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On the cover: Juan Puente, the thermal spray supervisor at Aircraft Tooling Inc., turns the HVOF flame on and then leaves the booth as a cobot performs the spray process. (Photo courtesy of Universal Robots.)

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

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A subscription to SPRAYTIME® is free for individuals interested in the thermal spray and coatings industry. Visit spraytime.org to subscribe.
Contractor Provides Thermal Sprayed Aluminum Coating Services to Protect Steel, Including Canopy at The National WWII Museum

Chet Morrison Contractors, Houma, La., an energy service company, is providing thermal sprayed aluminum coating services in-house at its ISO-certified facilities.

The company’s team is also applying the coating on the new Bollinger Canopy of Peace at The National WWII Museum in New Orleans, La. (see photos). The 825-ton canopy exceeds the American Society of Civil Engineers safety standards.

According to nationalww2museum.org, the architectural structure is scheduled for completion this year. It will rise 148 ft above the center of the institution’s campus. The canopy, featuring a steel lattice framework supporting Teflon™ coated fiberglass panels, will be 482 ft long and 134 ft wide, held aloft by four steel legs anchored in more than 1260 cubic yards of concrete. Made possible through a 2015 gift from Museum Trustee Donald T. Bollinger and his wife, Joy, it was designed by Voorsanger Mathes LLC.
UES Installs Second Robo-Met.QC® Unit for Thermal Spray Coatings at Hill Air Force Base

UES Inc., Dayton, Ohio, has revealed the second installation of and training for its newest product, Robo-Met.QC®, at Hill Air Force Base, Ogden, Utah.

The system provides for rapid, automated quality control of thermal spray coatings used by Air Force sustainment complexes in maintenance, repair, and overhaul operations. It improves throughput of the metallography process and enhances platform uptime for availability to warfighters. In addition, it will section, clean, mount (under vacuum or atmosphere), polish, and image standard thermal spray coupons without operator interaction.
TWI Deposits Silicon-Carbide Coatings by Thermal Spraying Techniques

TWI, Cambridge, United Kingdom, has recently completed a project on the development of ThermaSiC coatings, a new product from Seram Coatings, Norway. An advancement in the deposition of silicon carbide (SiC)-based thermal spray powders has allowed dense ThermaSiC coatings to be produced using conventional thermal spraying processes.

The TWI team, comprised of Melissa Riley, Andy Tabecki, Feifei Zhang, and Catherine Richardson, conducted trials with a range of ThermaSiC powders to make high-quality coatings using multiple spraying systems. The coatings offer potential in many applications across a wide range of industry sectors.

Currently, TWI is evaluating the coatings for a number of industrial purposes, including an investigation of coating properties such as adhesion/cohesion strength, wear, erosion, and cavitation resistance.

Bodycote Enters 15-Year Contract with Rolls-Royce

Bodycote, Macclesfield, United Kingdom, has signed a 15-year contract with Rolls-Royce’s civil aerospace business. The deal is expected to be worth more than $211 million in incremental revenues over that timeframe.

Bodycote will provide thermal processing services, including specialized vacuum heat treatment and hot isostatic pressing, to support Rolls-Royce’s turbine blade casting facilities in Derby and Rotherham, United Kingdom.

The agreement also ensures the provision of specialist thermal processing capacity, utilizing Bodycote’s approach, to support the growth of Rolls-Royce’s large civil engine programs.

Höganäs Acquires Surface Coating Division from H. C. Starck

Höganäs AB, Sweden, has taken over a part of international metal powder producer H. C. Starck, namely the division for surface coating, Surface Technology & Ceramic Powders (STC).

“With STC, Höganäs gets access to new markets and product groups within the premium segment for surface coating and additive manufacturing,” said Fredrik Emilson, president and CEO of the Höganäs Group.

STC employs close to 400 people, mainly in Germany where the company has two production units. Its user base is mainly European.

Share your company news, facility improvements, acquisitions, and noteworthy events with us.

