremy Clark, Monte DeBuck. Right group, left to right: kneeling – Kip Johnson, Jamie Lozon; standing – Jason Vitek, Allan Granger.**

Sharkskin is the vision of Al Granger, the president of both Maverick Machining and Sharkskin Coatings and Surface Techniques.

*For more information* contact ITSA company representative Shari Webber, [swebber@sscoat.com](mailto:swebber@sscoat.com) and visit website [www.sharkskincoatingsltd.com](http://www.sharkskincoatingsltd.com)

**Where is your article?** We encourage you to send articles, news, announcements and information to [spraytime@thermalspray.org](mailto:spraytime@thermalspray.org).

### 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 19.*

This is ideal for membership exchange between organizations. Contact Kathy Dusa at the headquarters office via email to [itsa@thermalspray.org](mailto:itsa@thermalspray.org)

## Protective Coatings for High Temperature Polymer Composites

by Satish Dixit, Plasma Technology Inc.

High Temperature Polymer Matrix Composites (HTPMC) have gained popularity in high-performance products that need to be lightweight, yet strong enough to take harsh loading conditions such as aerospace components (tails, wings, fuselages, inlet ducts and propellers), boat and scull hulls, bicycle frames and racing car bodies. The new Boeing 787 structure including the wings and fuselage are composed largely of composites. HTPMC has tremendous potential to reduce the weight and cost of military aircraft turbine engines if their durability in service environments can be demonstrated. Aircraft turbine engines operate in exceptionally aggressive environments. The high temperature, the impact of erosive particles combined with the presence of oxidizing environments pose severe operating conditions to the engine assemblies. An important factor for engine durability is damage tolerance to foreign object attack. Besides, turbine engine parts, polymer composites are also subject to impact and erosion

damage on other aircraft structures such as the tails, wings, fuselage etc. HTPMC's are also extensively used in the manufacturing of aircraft structures, such as molds and cure tools, and complex fiber placement mandrels. These are highly expensive large structures which are subject to repetitive impact and erosive/corrosive wear and multiple thermocycling. These components also need protective coatings. Polymers possess excellent tensile strength and stiffness, but they are prone to impact and erosive wear damage. This requires that viable damage protection materials be developed that are compatible with candidate HTPMCs such as Bismaleimide (BMI), Avimid N, carbon reinforced PMR-15, PMR-II-50, AFR-700, and AFRPE.

Composite tooling in the aerospace sector has become an industry standard. Composite tools for large composite structures have many advantages over metal tools due to the light weight, faster heat up cycles, and rapid build rates. However, these tools are not as damage tolerant as metal tools. Incipient impact properties are not as good as metal tools. Companies such as Northrop Grumman and Boeing are interested in increasing the damage tolerance of the composite tools. One Novel approach is to metalize the tooling surface to increase mar resistance, galling, and impact. Another advantage in metalizing the tool surface is thermal conductivity to help with heat up rates and consistent temperatures across the tool surface.

It is often desirable to coat the HTPMC's with a thin layer of hard metal or cermets. For example some HTPMC's are coated with a layer of metal for use in electrical and electronic circuits and equipment. Similarly, HTPMC's are often metalized to increase the components' hardness and wear resistance properties.

Metalizing HTPMC's with metal is difficult, because many traditional metalizing methods rely on high temperatures or electrical conductivity, neither of which will work with HTPMC's. Problems with consistent coverage and poor adhesion of the metal to the HTPMC are common.



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McCormick Place, Chicago, Illinois, USA, November 18-21, 2013. The upcoming event is expected to cover more than 500,000 net square feet and anticipates over 35,000 attendees and 1,200 exhibiting companies.

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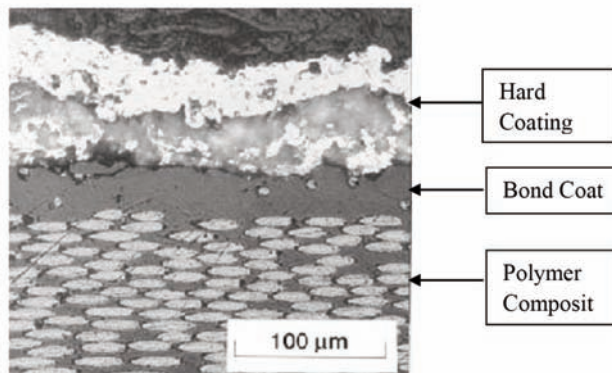


Figure 1. Surface engineering of HTPMC substrates.

