

Volume 19, Number 3

Center for Thermal Spray Research at Stony Brook Alumni Reunion



The Center for Thermal Spray Research (CTSR) at Stony Brook New York held an alumni reunion in conjunction with its annual consortium meeting. Over 35 alumni participated spanning several generations of graduates from the 1970s to the present.

The day long session comprised of lab visits followed by an afternoon of topical presentations by several of our distinguished alumni. Many of the alumni continue to be involved in thermal spray or materials technologies and alumni were able to share their experiences with current, students, post-docs and faculty members. CTSR founding director Professor Herbert Herman chaired the alumni technical program. The event concluded with a dinner with many of the families joining in on the festivities.

CTSR formerly the Thermal Spray Laboratory was founded by Professor Herman in the late 1970s and has been the focal point of thermal spray research within the United States. CTSR was a formed through a successful National Science Foundation Center grant in 1996 with a goal to bring together an interdisciplinary group of researchers addressing fundamental problems associated with thermal spray science and technology. Following the eleven year NSF award, CTSR has now established itself as a selfsustaining industry-university collaborative research center under the the auspices of the Consortium for Thermal Spray Technology operated out of Stony Brook.

For more information visit www.stonybrook.edu/ctsr



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 scholarship area for details.





Published by **International Thermal Spray Association** A Standing Committee of the American Welding Society

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

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Bay State Model CP-160 Plasma Control Console

Bay State Surface Technologies is pleased to introduce the new CP-160 plasma spray control console. The

model CP-160 is the first significant upgrade to its widely used CP-120 control console. Major improvements include larger capacity flow meters, stainless steel gas lines, industry standard gas connections, and a selector switch for the popular external HFM-600 Hydrogen gas module. Bay State was able to incorporate all of these upgrades without changing the selling price, continuing to make it the most cost effective plasma spray solution in the industry. Used with power supplies ranging from 30-80 Kw, the model CP-160 can be used to spray virtually any ceramic, metallic, or carbide powder.

Bay State Surface Technologies has been manufacturing affordable thermal spray equipment and materials for over 40 years. Based in Auburn, Massachusetts USA, Bay State is a subsidiary of Aimtek, Inc., a leading global manufacturer of aerospace grade welding and brazing alloys.

For more information, visit www.baystatesurfacetech.com or email Jay Kapur via jkapur@aimtek.com

See advertisment page 20.



Ardleigh Minerals Wins 2012 NEO Success Award For Growth

Ardleigh Minerals, Inc., an International Thermal Spray Association Member, has earned a 2012 NEO Success Award from



INSIDE BUSINESS Magazine for 16% growth in the number of employees, according to Ernest Q. Petrey, Ardleigh Minerals' president and CEO.

"We have experienced outstanding growth in recycling especially in support of the thermal spray industry," said Petrey. "We now have facilities in Charlotte, Cleveland, Houston and Phoenix."

The NEO Success Awards program was established in 1995 as a way to showcase the success of business in the Northeast Ohio Region. It reflects the region's determination to expand and revitalize its economic status. The award is unique because it combines the measurement of business success in terms of sales, growth and profitability.

Since its inception, Ardleigh Minerals has been specializing in the recycling of raw materials generated in thermal spray preparation and processing, including cold, flame, HVOF, plasma and wire arc spraying. Ardleigh proudly serves the aerospace, automotive, catalytic, electronic, and thermal spray industries.

Ardleigh provides the maximum economic recovery to each facility, and helps companies achieve their ISO 14001 requirements.

For more information, contact Ardleigh Minerals at 216.921.6500 or visit www.ardleigh.net

See advertisement page 12.



• Green Belting Industries

THERMAL SPRAY TAPES

High performance masking tapes for the Thermal Spray Industry, capable of withstanding many of the most aggressive applications are manufactured by GBI in a complete line, all available in various widths.



Thermal Spray Pavilion



Join the International Thermal Spray Association at the Fabtech Thermal Spray Pavilion this year in Las Vegas, Nevada November 12-14, 2012.



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Finishing Online Website Now Includes Thermal Spray

The website "Finishing Online" (www.finishingonline.com) now includes "thermal spray" in an "industries" area. Everyone is eligible for a basic free listing for one year. Go to their website to register and get your free listing.

LinkedIn Has Thermal Spray Group

The business social network "LinkedIn" has a group titled "Thermal Spray Coating" *currently with 431 members* and some discussions.

If you are interested, please visit www.linkedin.com and join the network and then join the group.

Genie Products is an ISO 9001: 2008 registered company.

PO Box 1028, Rosman, NC 28772

Thermal Spray Technology

Highlighted At Fabtech Show Las Vegas Convention Center November 12-14, 2012

Thermal Spray Basics: Putting Coatings To Work

Free Tutorial • 1:00 - 5:00 PM Monday, November 12, 2012 Registration Code: W30

Thermal Spray Technologies: High Performance Surfaces Conference

17 Speaker Presentations • 9:00 AM - 5:00 PM Tuesday, November 13, 2012 Registration Code: W29

Thermal Spray Pavilion Exhibitors

November 12-14, 2012 • Visit Aisle 2400 North

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"Clean Air Rocks" Video Takes Virtual Tour Through A Dust Collector

Camfil Farr APC Partners with ASU Center for Digital Initiatives on 3D Animated Video.



Camfil Farr Air Pollution Control (APC) has partnered with Arkansas State University's Center for Digital Initiatives (CDI) to create a 3D animated video titled "Clean Air Rocks" (http://www.camfilfarrapc.com/videos/77). For anyone who has wondered how an industrial dust collector really works, the 3-1/2 minute video answers this question by taking viewers on a virtual tour through the inside of a Camfil Farr APC Gold Series[®] dust collector.