Email press releases to spraytime@thermalspray.org.
Watlow® Earns Two Certifications on Its Heater

Watlow®, St. Louis, Mo., has earned UL® 499, the Underwriters Laboratories Inc.’s Standard for Electric Heating Appliances, and Canadian Standards Association C22.2 No. 72-10 component recognition certifications on its Fluent® in-line heater.

Achieving the UL® standard is approval that the component meets safety requirements for electricity and fire. It covers heating appliances rated at 600 V or less and have an electrical power rating of 15 kW or less per steam-generating vessel. The Canadian requirements are similar.

The product is a high-watt density, low-mass heater that enables on-demand heating with a fast response. Powered by the company’s patented thermal spray technology, the unit makes use of its entire surface to produce heat. A cutaway image of the Fluent® in-line heater shows the internal baffle and the chamber featuring thermal spray technology.
Product Spotlight

Molybdenum Thermal Spray Powders Repair Surfaces

Molybdenum thermal spray powders extend the life of products by repairing worn and damaged surfaces. They also protect against erosion, wear, and corrosion found in many applications like automobiles, trains, aircraft, and boats to chemical plants, food manufacturing and packaging, mining, earthmoving equipment, and power generation. The spherical, flowable thermal spray powders are optimized for diverse spraying processes such as plasma, flame, detonation, and HVAF and HVOF for high-velocity spray coating applications. Various size specifications are offered. Physical characteristics include a density of 30 g/in.³ minimum and hall flow of 35 s/50 g maximum. The molybdenum powder is shipped in nonreturnable polyethylene-lined, 20-L (5-gal) plastic pails or 60-L (15-gal) steel drums. Special packaging inquiries are available as well.

H. C. Starck Inc.
hcstarck.com / (517) 279-3647

AISC Releases Thermal Spray Coatings Guide

Specification for Application of Thermal Spray Coating Systems to Steel Bridges (S8.2), developed by the AASHTO/NSBA Collaboration Task Group on Coatings (TG8), provides guidance on shop metallizing of steel girders while establishing and defining of the functions, operations, requirements, and activities needed to achieve a consistent quality. While thermal spray coatings on steel structures are not new, it is new to steel bridges and has been growing in popularity with bridge owners, especially in the northeastern part of the United States. With growing interest, and increasing fabricator capabilities, the specification was developed to define a consistent set of standards. The document is written in specification language, so it can be adopted in whole as part of project documents. It joins a growing list of documents devoted to improving quality and value through the standardization of design, fabrication, and erection of steel bridges. This specification is available for free download at steelbridges.org/collaborationstandards.

American Institute of Steel Construction
aisc.org / (312) 670-2401

Roll Grinder Contains Upgrades for Higher Accuracy and Precision

The Mesta roll grinder, measuring 60 in. in diameter and 288 in. in length, gives users options for larger roll bodies, shafts, and a variety of thermal spray surfacing projects. It utilizes two-axis grinding capabilities and diamond grinding media. Designed for precision grinding, the unit contains upgrades of the CNC controls, touch probe, ground-up leveling and scraping, gearbox drive, filtering units, and many more. The Fagor CNC controller uses autotuning software that allows for the fine-tuning of processes for high-precision, two-axis grinding operations. It also enables users to work directly from print specifications, programming roll crowns and profiles using standard G-code programming, CAD/CAM software, or the control’s on-board profile editor. The Renishaw touch probe provides data showing flatness, roll crown profile, roundness, and/or total indicated run-out documented and readily transferable to Excel files for inspection. Comparative data can be integrated with in-place roll inspection data to track roll crown conditions and trending. Alignment and levels of all machine components are checked using a Hamar L-730 precision laser level. Two-arc-second level vials and pitch and roll adjustments are utilized to ensure the laser plane remains parallel to reference points. Replacement components, such as lubrication lines and mechanical way covers, are also included along with custom wear guards. Bearings and drive belts are added to the main gearbox drive unit. To improve operator safety and provide a cleaner work environment when grinding roll crowns, a Torit mist collector with a 9-in. duct is installed at the grinding wheel and belt grinder, as well as a Barnes Kleenall coolant cleaning unit with a magnetic/fabric filter. For finishing applications, a secondary Rosedale stainless steel bag filter is installed. Additional improvements include modifications to the grinding head, polynomial interpolation splines, and an improved machining system.