One of the approaches is the use thermal spray techniques to deposit metallic conformal coating as the activation layer onto the composite followed by the application of a thermal spray hard coating to yield the properties required. Cross section picture shown above (Figure 1) depicts one of the possible approaches to development of robust surface engineered products for polymer composite tooling.

Continued on page 24.



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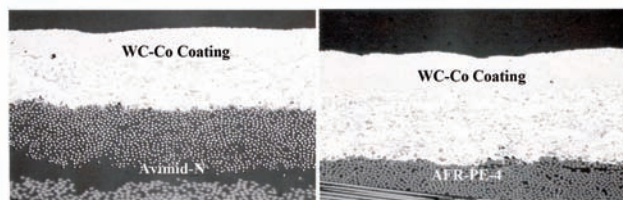
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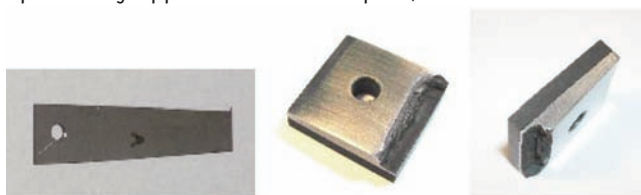
Continued from page 22.

Figure 2 below show the cross section microstructures of two different HTPMC's namely Avimid-N and AFR-PE-4 coated with thermal spray WC-Co wear resistant coatings.



**Figure 2. Cross section microstructure of WC-co coated HTPMC substrates**

Figure 3 demonstrates examples of some thick metallic coatings on composite coupons. These coatings are strongly bonded to the composite substrates and can be built to quarter inch or more thickness with drilling and machining capability. Ability to build thicker protective metallic or cermet coatings with good machinability opens up to many applications in aerospace, and automobiles.



**Figure 3. Machined thick metallic coating on HTPMC substrates.**

Also shown below in Figure 4 is a model glass filled fiber-glass aircraft coated with thermal spray aluminum coating.



**Figure 4. Model aircraft with coatings.**

**For more information**, contact author Satish Dixit via email [sdixit@ptise.com](mailto:sdixit@ptise.com)

**Where is your article?** We encourage you to send articles, news, announcements and information to [spraytime@thermalspray.org](mailto:spraytime@thermalspray.org).

## Abakan sub MesoCoat Wins First Prize

Abakan Inc. is delighted to announce that the Wall Street Journal released today results of its global 2012 Technology Innovation Awards, with MesoCoat winning top prize for Manufacturing Technology.

MesoCoat's CermaClad technology was selected because it sets a new, hard-to-meet benchmark in productivity, performance, and cost in the metal coating and cladding industry, offering up to two orders of magnitude improvement over current state-of-the-art cladding technologies. The primary application of Abakan's CermaClad technology is cladding pipes used in extreme applications such as the production and transportation of corrosive oil; transportation of highly abrasive oil sand and mining slurries; transportation of other corrosive and abrasive oil, gas, chemicals, and acids; pressure vessels, reactors, and tanks used in nuclear, desalination, oil and gas, chemical, and other industries; as well as several other applications where the operating environments are extreme and challenging.

"We are very pleased to be recognized by The Wall Street Journal as the top global innovator in manufacturing for 2012. This, of course, follows our being ranked by Forbes as the number-one most promising material science company in the U.S. in 2011," stated Robert Miller, CEO of Abakan. "Our CermaClad technology provides a faster, better, and more cost-effective way to apply protective coatings on metals that enable the metal assets to last up to 10 times longer than their current design life."

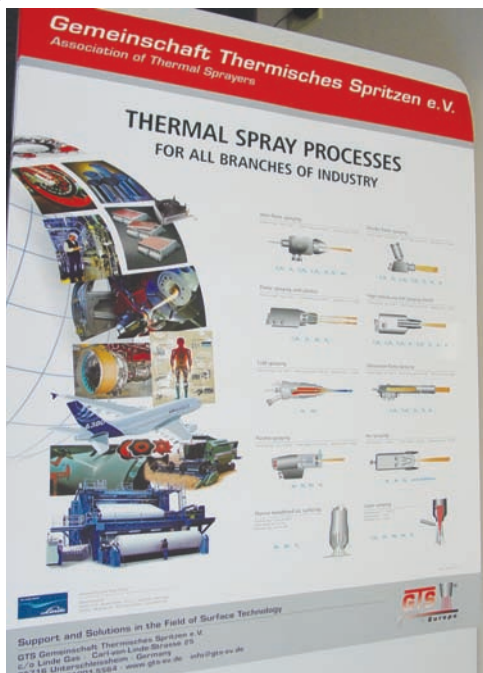
Abakan intends to establish large four-line clad pipe manufacturing facilities in the U.S., Brazil, Canada, the Middle East, and Asia that can each produce approximately 100 kilometers of corrosion- and wear-resistant clad pipes. The Company is currently completing the construction and installation of its first clad pipe manufacturing facility in Ohio, which, once operational in the first quarter of 2013, is anticipated to be the largest such facility in the U.S., with an annual production capacity of 25-30 kilometers of clad pipe.

