In The News

Publications and Information

Solving Thermal Spray Coating Problems

A free guide that identifies problems encountered in thermal spray coating operations and provides specific steps to solve them has been published by ***Hobart Tafa Technologies, Inc.***, Concord, NH. The ***cross-referenced, 10-pg. technical bulletin*** includes causes of and remedies for such arc spray coating problems as poor adhesion or machinability, excessive porosity or roughness, coating cracks, chipping, or delamination, uneven coating thickness, or component distortion. All the solutions are directly keyed to the cited problems and range from incorrect surface preparation before spraying (i.e., grit not sharp enough, excessive time between blasting and spraying, contamination by masking materials), as well as evaluating actual spraying operations (e.g., standoff distance, traverse speed, amperage, and angle of impact). Additional information and free copies of the flyer are available on request.

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Equipment Data Sheet

Technical Data sheet 1.10.9.3 from ***Hobart Tafa Technologies, Inc.***, Concord, NH, presents ***equipment features and advantages*** of the 186 Transverse Movement, an accurate, modern microprocessor controlled device that allows automated thermal spraying over a rectangular area. The unit is designed for lowest unit cost, simplicity of construction, ease of operation, reliability and long life.

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1992 Proceedings Published

Proceedings of the 1992 San Diego Symposium, "***Thermal Plasma Applications in Materials and Metallurgical Processes***," Ed. N. El-Kaddah, are available from the ***Minerals, Metals, and Materials Society (TMS)***, Warrendale, PA. The book reviews the state-of-the art and presents ongoing research for investigators, users and potential users of thermal plasma technology. A broad range of applications is discussed, including melting and refining, extractive metallurgy, plasma spraying, composite materials processing, and plasma synthesis of materials.

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Do you have literature or news you'd like highlighted in this feature? Send your contributions to the Editor.

Applied Technology

Weathering the (Martian) Storm

Key to the success of the Mars Observer Program, which is scheduled to be launched by UCLA and the Jet Propulsion Laboratory this year, is accurate measurement of the energies radiated from Mars (e.g., heat, light) to the circling satellite. That means precise calibration of the measuring instrument—the Pressure Modulated Infrared Radiometer (PMIRR). What is required is a surface that will provide exact, uniform, diffuse reflection under all conditions; in scientific terms, Lambertian reflectance. Over the past two years UCLA has tried more than 200 materials in its quest for this specially reflective surface. None proved successful until ***Hobart Tafa Technologies, Inc.***, Concord, NH, provided the carefully controlled ***electric arc spraying of aluminum on an aluminum base***, which has proved to be the ideal surface. The Mars Observer is expected to accurately report Martian weather conditions–knowledge that is expected to improve meteorological forecasts on Earth.

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Thick Thermal Barrier Coatings Developed

Caterpillar, Inc., Peoria, IL, has accumulated considerable experience in simulating the effects of thermal transients and erosion on aging of diesel engine exhaust and valve coatings. As part of the U.S. DOE Heavy Transport Technology program, Caterpillar will draw from this experience to ***test thick thermal barrier coatings in simulated engine environments*** to accelerate aging effects caused by oxidation, erosion, corrosion, and thermal transients. The thermal transient (thermal shock) testing will be performed using the Caterpillar plasma-flame thermal-shock rig, which was developed for testing ceramic-coated engine valves. The coating is used to protect the valves against corrosion by vanadium pentoxide when burning residual fuels containing high levels of vanadium. The objective is to gain an understanding of the powder process and material property requirements for producing cost-effective, reliable plasma-sprayed thick thermal barrier coatings. This, in turn, will lead to greater knowledge of the interrelationships of processing and properties toward the successful development of more fuel-efficient medium- and heavy-duty diesel engines.

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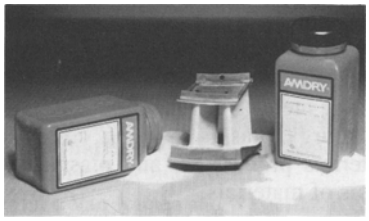
Equipment and Materials

New Powders for Thermal Barrier Coatings

Sulzer Plasma Technik, Inc., Troy, MI, announces the availability of four new AMDRY Yttria Stabilized Zirconia (YSZ) thermal spray ***powders for repeatable thermal barrier coatings with reliable microstructures***. The 6610, 6620, 6630, and 6660 powders are designed to meet the technical requirements of many OEM specifications and are suitable for producing thermal barrier coatings for such applications as turbine combustors and airfoils, rocket nozzle throats, and diesel engine valve heads, pistons, and cylinder heads.



AMDRY Powders

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Needleless Gun for Applying Abrasives

The AGN is a compact, needleless spray gun recently introduced by ***DeVilbiss Ransberg Industrial Coating Equipment***, Maumee, OH, that is ***ideal for applying abrasive material***, avoiding the problem of needle wear. Typical applications are spraying buffing compounds, ceramic glazes, water, oil applications on presses, release agents, etc. A diaphragm controls the fluid flow. The absence of a needle means less wear to the fluid tip resulting in reduced maintenance cost. No lubrication is required.