ASB Industries Inc.
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Spraytime.org
Report Shows Thermal Spray Equipment Market and Forecasts until 2023

**Global Thermal Spray Equipment Market — Segmented by Product Type, End-User Industry, Process, Material and Geography — Growth, Trends and Forecast (2018–2023)** reports the global thermal spray equipment market is expected to witness a compound annual growth rate of approximately 6.4% during the forecasted period. The major factor driving the market is the increasing usage from power generation applications and the growing demand from Asia-Pacific and the Cooperation Council for the Arab States of the Gulf. North America is expected to witness the highest demand for thermal spray equipment during the forecast period. This increase can be attributed to the growing construction and automotive industry in the region. Thermal spray applications are also poised for growth in the United States. Additionally, the end users of automotive and construction industries in Mexico are expected to augment the growth of the market during the forecast period. The report also analyzes various perspectives of the market utilizing Porter’s five forces analysis; lists the countries expected to witness the fastest growth during the forecast period; identifies the latest developments, market shares, and strategies employed by the major market; and provides a three-month analyst support along with the market estimate sheet.

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ITSA Membership

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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thermalspray.org
ITSA Member News

ITSA MEMBER NEWS

Tradeshow Assessment for ITSA Members Eliminated
ITSA Members were invited to participate in an ITSA Member Satisfaction Survey, in which they were asked to rate the value of various member benefits. Based on feedback received on the value of ITSA Booth participation at industry tradeshows, at its April 20, 2016, meeting, the ITSA Executive Committee unanimously decided to discontinue ITSA booth activity at tradeshows effective July 2016. As ITSA Members subsidized the cost of ITSA booth activity via annual assessments, this move will result in the elimination of these costly annual ITSA Member assessments going forward.

In lieu of booth representation at tradeshows, ITSA will proactively participate in alternative ways at key industry events. For example, a series of educational presentations promoting thermal spray are being scheduled as free, half-day sessions at tradeshows like FABTECH, POWER-GEN International, and CORROSION.

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 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 that is now on display at the State University of New York at Stony Brook in the Thermal Spray Research Center, USA.
Growing in size and value, there are now more than 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
Since 1992, the International Thermal Spray Association has been publishing SPRAYTIME for the thermal spray industry. The mission is to be the flagship thermal spray industry publication providing company, event, people, product, research, and membership news of interest to the thermal spray community.

Chairman David A. Lee

I look forward to the privilege of working with the ITSA board, AWS staff, and ITSA members who are dedicated and devoted to growth, education, and the use of thermal spray coatings and associated processes, during my term as chairman. I’m also glad to welcome Ana Duminie as vice chair to the ITSA board.

When I first participated with ITSA in 1986, it was known as Metallizing Service Contractors (MSC). Since then, I have experienced a lot of the good ITSA has accomplished, met a lot of thermal spray colleagues (many I miss), and observed several changes to the organization. I believe the growth of the organization over the past couple of years helps fulfill ITSA’s mission, while providing the opportunity to enjoy the fellowship of others whom affectionately love thermal spray.

Our October meeting, for example, is a result of recent change; the ITSA board has decided to expand the usual technical part of our annual membership meeting into a two-day symposium. We’ve expanded the technical content and focused on thermal spray coatings and other surfacing technologies in the oil and gas industry, followed by our annual business meeting, which is critical to report to members as well as hear from them on the direction the association should be directed. Over the three-day event, there will be many great opportunities to socialize with our fellow thermal sprayers.