"Our CermaClad, high-speed, large-area metal cladding technology has the potential to cause a paradigm shift in the industry," continued Mr. Miller. "Our goal is to make metal assets last up to 10 times longer, reducing the huge environmental footprint that is left behind when these metals do not last their design life. There are 2.4 tonnes of CO2 emission for every tonne of steel that is manufactured; imagine the positive environmental impact we can make by making this steel last up to 10 times longer."

About Abakan Inc.: Abakan Inc. (ABKI) is the parent company of Mesocoat Inc, and invests in additional companies that have developed transformational technologies on the cusp of commercialization. Abakan is the largest shareholder in MesoCoat Inc, and has a significant position in Powdermet Inc., each of which is a nanotechnology material science company involved in technology development and commercialization. MesoCoat is focused on metal asset protection and life extension by

Continued on page 26.





### 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](mailto:itsa@thermalspray.org)

### Scholarship Opportunity



Since 1991, the **International Thermal Spray Scholarship Program** has contributed to the growth of the thermal spray community. ITSA offers up to three Graduate Scholarships worth

**\$2,000.00 each.**

**Applications accepted April 15 through June 30 ONLY.**

Please visit [www.thermalspray.org/scholarship](http://www.thermalspray.org/scholarship)

### Become a Member of the International Thermal Spray Association

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**ITSA members invite your company to join us in this endeavor. See pages 18-19.**

### Journal of Thermal Spray Technology®

A publication of the **ASM Thermal Spray Society**  
**Simplified Model for Description of HVOF NiCr Coating Properties Through Experimental Design and Diagnostic Measurements**

**D. Zois, T. Wentz, R. Day, S. Sampath, and C.M. Weyant**

The use of factorial design in process parameter development allowed determination of the contribution of key process variables, such as flame energy (combustion pressure and  $O_2/F$ ), spray distance, and feed rate, on in-flight particle properties. The significance of each parameter was used to construct a simple model which enabled the description of particles' temperature and velocity. Particles with velocities ranging by as much as 300 m/s and temperatures ranging up to 350°C were used to produce an array of coatings on an in situ curvature sensor enabling the determination of the evolving—during spraying—and residual stress at the end of the process, correspondingly. These diverse particle states combined with the flame impingement on the substrate, resulted in coatings of similar thickness, but significantly different stress states. Real time evolving stresses—during deposition—and coating properties such as, microhardness, modulus, and corrosion behavior were correlated to particle in-flight properties and, via the use of the introduced model, to spray parameters.

**Read the entire article in the March 2013 Issue**

Visit [www.asminternational.org/tss](http://www.asminternational.org/tss)

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### Manufacturer's Representative

**Supersonic Spray Technologies**, a division of CenterLine (Windsor) Limited, is seeking professional, independent, technical sales representation in the **Northeast USA** and **Southeast USA** regions for its Cold Spray coating equipment and services.

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All interested candidates should reply in confidence to [info@cntrline.com](mailto:info@cntrline.com).



**CenterLine (Windsor) Limited**  
**Supersonic Spray Technologies Division**  
655 Morton Drive, Windsor ON N9J 3T9  
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Continued from page 24.

providing advanced wear and corrosion solutions, while Powdermet is focused on metal formulations as well as advanced energy management solutions. MesoCoat was recently recognized by Forbes as one of 'The Most Promising American Companies' and was the highest ranked material science and nanotechnology company. MesoCoat's technologies have been recipient of four prestigious R&D 100 awards, a Technology Innovation Program Award (TIP) for 100 year life coatings by the National Institute of Standards and Technology (NIST), two NorTech Innovation Awards for breakthrough materials and surface engineering solutions, and several other federal and state grants and awards. Powdermet is a nationally recognized nanotechnology and advanced materials research and development organization that has won approximately 100 federal and state awards, along with several technology innovation awards like R&D 100 and the NorTech Innovation Award.

For more information visit [www.mesocoat.com](http://www.mesocoat.com).