According to Dr. Alyson Gill, director of the CDI at ASU, "This is the first time we have partnered with local industry on a sponsored project, and it was a great collaboration. We

worked hand-in-hand with Camfil Farr APC's in-house production team to develop 3D modeling and animation to help realize their creative vision." The CDI, whose mission is to promote ASU's position as a leader in the creation of virtual interactive environments, has done numerous projects for the University as well as for state agencies and other government entities.

Entertaining and informative, the animated video takes viewers on a 3D tour alongside dust particles as they travel from the workplace into the dust collector and through its filtration system to ultimately deliver clean air back to the factory.

Camfil Farr APC president Lee Morgan states: "We were very excited to collaborate with ASU on this program and were impressed by the power of 3D visualization as an industrial communications tool. We urge other companies to support and partner with their local universities on technical projects like this one."

To view the "Clean Air Rocks" video, go to: http://www.camfilfarrapc.com/videos/77.

For general information, phone 800.479.6801 or 870.933.8048; e-mail filterman@farrapc.com; web www.farrapc.com.

CastoJet® CJK5 HVOF Thermal Spray System From Eutectic



Eutectic Corporation, announces the introduction of the CastoJet[®] CJK5 system which represents the latest development in kerosene fuelled high velocity oxy fuel (HVOF) spray technology. Features include a PC control panel and a touch screen interface for user friendly intuitive operation. Parameters can be stored in the PC and

recalled for accurate processing of repetative spray jobs. Start up and shutdown is quick and smooth being achieved in one minute or less, providing optimum fuel and powder conservation. The powder feeder has mass flow controlled carrier gas and closed loop motor control for reliable powder feeding generating a consistant coating quality. CJK5 ignition can use kerosene, hydrogen, propylene or



propane fuels. Coatings can be compressively stressed ,accomodating a thick coating without the fear of spalling. The result is a high quality, compact, economical and easy to use HVOF system that produces a high bond strength, low porosity coating. Ideal for high volume spray production. To accompany this new HVOF system Eutectic is offering a program of specially designed HVOF powder



high abrasion and corrosion resistance which extend the service life of critical components. Typical applications include oil/gas ball and gate valves, hydraulic rams, aircraft landing gear, suspension components, automotive valves, paper rolls, pump shafts and many others. This expansion of

alloys. When used with the CJK5, these alloys provide high density coatings with excellent deposit efficiency and low oxide levels. The combination provides



the company's line of thermal spray equipment furthers the implementation of its strategy of being a complete source of wear protection and fusion solutions to its customers.

Eutectic is a recognized leader in wear and fusion technology resulting from over 100 years of providing field tested solutions to major companies in a wide range of industries including cement, power generation, oil and gas, waste and recycling, mining and steel. About Eutectic Corporation

Eutectic Corporation, headquartered in Menomonee Falls, Wisconsin, is part of the MEC Group. Eutectic has manufacturing operations in Menomonee Falls and Milwaukee, Wisconsin and a sales network serving North America and Latin America. Eutectic's business is complimented by affiliate companies within the MEC Group that are located throughout the world.

For more information, including the latest product and technology offerings, visit www.eutecticusa.com.

About the MEC Group

MEC Holding GmbH (the MEC Group) is the holding company comprised of three operating divisions providing specialized products and services for industrial wear protection and fusion, steel cutting, and medical instrument development and manufacture. The MEC Group operates globally and is headquartered in Schwalbach, Germany.

For more information on the MEC Group, visit websites www.mec holding.com, www.castolin.com, www.messer cs.de, and www.bit instruments.com

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Thermal Spray Powders

Whether your finished part requires low, medium or high degrees of hardness, machinability, impact and abrasion or corrosion resistance, we have an alloy to meet your needs.



Alloy	С	CR	FE	NI	В	SI	CU	МО	со	Rc. Hardness	MELT TEMP (F°)
PF20	.03		1.5	BAL	1.5	2.5				12-20	2000
PF25	.06		1.5	BAL	1.5	3.5				20-30	1975
PF35	.05	10.5	2.0	BAL	2.0	3.3				32-40	1925
PF40	.30	7.5	1.5	BAL	1.4	4.0				40-48	1925
PF50	.65	14.0	4.2	BAL	2.8	3.8				48-54	1900
PF60	.90	16.5	4.5	BAL	3.3	4.3				56-62	1900
AM58	.90	16.5	4.5	BAL	3.3	4.3				56-62	1900
316L	.03	17.0	BAL	12.0		0.8		2.5		Rb78	2525
80/20		20.0		80.0							
PCN38			0.4	38.0			61.5			Rb60	2400
*PHAC	.05	15.5	8.0	BAL		0.8		16.0			
*PI600	.02	14.0	10.0	BAL		1.0				Rb74	2600
*PM400	.02			66.5		0.5	32.5				

The table below describes some of the standard alloys available from AMETEK. We also manufacture custom atomized powders for special applications.



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N D U S T R Y N E W S

Ι

Praxair Surface Technologies Launches TAFA Model 7780 Universal Process Control Center

Praxair Surface Technologies has launched the advanced TAFA Model 7780 Universal Process Control Center (UPCC), a closed-loop, computerized multi-process controller for unparalleled control of multiple thermal spray processes. Based on the proven control technology of the Model 7700



Model 7780 UPCC HMI

Universal Plasma Controller (UPC), Model 7780 can operate multiple spray processes including conventional single cathode Air Plasma Spray (APS), High Energy plasma PlazJet II, High Pressure/High Velocity Oxy-Fuel (HP/HVOF®), and conventional gaseous-fueled HVOF systems from the same Human Machine Interface (HMI) pedestal.