I’m finding that it takes an army of dedicated folks to organize this event. I wish to express my gratitude to them as they are volunteers dedicated to the organization’s growth and the goals of ITSA. I look forward to the fall meeting, and hope to see you there.

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. ITSA invites all interested companies to talk with our officers and company representatives to better understand member benefits.

OFFICERS

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Bill Mosier, Polymet Corporation
Peter Ruggiero, Curtiss-Wright Surface Technologies

Chairman David A. Lee
JOIN THE INTERNATIONAL THERMAL SPRAY ASSOCIATION

ITSA is a professional, industrial association dedicated to expanding the use of thermal spray technologies for the benefit of industry and society. ITSA Membership is open to companies involved in all facets of the industry — equipment and materials suppliers, job shops, in-house facilities, educational institutions, industry consultants, and others.

Engage with dozens of like-minded industry professionals at the Annual ITSA Membership Meeting, where there's ample time for business and personal discussions. Learn about industry advancements through the one-day technical program, participate in the half-day business meeting, and enjoy your peers in a relaxed atmosphere complete with fun social events.

Build awareness of your company and its products and services through valuable promotional opportunities — a centerfold listing in the SPRAYTIME Newsletter, exposure on the ITSA website, and recognition at industry trade shows.

Plus, ITSA Membership comes with an American Welding Society (AWS) Supporting Company Membership and up to five AWS Individual Memberships to give to your best employees, colleagues, or customers. Visit aws.org/membership/supportingcompany for a complete listing of additional AWS benefits.

For more information, contact Alfred Nieves at 800.443.9353, ext. 467, or itsa@thermalspray.org. For an ITSA Membership Application, visit the membership section at thermalspray.org.
David Lee Appointed Chairman of the International Thermal Spray Association

David A. Lee, a staff engineer at Kennametal Stellite, Goshen, Ind., has been selected as chairman of the International Thermal Spray Association (ITSA).

Lee has been actively involved with ITSA for more than 30 years. He holds a bachelor's degree in chemical engineering from Tri-State (now Trine) University and has completed some postgraduate studies.

Lee's past work experience includes six years at Boyd Machine and Repair, Kimmel, Ind., where he worked on the development and commercialization of thermal spray coatings and applications in plasma, HVOF, combustion wire, twin wire arc spray, and combustion spray. He joined Stellite, now Kennametal Stellite, in 1985, primarily to support and promote growth of hypervelocity thermal spraying, now known as HVOF. He has more than 35 years of hands-on experience with Jet Kote™ developing powders, equipment, process improvements, and applications for this first commercially available HVOF process.

For more than 30 years, Lee has supported and been instrumental in talent development at Stony Brook University, New York. He has worked with under- and postgraduates in thermal spray education and research, and has participated in the Center for Thermal Spray Research Consortium for more than 17 years.

Lee has also installed and trained numerous spray operators and engineers around the globe in producing and evaluating HVOF thermal spray coatings from basic to advanced coating requirements for aerospace.

He holds two patents for applications/materials for HVOF thermal spray coatings and has presented papers at various national and international conferences.

For more than 30 years, Lee has been active with the AWS C2 Committee on Thermal Spraying and served as chair of the committee from 2009 to 2014.
Ana Duminie Elected International Thermal Spray Association Vice Chair

Ana Duminie has been elected vice chair of the International Thermal Spray Association (ITSA). Duminie joined the thermal spray industry in 2007 when she was hired by H. C. Starck North American Trading Team LLC. She began as an inside sales representative and has taken on several roles within the surface technology organization over the years. She is now the regional sales director for North American Höganäs surface technology division. Duminie has been active with ITSA for more than nine years; she currently volunteers on its membership committee and is on the symposium planning panel. She holds a bachelor’s degree in international business management from Eastern Michigan University.