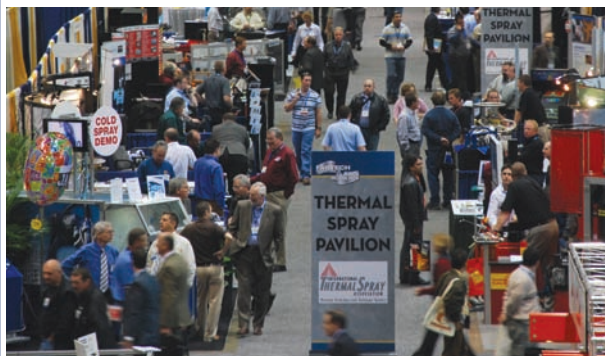
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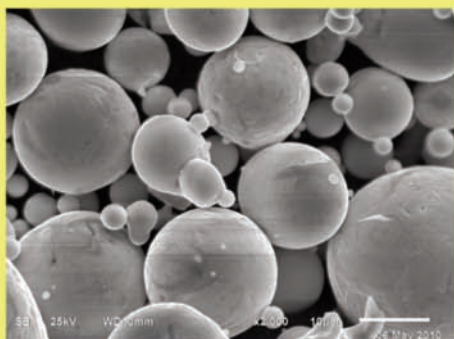
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INDUSTRY NEWS

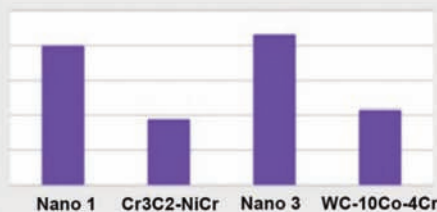
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**6-8 Goregon, Mumbai, India** *Power-Gen India and Central Asia* - visit [www.power-genindia.com](http://www.power-genindia.com)

**6-9 Houston, TX USA** *OTC2013 Offshore Technology Conference* - visit [otcnet.org/2013](http://otcnet.org/2013)

**7-9 Monterrey, Mexico** *5th Fabtech Mexico* - visit [fabtechmexico.com](http://fabtechmexico.com)

**13-15 Busan, Republic of Korea** *International Thermal Spray Conference and Exposition ITSC2013* - visit [www.asminternational.org/itsc](http://www.asminternational.org/itsc)

### JUNE 2013

**3-7 San Antonio, TX USA** *Turbo Expo* - visit [www.turboexpo.org](http://www.turboexpo.org)

**4-6 Edmonton, Alberta Canada** *Western Manufacturing Technology Show and Weld Expo Canada* - visit [www.wmts.ca](http://www.wmts.ca)

**4-6 Vienna, Austria** *Power-Gen Europe* - visit [www.power-geneurope.com](http://www.power-geneurope.com)

**4-6 New Orleans, LA USA** *Bring On The Heat 2013* - visit [www.nace.org](http://www.nace.org)

**4-6 June Barcelona, Spain** *2nd Cold Gas Spray* - University of Barcelona, [www.cptub.com/images/PDF/programme\\_summer%20school.pdf](http://www.cptub.com/images/PDF/programme_summer%20school.pdf)

**June 6-8 Ogden, UT USA** *International Thermal Spray Association Annual Membership Meeting* - email [itsa@thermalspray.org](mailto:itsa@thermalspray.org)

**24-26 Newport News, VA USA** *Mega Rust 2013: Naval Corrosion Conference* - visit [www.navalengineers.org](http://www.navalengineers.org)

**25-28 Moscow, Russia** *5th Russia Essen Welding & Cutting with Joining, Cutting, Surfacing* - visit [www.russia-essen-welding-cutting.com](http://www.russia-essen-welding-cutting.com)

### SEPTEMBER 2013

**15-18 San Diego, CA USA** *9th International Corrosion Solution* - [www.aticorrosionconference.com](http://www.aticorrosionconference.com)

**16-21 Essen, Germany** *Int'l Trade Fair Joining Cutting Surfacing* - visit [www.schweissen-schneiden.com](http://www.schweissen-schneiden.com)

**24-26 São Paulo, Brazil** *Power-Gen Brazil* - [www.power-genbrasil.com](http://www.power-genbrasil.com)

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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. See pages 18-19.*

**30 SEP-30 OCT Hamburg, Germany** *ASME 2013 Turbine Blade Tip Symposium & Course Week* - email [igtiprogram@asme.org](mailto:igtiprogram@asme.org)

### OCTOBER 2013

**1-4 São Paulo, Brazil** *Brazil Welding Show and Congress* - visit [www.brazil-welding-show.com](http://www.brazil-welding-show.com)