Model 7780 UPCC uses a robust PC/PLC combination in which the PLC controls the critical spray process parameters. The industrial grade PC is used as a display screen for the process data from the PLC, to store and create recipes, and as a storage center for data acquisition.

Importantly, Model 7780 UPCC reduces operating costs by utilizing highly efficient, closed-loop adjustment and



control of the spray parameters. A user-friendly, computerbased operator interface keeps operation simple and

repeatable, making the Model 7780 UPCC system a versatile and comprehensive multi-spray process controllers. The system has a large recipe storage capability that makes coating selection easy and helps assure unparalleled coating repeatability. The unit's data acquisition capability will help exercise ultimate quality, shop management and cost control measures.



In addition to being an intuitive and easy-to-use control platform, Model 7780 offers the important capability of closed-loop control of the spray process. Reduced variability in the coatings and cost savings are realized due to the instantaneous control of critical spray parameters in real time during operation, which result in greater coating consistency and less rework.

About Praxair Surface Technologies

Praxair provides high-performance coating services that reduce the harmful effects of abrasion, oxidation, corrosion, erosion, wear and extreme temperatures on metal parts for the aviation, energy, and industrial markets. In addition the company produces and markets a full line of thermal spray equipment and powder and highperformance slurry materials.

For more information, please visit the website www.praxairsurfacetechnologies.com.

See advertisement page 23.



Nation Coating Systems Advances

Nation Coating Systems has employed the use of the ISO 9001 and AS9100 quality management systems for a number of years, so when new business



opportunities in the aerospace field arose, NCS didn't hesitate going after Nadcap accreditation.

To accomplish this accreditation, a new Quality Manager, *Jack Chidester*, was hired to review and amend the existing policies, procedures, and associated documentation aligning the system with both Nadcap and

AS9100C requirements while maintaining FAA repair station compliance.

Recent research and development work has been conducted to produce a new powder formulation intended for aluminum and titanium substrates which is extremely hard and exhibits very high wear resistance capability. Applied at a very thin thickness, this new coating is rather light weight and is ideal for aircraft and heavy industrial applications where low weight and extended longevity are being sought.



Another recent development at NCS is the strategic partnership struck with Hadronics, a leading supplier of new and repair parts to the offset printing industry, to market a release coating designed and developed by NCS. The coating has been tested on idler rolls and proven to prevent ink and other

materials from sticking to it with properties that rival that of other, more expensive finishes. In the near future NCS and Hadronics will collaborate to create a new ceramic coating that will last longer in the field and deliver superior protection from dielectric leaks and breakdown.

For more information visit Nation Coating website www.nationcoatingsystem.com

See advertisement page 23.

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 page 22.



Systems & Equipment

Materials & Supplies

Coatings & Services

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HAI Inc., Introduces New Automated Spray Cell System

HAI Inc., introduced a new automated thermal spray cell system, called AUTOCote. It operates all equipment in your old or new thermal spray cell automatically with a press of a button. Simply press start and your robot does the rest. Whether you have arc spray, plasma, HVOF, chillers, dust



collectors, safety equipment or more.

The system is controlled and monitored from one touchscreen HMI (Human-Machine Interface) mounted anywhere outside the booth, eliminating

operator safety issues and clearing valuable floor space of all cabinets,hoses, and cables.

It includes data logging and user

access management to provide traceability that makes repeating your process as easy as pushing a button. Most importantly, every AUTOCote system includes HAI's custom tailored Integrated Safety System (ISS) which gives you the assurance that safety is never compromised by human error.

Their Advanced Programming Technology (APT) team will work with your existing devices or replace them with mod-

ern robotics and industry standard automation equipment to create a unique AUTOCote system that meets your budget and production needs.

For more information, contact HAI Inc., at 877.411.8971, email: sales@haiinc.com or visit website www.haiinc.com. **See advertisement page 11.**

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 stan-



dards/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.

Send request for poster to itsa@thermalspray.org.



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Watson Grinding and Manufacturing Launches New Web Site

Watson Grinding and Manufacturing announces the launch of a new website. Site visitors will have the ability to submit same-day quote requests online through a "Request a Quote" form. WatsonGrinding.com will offer detailed information on machining, grinding and thermal spray coatings services as well as equipment lists and capacities.

Site visitors can browse the "Industries Served" section to find industry specific solutions that meet their needs. The dynamic Blog will keep readers up to date on company news, press releases, and upcoming events. Social networking outlets such as Facebook, Twitter, YouTube and LinkedIn can be accessed from the homepage.

"We are constantly improving our manufacturing processes and the technology we use. We want our web site to give our customers a modern view of our company that's been in operation for over 50 years," John Watson, President, Watson Grinding & Mfg.

About Watson Grinding & Mfg. – Since 1960 Watson Grinding & Mfg. provides machining, grinding, lapping and thermal spray coatings services. Our operations are ISO 9001:2008 certified. We increase the service life of industrial parts utilized in the oil and gas, petrochemical, chemical processing, pulp and paper and power generation industries. Our capabilities include: CNC and manual machining, grinding, thermal spray coatings, metallurgical coatings analysis and non-destructive testing.

For more information visit www.watsongrinding.com

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Wall Colmonoy Launches New Global Website

Wall Colmonoy, a materials engineering group of companies engaged in the manufacturing of surfacing and brazing products, castings, and engineered components, announces the launch of their new global website. This launch follows their global rebrand initiative unveiled July 2011.