CenterLine Adds VP and General Counsel

CenterLine, Windsor, Ontario, Canada, has added David Mueller to the position of vice president and general counsel. In his new role, Mueller will serve as a member of the executive committee reporting to CEO Michael Beneteau. He will lead all legal and risk management matters, steer various global growth initiatives, and help drive strategic planning for the company. Prior to joining CenterLine, Mueller spent nearly five years at Valiant TMS, a global tooling and automation company, as a member of its executive leadership team in a corporate development and general counsel role, where he supported the CEO and the board in a variety of global growth mandates. He started his legal career at Fasken Martineau DuMoulin LLP in Toronto before joining Shibley Righton LLP in Windsor, Ontario, where he worked as a business law associate advising clients on a variety of commercial matters.

Key Staff Changes Made at SSPC

The Society for Protective Coatings (SSPC) has recently announced several staff additions, promotions, and key changes related to its May reorganization. Key additions include the hiring of Kevin LaRue as director of technical services and Greg Muha as the new director of member development and engagement. In addition, Jennifer Merck has been promoted to the new position of director of training and certification. Longtime SSPC Directors Terry Sowers and Michael Damiano are moving into senior advisory roles, with Sowers planning to retire in 2019 and Damiano leading special projects for the organization. Other promotions announced include Sara Badami assuming the role of training manager and Dustin Young taking on the role of training materials development manager.

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Collaborative Robots Automate Aviation Industry Thermal Spray Cells

By Manuel Sordo

Juan Puente, the thermal spray supervisor at Aircraft Tooling Inc., turns the HVOF flame on and then leaves the booth as a cobot performs the spray process.
Aircraft Tooling Inc. (ATI), a Dallas, Texas-based repair center for the aviation industry, was surprised to find collaborative robots could withstand the high temperatures and harsh environments of metal powder and plasma spray processes. The company’s “cobots” have been in operation for three years without breakdown or service requirements. The results reinforce the decision to automate processes that are undesirable for human workers and too expensive and complex for traditional robotics.

ATI became an FAA-approved repair station in 1970, with the development of hard chrome plating and plasma spray repairs for aircraft landing gears, airframes, and engine components. When the company decided to automate repair tasks involving new high-velocity oxygen fuel (HVOF) and plasma spray, its commitment to excellence extended to that decision.

But when Thermal Spray Supervisor Juan Puente researched industrial robots, he concluded, “The cost was outrageous, the cast iron models we looked at were too bulky, we could not easily move them between cells, they were hard to program, and all required safety guarding, which would not work in our small spray cells.” That’s when he stumbled on collaborative robots.

Safety, Flexibility, and Ease of Use

Cobots are deemed “collaborative” because of their built-in safety system that makes the robot arm automatically stop operating if it encounters objects or people within its route. Once a risk assessment is performed, most cobots can be deployed without safety guarding to keep workers from the area, which can significantly reduce costs and complexity.

Puente was surprised to discover that cobots had the required reach for the spray distance at a cost that was about half of everything else he had researched. Collaborative robot arms are typically smaller and much lighter in weight than traditional industrial robots, with a footprint that allows them to be mounted almost anywhere: on a moving cart, a stand, or even from the ceiling. The ceiling-mount option was an advantage for ATI so workers could walk underneath the robot and keep the floor clear of equipment and obstacles — Fig. 1. Additionally, the robot’s payload and speed were more than sufficient for the company.

“Our spray guns are not that heavy, so payload was not an issue. Most of the speed comes from our turntables making sure that the coating is being applied at a certain velocity,” explained Puente.

The small size and light weight of cobots means they can also be easily moved and redeployed as needed, a capability that is reinforced by their ease of programming.

Programming Speeds Deployment

Puente purchased a Universal Robots UR10 cobot with a payload of 10 kg (22 lb), reach of 51 in., and speed of 39.4 in./s, through distributor Olympus Controls. It took the company’s team about 4 h to unpack the robot and program it.

Programming the spray path was done using the “teach method,” which allows the user to grab the robot arm and move it through waypoints that are set directly on the robot’s touchscreen teach pendant — Fig. 2.