**2-4 Bangkok, Thailand** *Power-Gen Asia* - visit [www.power-genasia.com](http://www.power-genasia.com)

**27-31 Montreal, Quebec, Canada** *Materials Science and Technology Conference and Exposition (MS&T) 2013* - visit [www.asminternational.org/events](http://www.asminternational.org/events)

### NOVEMBER 2013

**12-14 Orlando, FL USA** *Power-Gen 2013* - visit [www.power-gen.com](http://www.power-gen.com)

**TBD Chicago, IL USA** *FABTECH with a Thermal Spray Pavilion and Conference* - visit [www.fabtechexpo.com](http://www.fabtechexpo.com)



### 2014

#### MARCH 2014

**9-13 San Antonio, TX USA** *Corrosion 2014* - visit [www.nace.org](http://www.nace.org)

**17-19 Cape Town, South Africa** *Power-Gen Africa* - visit [www.powergenafrika.com](http://www.powergenafrika.com)

#### MAY 2014

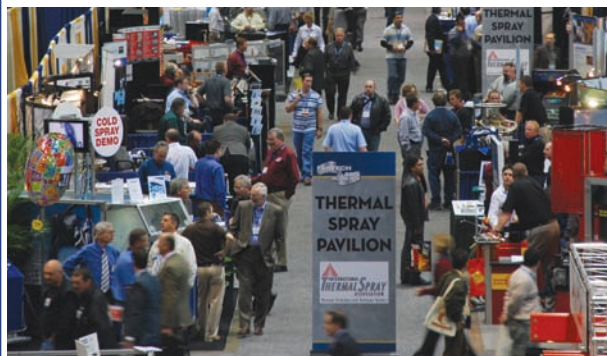
**3-8 Chicago, IL USA** *57th SVC Annual Technical Conference* - visit [www.svc.org](http://www.svc.org)

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



North America's largest metal forming, fabricating, welding and finishing event will be held at the North and South Halls of McCormick Place, Chicago, Illinois, USA, November 18-21, 2013. The upcoming event is expected to cover more than 500,000 net square feet and anticipates over 35,000 attendees and 1,200 exhibiting companies.

### Thermal Spray Pavilion



Join the International Thermal Spray Association at the Fabtech Thermal Spray Pavilion this year in Chicago.

*To reserve your booth space*, contact Joe Krall, 800.443.9353 x 297 or email [jkrall@aws.org](mailto:jkrall@aws.org).

*For event information*, visit [www.fabtechexpo.com](http://www.fabtechexpo.com).



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Following the success of the first ever Bring on the Heat Conference, this important event on high-temperature coatings will be held in the historic city of New Orleans. This event will feature three days of informative programming with some of the industry's leaders in fireproofing, high-temperature, and other protective coatings. The technical program will focus on the following topics:

- **Insulation**
- **Thermal Spray Aluminum**
- **Corrosion Under Insulation**
- **Passive Fire Protection**

## **Register Today!**

Register by **April 30 to save** on your registration fee.

For more information and to register visit **[www.nace.org/both2013](http://www.nace.org/both2013)**

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THE CORROSION SOCIETY



## In Memoriam

### The Passing of a Father of Thermal Spray Technology -- Donald MacKelvie Yenni

The primary inventor of plasma spray deposition, **Donald MacKelvie Yenni**, FASM, TS HoF, died February 14, 2013 in Ann Arbor, Michigan, at 95 years old. His most significant contribution to the field of thermal spray was the invention with R. M. Gage and O. H. Nestor of the powder fed plasma arc spray torch (U.S. Patent 3,016,447). Don also invented wire fed plasma spray torches (U.S. Patents 2,847,555 and 2,982,845). These inventions and related inventions were used by Union Carbide (now Praxair Surface Technologies) to develop a leading worldwide coating service business and licensed to Metco and others who manufactured and sold plasma spray torches around the world. Yenni's inventions included both internal and external powder feeding systems. These included an internal powder injection system that produces uniquely clean, uniform dense coatings that was, and still is, only used by Praxair in their service business.

In addition to the above, he had many other inventions and patents. Only a few examples will be mentioned here. Yenni designed and built a wide variety of equipment to facilitate thermal spray. These included a highly sophisticated machine to uniformly coat complex shapes such as turbine blades that was the first to make their coating feasible on a high volume production basis. It was used to coat blades for the major gas turbine manufacturers

and licensed to one. Yenni also developed a method to produce very large monolayer sheets of metal matrix fiber reinforced composites that could be used to produce gas turbine fan blades and other components. He contributed many other thermal spray product and material innovations including the use of coatings on spark plugs and electrodes (U.S. Patent 3,075,066) and chromia-nichrome coatings (U.S. Patent 3,279,939).