The new website highlights the company's new global positioning: Progressive Collaboration for Superior Performance. Worldwide. The site is specifically designed to showcase who Wall Colmonoy is, its range of capabilities and products across a global platform.

Clear, concise and easy to navigate, the site allows for more efficient and effective communication with customers and industry partners. The site also features a NEW News Area continuously updated with the latest company news, product developments, technical papers, video and other important industry headlines.

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 and 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 70 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 websites www.wallcolmonoy.com, www.facebook/wallcolmonoy.com and www.twitter/wallcolmonoy.com.

Thermal Spray Jobs listed at "For Hire" www.thermalspray.org

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.



Our new Automated Spray System can operate all your equipment in your new or old thermal spray cell... with a push of a a button.

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VAC AERO Opens Facility in Southeast Poland

First established in 2003 in Kalisz, Poland to offer metallurgical services to the burgeoning aerospace industry in Poland, VAC AERO has now opened a second facility located in the town of Rzeszow in southeast Poland. VAC AERO's Polish divisions offer special processing services, including vacuum heat treating and brazing, vacuum carburizing, air plasma spray (APS) and HVOF protective coatings, as well as corrosion and oxidation resistant paint coatings.

This new addition to the VAC AERO group of companies will be the sixth vacuum heat treating, brazing and coating facility worldwide. VAC AERO has been operating its first plant in Kalisz, in central Poland since 2003. According to Scott Rush, VAC AERO's President "the new plant is located in Poland's revitalized aerospace cluster, a zone that fosters a vibrant supply chain for major north American and European aerospace prime contractors."

The company is part of the VAC AERO International group with its headquarters in Oakville (Ontario, Canada) and is a member of the Polish Aviation Valley Association, Polish Canadian Chamber of Commerce, and Wielkopolska Aerospace Cluster. All of VAC AERO employees will be from the local area, selected specialists will be relocating from VAC AERO's Kalisz-Poland plant to assist in the initial plant start-up.

For more information visit www.vacaero.comThermion

Thermion Offers Arc Spray Reference Material

The Thermion, Inc. website offers a multitude of arc spray reference material gathered from the American Galvanizing Association, the Army Corp of Engineers, AWS Previews, the Department of Transportation and Federal Highway Administration, The Department of Defense (DOD – Army, Navy, Air Force and Marines), NACE, SSPC, bridge and concrete information, and controlled studies and papers.

This includes samples of thermal spray studies which have been conducted with listing of authors and paper titles. Additionally, there is a small sample of the specifications for the application, safety and quality assurance of thermal spray coatings.

Within most of the documents there are more specific details covering all aspects of preparing for and applying a long life thermal spray coating.

For more information, visit www.thermioninc.com

LinkedIn Has Thermal Spray Group

The business social network "LinkedIn" has a group titled "Thermal Spray Coating" *currently with 431 members* and some discussions.

If you are interested, please visit www.linkedin.com and join the network and then join the group.





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#1 COMPREHENSIVE RECYCLING FOR THE THERMAL SPRAY INDUSTRY

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Ardleigh Minerals' PyroT[™] process enables complete recycling of dust collector filters, tape, and mask materials. Ardleigh accepts a broad range of materials for recycling including:

- Aluminum oxide, silicon carbide, glass, plastic, and bicarb blast media
- Metal chips, solids, grindings and turnings
- Steel, stainless, and zinc shot and dust
- Thermal spray, Plasma spray, Cold Spray, and HVOF overspray powders, dusts, solids, and sludges containing chromium, cobalt, copper, indium, molybdenum, nickel, rhenium, and tungsten carbide
- Certified parts destruction

Corporate offices are located in Beachwood, OH. Facilities are located in Charlotte, Cleveland, Houston, and Phoenix.

See us at ITSC 2013 at Busan, Korea May 13-15, 2013



Global Engineering Coating Equipment

Mass Flow Control Systems

Metallisation's Plasma, HVOF and automated flame spray systems all have mass flow control for ease of operation and optimum repeatability. The systems are PLC controlled with a familiar Windows interfaced touch screen that users find easy to operate. All of Metallisation's systems are high quality, compact and easy to use.



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.

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100th TriplexPro[™]-Based System Sale Marks Market Shift in Atmospheric Plasma Spray Technology

Sulzer Metco, a leading surface solutions provider, proudly

announced the sale of their 100th TriplexPro-based atmospheric plasma spray system.

The TriplexPro plasma spray gun employs cascading arc and triplecathode technology engineered such that the plasma arc is independent of gas flow. Thus, high-quality coatings are attained with very high feedstock throughput. Thermal spray systems based on the TriplexPro technology provide unparalleled efficiency gains and process cost reductions.

"The TriplexPro consistently lives up to our claims," remarked Steven Ort,

Product Line Manager for Thermal Spray Equipment. "While others have introduced high-efficiency plasma guns, the

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market has recognized the reliability and proven track record of this spray gun. When reviewing papers given at the ITSC (International Thermal Spray Conference) involving atmospheric plasma spray, the predominant gun

> discussed in recent years has been the TriplexPro. This trend, coupled with Sulzer Metco's milestone sales achievement, demonstrates a clear industry shift towards this more efficient technology."

> "There is nothing temperamental about the TriplexPro," states Chris Dambra, Manager Coatings Solutions Center – Americas. "Once a spray parameter has been established, the TriplexPro easily hits and maintains the process window. That fact alone makes the TriplexPro a favorite of our customers."