“We used a red laser to indicate exactly where we wanted the robot to move, and once the waypoints were set, we just hit ‘play’ and the robot moved through that trajectory,” said Puente.

Operating in Harsh Environments

Despite his enthusiasm, Puente was faced with significant hesitation in the workplace as to whether the cobot could operate reliably in the spray booth’s extremely hot and dusty environment. The HVOF thermal spray coating process is used to improve or restore a component’s surface properties or dimensions, extending equipment life by significantly increasing erosion and wear resistance. The spraying of parts usually takes 3 to 4 h, with spraying in 1- to 2-min intervals followed by a 2-min cool down period with cold air provided by a pneumatic cooler. For other processes, ATI uses plasma spray, which is a hotter flame, to deliver a denser coating.

Nick Armenta, automation engineer with Olympus Controls, explained that ATI’s experience with the robot’s durability is common. “We very often see the robots operate in harsh environments, taking over jobs that humans don’t want to perform,” he said. “Many think of cobots as being fragile, but the...
Puente added, "We were very surprised. I actually thought the robot wouldn't stand it. Some of these powder coatings are tungsten carbide, which is a hard metal coating. If it seeps into the bearings of the robots, we were afraid it would destroy them," he explained. But after three years of operation, ATI opened the seals on its cobot and found the bearings intact. "There were no particles in there; three years of operation, it doesn't show," said Puente. "All we do is dust the robot arm off and keep on going."

Another concern was recoil from the spray gun — Fig. 3. "We were nervous that the recoil would trip the robot or interfere with the servo capabilities. We went as high as the pressures would take to make it bounce, and it wouldn't do it. The robot simply stayed in position," he added.

Cobots Prove Reliable

Puente now has two cobots in operation — one for HVOF and one for plasma spray — and has a third being installed that will handle more complex tasks.

"We're looking into adding a vision camera so we can have the robot perform quality inspection of coated parts, locating areas that need an extra coating. There are so many things we can do with these robots that we have only started to explore," he concluded.

Manuel Sordo (mso@universal-robots.com) is area sales manager of the south central U.S. region for Universal Robots, Dallas, Tex.
The ITSA Annual Membership Meeting

Presents

Join the International Thermal Spray Association in conjunction with the American Welding Society for the 2nd Annual Advanced Coatings Symposium — “Oil and Gas”.

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Keynote Speaker

Krutibas Panda is currently a Technical Advisor with Halliburton – Sperry Drilling Services located in Houston. He has been serving his current job for the past 9 years and in the present capacity he oversees Sperry Drilling’s Materials needs. Prior to joining Halliburton, he spent about 5 years with Sandvik Mining and Construction (USA) and a brief stint with Tata Motors (India) as a Materials Engineer. He is an executive member of ASM International and a member of NACE International.

Krutibas Panda is the author and contributing author of more than 20 technical papers, research publications, and patents. His publications have appeared in leading materials journals like Acta Materialia, Computational Materials Science, Metallurgical and Materials Transactions & Journal of Materials. He received his Master of Science degree as well as his Ph.D. degree in Metallurgical Engineering from the University of Utah.

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After a successful coatings symposium in Greenville, S.C., in 2017, the International Thermal Spray Association (ITSA) in conjunction with the American Welding Society (AWS) will head to The Woodlands, Tex., on October 9–11 for the 2nd Annual Advanced Coatings Symposium.

This year’s symposium will focus on the oil and gas industry and how thermal spray plays a part in that. In addition, the symposium will be held at the same time as ITSA’s annual meeting. The annual meeting remains the premier event for the thermal spray community and provides a mutually rewarding experience for attendees on both business and personal levels.

“Combining our second annual symposium with the ITSA annual meeting will provide the perfect opportunity to meet industry experts, network with peers, and discuss common issues,” said David Lee, ITSA chairman.