Don was a very quiet, modest man of very high integrity. He served as an outstanding mentor for several generations of young engineers and a highly valued expert consultant and colleague for his peers. His innate understanding of the thermal spray process and associated engineering technologies was passed on and fueled the creativity of others. His impact on the thermal spray industry was much broader than he would ever admit to. A member of ASM International for over 45 years, Yenni was a Fellow of ASM and inducted into the Thermal Spray Hall of Fame in 2006.

Don was born May 19, 1917 in Louisiana, lived for a time in Alabama and went to high school in New York City. He earned a BS in metallurgical engineering at the University of Michigan in Ann Arbor in 1939. Don joined Union Carbide Corporation near Buffalo, New York and subsequently moved to Indianapolis, Indiana, with UCC, retiring in 1976. He died only two months after his wife of 72 years passed away.



#### 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 June 30 ONLY.** Visit [www.thermalspray.org](http://www.thermalspray.org) scholarship area for details.

#### 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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Genie Products, Inc. ....5  
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HAI .....11  
Hunter Chemical .....14  
Lineage Alloys .....14  
Metallisation .....13  
Metallizing Equipment Co.....23

Nation Coating Systems .....12  
Polymet Corporation .....3  
Praxair Surface Technologies.....15  
Progressive Surface .....7  
Saint-Gobain Coating Solutions..17  
Schweissen & Schneiden .....35  
Sulzer .....36  
Thermach, Inc. ....10  
TurboExpo.....29

## Wall Colmonoy Corp. (USA) Announces Director of Operations for Alloy Products



**Edgardo Garcia** joins Wall Colmonoy as Director of Operations for the Alloy Products Group in Los Lunas, New Mexico.

Mr. Garcia is responsible for process and lean manufacturing improvements, new product developments, budgeting and financial performance for reaching departmental goals. He has

an extensive background in inventory control, materials management, MRP systems, Lean Manufacturing and Quality Management ISO 9000.

Mr. Garcia holds a BSME from the University of UABC and completed Six Sigma Black Belt Certification.

About Wall Colmonoy: Wall Colmonoy is a global materials engineering group of companies engaged in the manufacturing of surfacing and brazing products, castings, coatings, and engineered components across aerospace, automotive, oil & gas, mining, energy and other industrial sectors.



Known for our unique proven way of creating superior performing alloys that extend the useful life of engineered components, we pride ourselves on long-term strategic customer collaboration that produces value-added ideas and creative solutions.

Combining over 75 years of engineering technology with a progressive, visionary outlook, Wall Colmonoy offers customers trusted, customized expertise that results in smart innovation and shared growth.

**For more information**, visit [www.wallcolmonoy.com](http://www.wallcolmonoy.com), <http://www.facebook.com/wallcolmonoy> and [www.twitter.com/wallcolmonoy](http://www.twitter.com/wallcolmonoy).

## NACE International Announces New Director of Education



NACE International, The Corrosion Society, is pleased to announce the appointment of **Matthew M. Miller** as Director of Education.

Mr. Miller joins NACE International after 12 years with SAE International where he served as Director of the SAE Foundation and Pre-Professional Programs. Mr. Miller was responsible for setting strategic direction and overseeing operations and fundraising activities of the SAE Foundation and its related entities, including the award winning A World In Motion (AWIM) and Collegiate Design Series programs. His areas of expertise include strategic planning, development and administration of education programs, program management, improving operational efficiencies, and working with volunteer leaders and members.

"Matt's leadership and fresh perspective will be an asset

to NACE educational programming," said Bob Chalker, NACE Executive Director. "His wealth of knowledge and experience could not be a better fit for our organization as we strive to meet the growing education needs of corrosion professionals worldwide."

"I'm excited to join an organization with such strong education programs, an actively involved membership and extensive global reach," said Miller. "I look forward to working directly with members, stakeholders, and NACE staff to further the organization's vision for making corrosion education accessible globally."

Miller holds a Master of Science degree in Nonprofit Management from Robert Morris University and in Instructional Technology from Duquesne University. He will be working from the NACE International Headquarters office in Houston, Texas.

About NACE International: Founded in 1943, NACE International, The Corrosion Society, serves 30,000 members in 130 countries. Based in Houston, Texas, with offices in the U.S., China, Malaysia and Saudi Arabia, the organization reaches all industries impacted by corrosion and offers the most specified technical training and certification programs, conferences, industry standards, reports, publications, and software to prevent and mitigate corrosion. NACE International provides members with career and business building resources, government relations and public awareness support, and research and education to support the pursuit of global corrosion control solutions.