Over 85 percent of the TriplexPro-

based systems sold are for high volume production. Sulzer Metco uses their unique ability to combine their materials expertise with a highly experienced systems integration team and coating solution centers to provide customers that purchase a Sulzer Metco spray system with a complete surface solution package. Continued on page 18.

input along the way." Simply pros!

Find out how Progressive Surface can exceed your expectations, **Pro**cisely!*

progressive surface.com

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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.

JOB SHOP MEMBER COMPANIES

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Continued from page 15.

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SULZER



Sulzer Metco is the proud sponsor of The LEGO Chicks, a

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Girls Scouts, in the FLL, FIRST LEGO LEAGUE, (For

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The FIRST LEGO League is an international program for youth that combine a hands-on, interactive robotics program with a sports-like atmosphere. The FIRST LEGO League International introduces elementary and middle schools around the world to the fun and experience of solving real-world problems by applying math, science, and





SPRAYTIME Third Quarter 2012

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technology. Guided by adult mentors and their own imaginations, FLL students solve real-world engineering challenges, develop important life skills, and learn to make positive contributions to society. Sulzer Metco recognizes the need to inspire these young minds through funding and mentoring to promote our need for engineers and scientists.



On March 4, 2012, the LEGO Chicks competed in the FLL Long Island Championship Tournament winning championship trophy, placing 1st of 90 teams. As Long Island Champions they were invited to represent the region competing in the World Invitational Open held in Orlando, Florida in May, 2012. With Sulzer Metco helping to sponsor their trip, the LEGO Chicks traveled to Orlando to compete with sixty-four other teams from around the world finishing 30th in their first international competition. As a reward for their success, Sulzer Metco arranged a visit to Stony Brook University's thermal spray laboratory on Long Island.

On Thursday, July 5, 2012, the team visited Stony Brook University Center for Thermal Spray Research (www.sunysb.edu/ctsr) where Dr. Sanjay Sampath and his colleagues gave a very informative presentation on thermal spray and how gas turbine engines work for jet propulsion and power generation. The girls and their coaches were able to see both plasma and arc spray applications in process which provided tremendous insight to real world application of their robotic experience. The girls especially loved the thermal spray samples they were given.

For more information visit www.sulzer.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 page 22.

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Hausner Hard Chrome Wins State Award Pollution-Fighting Efforts Are Honored

Hausner Hard Chrome's Owensboro facility has earned the Environmental Sustainability Award from the Kentucky Pollution Prevention Center (KPPC), a state resource center in the J.B. Speed School of Engineering at the University of Louisville.

The hard chrome plating plant's Energy Team has been working with engineers at KPPC since 2010. Since then, the company has reduced its overall electricity costs, upgraded the plant's lighting and made improvements in its compressed air usage to reduce emissions.

Hausner Hard Chrome expanded into Owensboro in the late 1970s. The company's Elk Grove Village, IL, operations began in the late 1960s. The company offers a full spectrum of plating services for remanufacturing customer equipment and machine parts for all industries. These services include in-house hard chrome, machining and fabrication.

KPPC provides free, customized, technical services to help businesses and industries with pollution prevention and energy efficiency.

"This was recognition of our employees," said Scott Davis, Hausner's chief operating officer. "It's not just a capital investment and not just a project. It's a mind-set around energy efficiency and includes recycling and reducing energy and waste. The award was presented to the plant, and our employees do the work every day." Hausner expects to continuously improve, Davis said. "We're about halfway through the improvements we are going to make working with KPPC."

KPPC sent engineers to Hausner in 2010 to conduct an assessment and the engineers followed up with recommendations for improvements.

Employees worked with Owensboro Municipal Utilities to install new capacitors and lighting at the plant was upgraded.

"The lighting is so much better technically and resulted in cost savings, but at the same time, the brightness allows employees to do their work better and provides a more pleasant atmosphere," Davis said.

Winners of the Environmental Sustainability Award must be committed to three principles taking responsibility for: the essential well-being of their employees and the community; achieving economic benefits' and practicing environmental stewardship.

Another key factor in this recognition is the company's involvement with the Kentucky Energy Alliance, which provides networking opportunities for businesses and industries working on energy efficiency and waste reduction. Alliance members pledge to reduce energy use by 2.5% per year for 10 years.

For more information, visit www.hausnerinc.com

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American Welding Society*

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.

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

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. Vice-Chairman: *Jason Falzon*, FW Gartner Thermal Spraying Treasurer: *Bill Mosier*, Polymet Corporation

Corporate Secretary: Kathy Dusa

Executive Committee (above officers plus the following) *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 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.

ITSA Headquarters

Post Office Box 1638, Painesville, OH 44077 USA voice/cell: 440.357.5400 • fax: 440.357.5430 itsa@thermalspray.org • 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.

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, Weldmex Mexico, PowerGen, Society of Vacuum Coaters 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.

NEW "Supporting Societies" Membership

The International Thermal Spray Association is pleased to announce a new "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 17.

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

Thermal Spray Jobs listed at "For Hire" www.thermalspray.org

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Since 1991, the *International Thermal Spray Scholarship Program* has contributed to the growth of the

offers up to three Graduate Scholarships **worth**

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Applications accepted April 15 through June 30 ONLY.
Please visit www.thermalspray.org scholarship area for
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ITSA On Facebook

Dear Thermal Spray Colleague,

The International Thermal Spray Association now has a very basic Facebook Page. If you are a Facebook user, you can simply type in thermal spray in the top search engine. At that point, select "like" and you will be connected to the ITSA page. Right now, we have our ITSA promotion video on the page, plus a few recent messages. We are not sure how and to what extent this will be used, but it was apparent by some recent and continuing requests that we be there. If you are a Facebook visitor, enjoy.