Topics Embrace Several Subjects

Topics to be discussed at the symposium include the following:
- Kennametal’s surface technologies and materials for the oil and gas market
- Advantages and limitations of automation of thermal spray
- Dimensional restoration in regard to wear coatings, incorporating industry trends, and the various methods of repairing components to extend the life in service
- Overview of advanced materials applications of thermal spray coatings and laser clad overlays in the oil and gas industry
- Combining thermal spray coatings with heat treating to achieve dense metallurgically bonded coatings for wear and corrosion resistance
- New developments in HVAF coating equipment and technology
- Wear-resistant weld overlays with conventional CTC and Macroline® in comparison
- Stripping of Coatings — How does acid dissolve metals?
- Wear- and corrosion-resistant amorphous thermal sprayed coatings
- Slurry applied tungsten carbide hardfacing
- Ensuring durability: Testing and evaluation for harsh-service overlays
- Recent coating advancements to meet oil and gas industry goals for improved equipment performance
- Thermal spray of oilfield downhole tubulars for wear and corrosion mitigation.

Getting Acquainted with the Keynote Speaker

The symposium’s keynote speaker will be Krutibas Panda, technical advisor with Halliburton–Sperry Drilling Services located in Houston, Tex. Panda has been in his current position for more than nine years and currently oversees Sperry Drilling’s materials needs.

Prior to joining Halliburton, he spent about five years with Sandvik Mining and Construction (USA) and also had a brief stint with Tata Motors (India) as a materials engineer. He is an executive member of ASM International and a member of NACE International. In addition, Panda is the author and contributing author of more than 20 technical papers, research publications, and patents. His publications have appeared in leading materials journals. He earned his master of science and PhD degrees in metallurgical engineering from the University of Utah.

What Else to Expect

A number of sponsorship packages, including tabletop exhibit spaces, are still available for businesses looking to have more exposure at the symposium. For more information and to register to attend, please visit thermalspray.org/itsa-annual-meeting/.

Cindy Weihl (cweihl@thermalspray.org) is the editor of SPRAYTIME®.
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eurocorr.org

- **IMTS 2018**
  September 10–15 / Chicago, IL  
imts.com

- **World Congress on Powder Metallurgy (WORLDPM2018)**
  September 16–20 / Beijing, China  
worldpm2018.medmeeting.org

- **Heat Treat Mexico 2018**
  September 25–28 / Queretaro, Mexico  
asminternational.org/web/heat-treat-mexico-2018

### OCTOBER 2018

- **Materials Science & Technology (MS&T18)**
  October 14–18 / Columbus, Ohio  
matscitech.org

- **Euro PM2018 Congress & Exhibition**
  October 14–18 / Bilbao, Spain  
europm2018.com

- **EuroBLECH 2018**
  October 23–26 / Hanover, Germany  
euroblech.com/2018

- **2018 PM Management Summit**
  October 27–29 / San Diego, CA  
mpif.org

### NOVEMBER 2018

- **FABTECH**
  November 6–8 / Atlanta, GA  
fabtechexpo.com

- **Metal Additive Manufacturing Conference**
  November 21–23 / Vienna, Austria  
mamc2018.org

### DECEMBER 2018

- **POWER-GEN International**
  December 4–6 / Orlando, FL  
power-gen.com

### JUNE 2019

- **Additive Manufacturing with Powder Metallurgy**
  June 23–26 / Phoenix, AZ  
mpif.org

### MARCH 2019

- **Corrosion 2019**
  March 24–28 / Nashville, TN  
nacecorrosion.org

### APRIL 2019

- **2019 62nd Annual Society of Vacuum Coaters Technical Conference**
  April 27–May 2 / Long Beach, CA  
svc.org

### MAY 2019

- **Offshore Technology Conference (OTC)**
  May 6–9 / Houston, TX  
2019.otcnet.org

### SEPTEMBER 2019

- **EUROCORR 2019**
  September 8–13 / Seville, Spain  
efcweb.org

### OCTOBER 2019

- **2019 PM Management Summit**
  October 26–29 / Miami, FL  
mpif.org

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