**For more information**, visit [www.nace.org](http://www.nace.org)

## NACE International Institute Names Helena Seelinger as its New Executive Director

The NACE International Institute announced today the appointment of **Helena M. Seelinger** as its new Executive Director. Seelinger has been a staff member of NACE International since 1986 where she has served in multiple leadership roles within the organization including service as interim executive director of NACE in 2005; Director of Education during the organization's initial international expansion and global training partnerships; and currently serves as Senior Director of Membership and Government Relations.

The NACE International Institute was formed in 2012 to establish an organization focused on certification activities and further advancing the corrosion profession. The Institute will support growth and quality of certification for the corrosion control field, improve the business conditions of the industry, and advance knowledge through certification programs that promote public safety, protect the environment and reduce the economic impact of corrosion. The Institute will also lead NACE's certification programs toward compliance with the ISO standard for certification bodies (ISO17204).

"Helena has provided outstanding leadership and demonstrated a real passion for the successful launch of the Institute," said Bob Chalker, NACE Executive Director. "I



could not be happier with the work she has done to this point and I am confident she will provide the leadership needed to make the Institute a success."

The NACE International Institute will initially focus on meeting industry needs for workforce certification programs, pursuing global consistency of certification requirements, raising industry and public awareness of the purpose and benefits of certification programs, and supporting employment of certified corrosion control professionals. Over time, the Institute will continue to draw more activities into its operations to serve stakeholders based on changing industry needs.

Seelinger will be a non-voting, ex-officio member of the Institute's Board of Directors, responsible for providing strategic direction and leadership to the Institute's day-to-day operations, and will maintain oversight of NACE International's technical activities, membership, public relations and public affairs activities.

"I am grateful to be given an opportunity to support the new Institute and its future activities, in particular directly connecting personnel certification programs to industry needs," said Seelinger.

About the NACE International Institute: The NACE International Institute was formed in 2012 to establish an organization focused on certification activities and further advancing the corrosion profession. The Institute will support growth and quality of certification for the corrosion control field, improve the business conditions of the industry, and advance knowledge through certification programs that promote public safety, protect the environment and reduce the economic impact of corrosion.

For more information, visit [www.nace.org](http://www.nace.org)

### **NanoSteel Names Harald Lemke Vice President and General Manager of Powder Metallurgy**

The NanoSteel® Company, a leader in nano-structured steel materials design, today announced that **Harald Lemke** has joined the company as vice president and general manager of powder metallurgy.

In this new role, Lemke will lead the commercialization of NanoSteel's alloys into the powder metallurgy industry utilizing both the recent breakthrough in AHSS and the company's established coatings products. Lemke will focus on high hardness, wear and yield strength applications that also require ductility traditionally served by specialty and hard materials. Initial target industries for the company's PM business will be oil and gas, power generation and mining.

Lemke's leadership experience spans a broad range of advanced materials including metals, ceramics, plastics and composites. Across this spectrum of businesses, he established a track record of delivering customer value through the optimization of materials design, manufacture and component forming processing.

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to [spraytime@thermalspray.org](mailto:spraytime@thermalspray.org)***

"There is significant opportunity to leverage our breakthrough in nano-structured sheet steel into the cladding and near-net shape parts businesses of powder metallurgy," said David Paratore, president and CEO. "Harald's proven leadership in growing a number of advanced materials categories makes him the ideal choice to build this business."

"NanoSteel's combination of exceptional performance capabilities and cost competitiveness makes the company uniquely positioned to meet customer requirements in increasingly more demanding industrial environments," Lemke said. "With NanoSteel's broad portfolio of products, we have the opportunity to extend steel's footprint outside of traditional metal performance boundaries into new markets and applications."

Lemke was most recently the global vice president of materials marketing at the \$650M coatings division of Sulzer-Metco where he raised top and bottom line growth. Previously, Lemke was business development manager for Kennametal's advanced materials division and chief operating officer and general manager of Powdermet, where he scaled a metal and metal matrix powder start-up business. Lemke has also held key positions at Conoco-Phillips, Air Liquide and Nalco-Exxon Energy Chemicals L.P.

**For more information**, visit [www.nanosteelco.com](http://www.nanosteelco.com) or follow us on Twitter @NanoSteelCo.

### **CenterLine (Windsor) Limited Appoints Corporate Account Manager**

Centerline (Windsor) Ltd. is very pleased to welcome the addition of Mr. **Greg Van Dyke** to Centerline's sales team as an Account Manager specializing in resistance welding consumables and automation component products.

Greg has over 10 years of resistance welding experience in sales and service and is a college graduate with a Marketing diploma majoring in International Marketing.