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Metallisation Appoints Two New Directors

Metallisation Ltd, a global leader in the supply of thermal spray equipment, has appointed two new directors to its management team at its UK manufacturing site.

Stuart Milton has been promoted to Sales Director and *Jon Erskine* to Operations Director.

Jon and Stuart will join Terry Lester, Managing Director, and Rob Hill and Steve Barker, who will both assume the



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title of Deputy Managing Director, on the management board of Metallisation.

The three existing directors will remain active in the day to day running of the company. The two new appointments have been made as part of Metallisation's commitment to the long term future of the company.

Jon joined the company in January this year as Operations Manager. Jon will

continue to manage production and purchasing and, as Operations Director, will expand his role to include responsibility for the company's technical service and R&D. Stuart joined Metallisation in 2003 as Sales and Marketing

Manager and has successfully developed the Metallisation

customer base and global distribution network. As Sales Director, Stuart will continue development responsibility for the sales and marketing function of the company.

Earlier this year Metallisation celebrated 90 years in business and continues to grow from strength to strength. The company employs a growing workforce, with 43 people currently working at its Dudley factory. It is represented around



Stuart Milton

the world by a network of agents and distributors, who assist clients with their equipment, material and technical requirements. Metallisation is an owner-managed company and has grown its turnover by 80% since 2009, both domestically and through exporting to over 72 countries.

Dr Terry Lester, Managing Director, says: "This is a very exciting time for all of us. We are committed to the future of Metallisation as a company and to its employees, customers and distributors. We are very proud of the fact that even in the current climate we have continued to buck the trend and increase our sales year on year. The promotion of Jon and Stuart will strengthen the team of directors and galvanise the future ambitions of the company. Everyone at Metallisation is looking forward to continued development and growth and a very exciting future."

For more information visit www.metallisation.com

Sanjay Sampath Elected to ASM TSS Board of Directors

Dr. Sanjay Sampath has been elected to the ASM Thermal Spray Society Board of Directors

Dr. Sampath is Professor of Materials Science and Engineering at Stony Brook University (SUNY) and Director of the Center for Thermal Spray Research (www.sunysb.edu/ctsr) an interdisciplinary industryuniversity cooperative research center in the field of thermal spray materials processing and surface engineering.

Sampath received his PhD from Stony Brook in Materials Science in 1989. After graduating, he spent four years at GTE Sylvania involved in research, development, and processing of refractory metal compounds and composites. Upon joining the faculty at Stony Brook in 1993, Dr. Sampath has directed



research efforts on various federal and industrially funded programs. Under the auspices of the NSF Center, he directed a group of a dozen or so interdisciplinary faculty members towards fundamental understanding of thermal spray processes, materials and applications.

The self-sustaining Center is home to the Industrial Consortium for Thermal Spray Technology comprising of 35 leading companies aimed at knowledge transfer from fundamental research to application engineering. He was also PI on a major DARPA grant aimed at developing new processing tools for direct writing of mesoscale electronics and sensors. Sampath has over 200 publications to his credit, 13 patents and several best paper awards.

He received the SUNY Chancellor's Award for excellence in scholarship and creative activities in its inaugural year, elected Fellow of ASM International and in 2007 won an R&D 100 award for developing the direct write technology. He was recently inducted as Fellow of the American Ceramic Society.

For more information visit www.sunysb.edu/ctsr or www.asminternational.org/tss

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NOVEMBER 2012

26-28 Ibaraki, Japan ATSC 2012 5th Asian Thermal Sprav Conference - Organized by Japan Thermal Spray Society and Asian Thermal Spray Society - www.jtss.or.jp/atsc2012

DECEMBER 2012

12-13 Orlando, FL USA Power-Gen Conference and Exposition - visit www.power-gen.com

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JANUARY 2013

7-10 Dubai. United Arab Emirates Arabia Essen Welding and Cutting Int'l Trade Fair Joining, Cutting, Surfacing - contact Messe-Essen christina.kleinpass@messe-essen.de

MARCH 2013

13-15 Orlando, FL USA Above Ground Storage Tank Conference and Trade Show - contact Jim DeMartini 800.827.3515 or email jdemartini@nistm.org

17-21 Orlando, FL USA Corrosion 2013 - visit

www.nace.org

17-21 Doha, Qatar *Middle East Turbomachinery* Symposium - contact turbolab@tamu.edu.

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7-9 Monterrey, Mexico 5th Fabtech Mexico - visit fabtechmexico.com

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30 SEP-30 OCT Hamburg, Germany ASME 2013 Turbine Blade Tip Symposium & Course Week - email iqtiprogram@asme.org

NOVEMBER 2013

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2014

MARCH 2014

9-13 San Antonio, TX USA Corrosion 2014 - visit www.nace.org

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Journal of Thermal Spray Technology® A publication of the ASM Thermal Spray Society

Slurry Erosive Wear Evaluation of HVOF-Spray Cr₂O₂ **Coating on Some Turbine Steels**

Deepak Kumar Goyal, Harpreet Singh, Harmesh Kumar. and Varinder Sahni

In this study, Cr₂O₃ coatings were deposited on CF8M and CA6NM turbine steels by high-velocity oxy-fuel (HVOF)-spray process and analyzed with regard to their performance under slurry erosion conditions. High Speed Erosion Test Rig was used for slurry erosion tests, and the effects of three parameters, namely, average particle size, speed (rpm), and slurry concentration on slurry erosion of these materials were investigated. SEM micrographs on the surface of samples, before and after slurry erosion tests, were taken to study the erosion mechanism. For the uncoated steels, CA6NM steel showed better erosion resistance in comparison with CF8M steel. The HVOF-sprayed Cr₂O₃-coated CF8M and CA6NM steels showed better slurry erosion resistance in comparison with their uncoated counterparts. It may be due to the higher hardness as a result of HVOF-sprayed Cr_2O_3 coating in comparison with the uncoated CF8M.

Read the entire article in the September 2012 Issue Visit www.asminternational.org/tss Editor: Christian Moreau • Lead Editor: Basil Marple Editor Emeritus: Christopher C. Berndt **Associate Editors:** Kendall Hollis, Seiji Kuroda, Chang-Jiu Li and Armelle Vardelle

Moses A. Levinstein died Feb. 9, 2011 at Bon Secours DePaul Medical Center at the age of 92. He left behind his beloved wife, Mary; two sons and daughters-in-law; five grandchildren and five great-grandchildren; his younger sister and her husband; and several nieces and nephews.

Mr. Levinstein was born in Duluth, Minnesota, and grew up in Ironwood, Michigan. He attended Michigan College of Mining and Technology (now Michigan Technological University) and graduated with a degree in metallurgical engineering. He earned a master's degree at Carnegie-Tech (now Carnegie Mellon University.)

Mr. Levinstein served in the United States Navy in World War II and during the Korean conflict. He was a decorated beach master in five Allied landings in North Africa, Sicily and Italy. A great source of pride for him was that he lost none of his men during the invasions. He retired with the rank of captain.

Mr. Levinstein was employed as a metallurgical engineer by the General Electric Company developing aircraft engines. An active member of the American Welding Society, he brought the first International Thermal Spray Conference to America and was inducted into the ASM Thermal Spray Society Hall of Fame in 1998. His citation read: "While at General Electric, Mr. Levinstein was obsessed with promoting thermal spraying both within GE and the United States. He introduced sprayed coatings into General Electric turbines. As American Welding Society C2 Chairman, he changed the process name to 'Thermal Spraying', and brought America its first International Thermal Spray Conference."

Mr. Levinstein pursued many interests after his retirement in Cincinnati. He explored painting, tailoring, politics and theater. He was a docent for the Taft Museum of Art, was active in politics and was a devoted member of Stagecrafters Community Theater, where for many years he acted, stage-managed and produced shows.

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Norman L. Rundle, 79 of Carmel, Indiana passed away Thursday, September 20, 2012.

Norm was born May 26, 1933 in Amityville, NY. He served in the US Army Airborne. Norm was a 1960 graduate of the University of Kentucky receiving his degree in Mechanical Engineering.

Norm worked for the Union Carbide Corp. for 30 years, retiring in 1991. Thirty or so years ago, Norman Rundle was involved in the true beginnings of thermal spray



in an organization, now known as Praxair Surface Technologies.

Norm was a development engineer in a department known as the "Flame Plating Department" which was within the Linde Division of Union Carbide. At that point, he was involved in coating and coating process development.

One of the most notable developments of that era was the application of detonation gun thermal spray tungsten carbide coatings onto titanium fan blades for the Pratt and Whitney engines used on Boeing 707 passenger aircraft.

Because of his extensive knowledge of various thermal spray coating processes, Norman moved to the sales and market development to better serve and sell the many benefits of thermal spray coatings particularly for jet engine components to save on weight, reduce wear, and improve efficiency

Norm provided encouragement and guidance to new engineers and was always available to mentor colleagues throughout his entire thermal spray career.

Upon his retirement, Norman's title for Union Carbide Coating Service Corporation was Director, Sales and Marketing. Subsequently the organization became Praxair Surface Technologies.

He served as a Carmel City Councilman from 1996-2004. He was a member of Brookshire Golf Club.

Norm is survived by his wife of 57 years, Lois; sons, Michael (wife, Jenny) and Brian (wife, Alison); grandchildren, Ashley (husband, Seth), James, Bret, Brooke, Dane, R.J., Ava, DeLaney; sister, Gail (Louie) Marquart and Lois (Frank) Szemko.

You may leave a personal message on the Guest Book at www.tributes.com/show/Norman-L.-Rundle-94460499

Where is your article? We encourage you to send articles, news, announcements and information to spraytime@thermalspray.org.

PLE IN THE NEWS

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Genie Products Appoints Sales Team



Genie Products Inc. is pleased to announce the appointment of *Marc Campbell* and *Patrick Doyle* to the company's sales team. Marc, as Sales Manager, is heading up the sales office. As Customer Service Manager, Patrick is assisting customers with orders and handling day to day inquiries regarding products and services. He is available to help with customer service issues or questions.

Marc Campbell joined Genie Products in August, 2011, bringing 16 years of experience in material planning, purchasing, account management and customer service to the



position. Marc has a BS degree in Business from West Virginia Wesleyan College. Prior to moving to North Carolina, Marc worked for General Fastener Company, Livonia, MI, where he managed all facets of multi-million dollar customer accounts.

Marc has spent the past year working with Alendia Barton,

a 19 year veteran of Genie Products, who retired in June, 2012. This experience helped Marc gain extensive knowledge of our customer base and the parts and services they require.

Patrick Doyle began his career as a CNC Programmer and is certified in precision CNC programming. He subsequently moved into sales and marketing, with experience in both consumer and industrial product lines.