Among his career highlights, Greg has previously held sales and customer service positions with Resistance Welding Products Ltd., and the Tuffaloy Group of companies.

CenterLine is certain that Greg's proven resistance welding knowledge and extensive industry contacts will provide the highest possible level of support to our customers.

Centerline (Windsor) Ltd. is a recognized industry leader in the design, manufacture and supply of a full range of products and services satisfying welding, metalforming and cold spray applications for the automotive, mass transit, aerospace and defense industries. With over 55 years in business, Centerline is continuing to develop advanced technologies and processes to assist its customers in maintain their competitive advantage.

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



## Peter Heinrich Retires

Dear thermal spray friends,  
After 13,726 fantastic days at Linde, full of fun and variety, my official working life came to an end on 31 March 2013.

I am putting pen to paper now to say thank you to all the thermal spray enthusiasts I had the pleasure of getting to know.

In the course of these years, you were important partners for me in the field of thermal spraying. And I can safely say that I wouldn't have wanted to miss any of those 13,726 days because it really was a great time for me.

Now at the start of a "new chapter", I am planning to devote plenty of time to fitness and creativity and to spend lots of enjoyable hours with my wife.

Thank you ever so much and all the very best.

Yours

**Peter Heinrich**

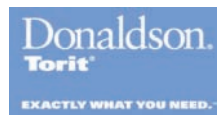
Germering, Germany, April 2013



who assist clients with their equipment, material and technical requirements. Metallisation is an owner managed company and has grown its turnover by 75 per cent since 2009, both domestically and through exporting to over 72 countries.

Commenting on his appointment, Pete says: "The role of Finance Director at Metallisation really appealed to me. The forward thinking of the Directors and the growth strategy for the next five years is very exciting. It's great to be a part of a business that wants to grow and continually develop its relationships with its customers. I'm looking forward to helping Metallisation achieves its global growth targets."

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



## Donaldson Torit Announces Jeff Abelson as Program Manager

Donaldson Torit is pleased to announce **Jeff Abelson** as the Industrial Air Filtration Program Manager.

In this new role Jeff provides leadership and oversight in the new product development process creating platform and breakthrough technologies.

Jeff has been an employee of Donaldson for the past 12 years. Jeff will continue to get involved in major customer proposals and projects.

Previous to his current role, Jeff was the Technical Services Manager, worked in developing new applications for Donaldson's nanofiber technology and served as a Torit Application Engineer. Jeff will continue to be an active member of the International Thermal Spray Association.

*For more information*, visit [www.donaldsontorit.com](http://www.donaldsontorit.com) or email [jeff.abelson@donaldson.com](mailto:jeff.abelson@donaldson.com)



## Metallisation Appoints New Finance Director

Metallisation Ltd, a global leader in the supply of thermal spray equipment, has appointed **Pete Silcox** as its new Finance Director.

Pete is the latest member to join the team of Directors at Metallisation's United Kingdom manufacturing site and follows the appointments last October of Stuart Milton to Sales Director and Jon Erskine as Operations Director. The team of Directors also includes Managing Director, Terry Lester, and Deputy



Managing Directors, Rob Hill and Steve Barker, who all continue to be involved in the strategic development of the business.

Before joining Metallisation Pete was Finance Director at Craven Dunnill, a ceramic tile manufacturer and distributor in Bridgnorth.

In his new role, Pete will head up the Finance Team and be responsible for the financial management of the company, as well as liaison with Metallisation's auditors, banks and insurance companies. Pete is also planning to represent the company at various events organised by The Black Country Chamber of Commerce.

Metallisation continues to buck the economic trend by employing a growing workforce, with around 45 people currently working at its Dudley factory. It is represented around the world by a network of agents and distributors,

### Finishing Online Website Now Includes Thermal Spray

The website "Finishing Online" ([www.finishingonline.com](http://www.finishingonline.com)) now includes "thermal spray" in their "industries" area. Go to their website to register and get your free listing.

### LinkedIn

#### Has 1700+ Member Thermal Spray Group

The business social network "LinkedIn" has a group titled "Thermal Spray Coating" **currently with 1700+ members**. Visit [www.linkedin.com](http://www.linkedin.com), join the network and then join the group.





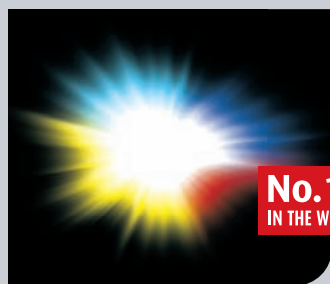
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