Patrick joined Genie Products in March 2010 as CAM manager. Patrick's CNC experience at Genie Products has given him an in depth knowledge of the company's



product line. Patrick spent the past He also spent time working with Ms. Barton prior to her retirement.

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Both Marc and Patrick look forward to working closely with our customers to match their metallizing requirements with the products and services offered by Genie Products.

For more information, please visit www.genieproducts.com.



DeWAL Industries Expands Sales Force

Sales coverage for the West Coast has been added this month for DeWAL

Industries' full product line. *Neil Yingling* has joined DeWAL's sales team and is the Sales Manager for the west coast of the United States to include Arizona. He comes to DeWAL with a formidable background in business and sales of manufacturing goods and supplies.

The addition of Neil'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.

Says Neil, "I am looking forward to meeting current customers, and exploring new opportunities where DeWAL's expertise can offer creative solutions".

Since it's 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, phone 401.789.9736 or visit www.dewal.com

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LinkedIn

Has Thermal Spray Group

The business social network "LinkedIn" has a group titled "Thermal Spray Coating" *currently with 431 members* and some discussions.

If you are interested, please visit www.linkedin.com and join the network and then join the group.

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CeralUSA Announces Management Team Additions

CeralUSA, LLC, manufacturer of environmentally friendly coatings for the aerospace, power generation, and oil

and gas industries, today announced the appointments of **Doug Ellsworth** as Manager of Operations and **Greg Engleman** as Manager of Engineering. The appointment of Ells-worth and Engleman broadens the CeralUSA management team as the Company takes one step closer to be-coming the global leader in the development of leading

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edge coating technologies. *Doug Ellsworth* appointed CeralUSA Manager of Operations

As manager of operations Doug Ellsworth will establish and implement processes that will not only guide the Company's dayto-day activities but also lay the foundation for implementation of CeralUSA's long term goals.

Doug has over 35 years of business development,

commercial R&D, technical support, manufacturing and coatings-related experience. Previously, Doug was the Executive Vice President and Chief Operating Officer of Northwest Mettech Corp., a thermal spray coatings equipment and coatings development company. Prior to Mettech, Doug was the Senior Vice President of Altairnano, Inc., a developer of unique nanomaterial products for coatings and other thin film applications. Doug has a dual degree in Chemistry and Geology from New York State University at Oneonta.

Is Your Employee Listed? Send notice to spraytime@thermalspray.org Greg Engleman appointed CeralUSA Manager of Engineering

As Manager of engineering Greg Engleman will coordinate and direct projects, making detailed plans to accomplish goals and directing the integration of technical activities. Greg will evaluate technology resource needs and spearhead the Company's technical direction based on market drivers.



Greg has over 14 years of materials science and engineering experience. Previously, Greg was the Chief Technology Officer of Mesocoat, Inc., an Ohio-based coatings development startup. Prior to that Greg worked as Coating Technologies Group Leader at Powdermet, Inc. and prior to that as a Coating Development Engineer at Oak Ridge National Laboratory. Greg has a M.S. degree, Materials Science and Engineering from the University of Tennessee Space Institute.

Suzanne Bodger, Managing Partner of CeralUSA, LLC stated, "We are very excited to welcome Doug and Greg on board. They bring with them a proven track record of vision, energy, and ability to drive success. We are on a growth trajectory with significant challenges ahead. We expect to benefit significantly from both Doug's and Greg's experience."

About CeralUSA

CeralUSA is a woman-owned small business based in Oklahoma City, OK. In the short time since its inception in 2008, CeralUSA has become well known for its "green" coatings, making waves with Ceral 3450, the low-chrome drop-in replacement for legacy carcinogenic aluminum ceramic coatings.

For further information about CeralUSA, LLC, or for detailed information regarding its products, email info@ceralusa.com or visit website www.ceralusa.com

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Turbine Engine Exhaust Silencer Coated With Twin Wire Arc

SprayTec Coating Solutions, LLC's customer, based in Georgia, secured a contract to fabricate, thermal spray coat pure aluminum, and apply a seal coating onto a turbine engine exhaust silencer segments for corrosion prevention.



Grit blast with aluminum oxide.

SprayTec used a Thermion 4.8 arc spray system, spraying 3/16 in diameter wire for the large areas, and a BP-400 system to manipulate around flanges and more restricted areas to complete the work. The exhaust silencer test cell is comprised of 11 segments, ranging from 8 ft x 14 ft high, 8 ft high x 16 ft diameter, and 20 ft high x 16 ft diameter. In addition, multiple flanges and plates were coated for a total coat area of approximately 10,000 sq ft



All exterior surfaces and various flanges were grit blasted with aluminum oxide, and then thermal sprayed with twin wire arc to a thickness of 0.010 - 0.015 in. Upon the completion of the coating process, a high temperature sealer PPG Amercoat 873 was applied to PPG manufacturers recommended thickness. The Amercoat 873 is a 100% aluminum silicone coating, resistant to 1200F, and suitable



for rapid thermal cycling. The silicone coating was applied to 0.00150.002 in.





Amercoat 873 sealer applied.

About SprayTec: SprayTec Coating Solutions, LLC (www.sprayteccoat.com), produces quality coating solutions for various applications to include dimensional restoration, corrosion protection, abrasion and wear resistant coatings. SprayTec provides Teflon, ETFE, and PFA coatings. SprayTec offers onsite arc spray, onsite HVOF, and in-house arc spray, plasma, HVOF and machine shop service and fabrication.

For more information, please contact Troy Robinson, troy@sprayteccoat.com or visit www.sprayteccoat.com.

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