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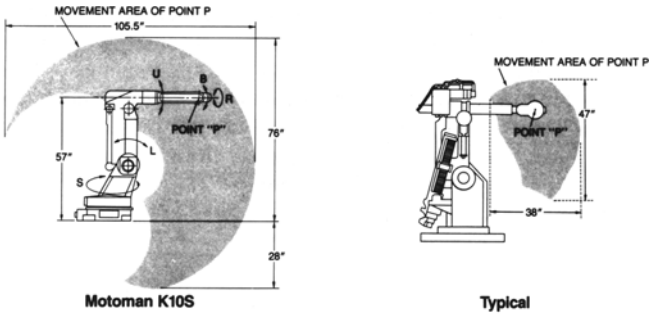
New Thermal Spray Robot

A ***six-axis articulated arm robot*** specially designed to thermal spray coat large or small parts with complex geometries has been introduced by ***Hobart Tafa Technologies, Inc.***, Concord, NH. Features of the new equipment include off-line programming capability via Ethernet as well as up-/down-load functions, operator friendly system via CRT screen messages, a teach pendant, absolute encoders to eliminate homing or return to tool center point at start-up or after program interruption—reducing process time—and AC servomotors to ensure reliability and low maintenance. All motors and controls are designed to operate reliably in hostile environments and are sealed against heat, moisture, and abrasive spray dust. Storage of programs is provided on both floppy and/or hard disk formats.



Envelope comparison

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International Services Overview

Canada

Montreal Carbide Co., Ltd., is the North American distributor of ***high-quality plasma ceramic powders*** for Japan Abrasives Co., Ltd. A manufacturerer of ***boride based composite powders*** for thermal spraying wear-resistant coatings, it was recently chosen by Thermosystems Div., Browning Co.'s, exclusive distributor of a new high-velocity air fuel system for its Canadian market through Aerospray Systems.

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England

AEA Technology is the international trade name of the United Kingdom Atomic Energy Authority (UKAEA). Thermal spraying facilities include wire arc, combustion, plasma, and low-pressure plasma with the latest robotic handling equipment. The ***considerable experimental and analytical resources*** of the Harwell Laboratory are applied in solving a variety of problems.

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France

In April, 1991, ***Plasma-Technik SA*** inaugurated a new facility near Lyon, employing 20, including 14 engineers. One of three P-T research centers developing thermal spray applications and products in France, it has unique capabilities for powder treatment through inductive plasma processing and coating with controlled atmosphere plasma spray systems (CAPS).

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India

The ***Metallizing Equipment Co.*** has agents in Madras, Bangalore, Calcutta, and Visakhapatnam, India. The company was formed in 1967 and has some 125 employees. Thermal spray equipment includes ***HVOF and plasma systems***.

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U.S., Northeast

Brodeur Machine Co., Inc., New Bedford, MA, is a full-line fabrication and machining facility with an ***integrated thermal spray coating division***. Thermal spray equipment includes HVOF, plasma, and wire arc processes.

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A Closer Look: Company Profile

Control Vision, Inc., Idaho Falls, ID, USA

Control Vision was founded by J.O. Bolstad in December 1986. As a group, the principals bring more than 60 years of experience to the company in various areas of engineering, manufacturing, technical marketing, project management, business management, etc. Its primary business is to develop and manufacture laser-augmented vision systems for industrial use. These special-purpose camera systems are especially useful for various forms of arc welding and also for many other industrial and research processes where vision is impaired by the high luminosity of a plasma, combustion flame, high-temperature furnace, etc.

The Control Vision sensor is based on a patented technique invented and perfected by J.O. Bolstad, Craig Shull, and their associates. In 1986, they were awarded the prestigious IR 100 Award, presented by Research and Development Magazine. Each year, this magazine selects 100 new products developed in the United States and elsewhere that are thought to be the most significant new technical products of the year. Winning products are selected on the basis of their importance, uniqueness, and usefulness from a technical standpoint, as determined by the magazine's editorial staff, advisory board, and other experts.

LaserStrobe Viewing System

The complete camera system is comprised of one or more strobe illumination units, a camera head, and a system controller. The pulsed laser is an ideal strobe light source for some of the more demanding applications. The type of laser used produces an optical pulse of 5 ns duration. It is a gas discharge laser, producing the energy for the laser pulse by means of a very rapid high energy electric discharge through a sealed laser cavity of high-purity nitrogen gas. This laser is especially attractive for industrial applications, because it is reliable, simple in design, and needs very little maintenance. It does not require a vacuum pump, a continuous gas supply, a cooling system, or any other sort of support equipment often required for pulsed laser systems.

The typical close-up viewing application will require only about 5 mW of average optical beam power at 30 pulses per second. This can be achieved with a unit comparable in size to a small briefcase with a net weight of 20 lb. or less. The attached fiberoptic cable assembly can be fabricated in lengths up to 100 ft. with minimal loss of laser energy.

A strobe illumination system would be more suitable for routine process monitoring, process control, and diagnostic activities on the factory floor. Similar systems are routinely used with machine vision for inspection of components on a conveyer belt, etc.

The specialized camera head provides the electronic shuttering capability and also amplifies the intensity of the strobe image by a factor as great as 10,000-to-1. The image is relayed to a small CCD video camera integrated into the aluminum housing. With the high gain capability, there is enough light for good exposure of the CCD camera, even when using a laser system of relatively low average power. Customized optics are available for unique imaging problems.

A separate system controller sends the appropriate trigger commands to fire the strobe unit(s) and to initiate shuttering of the camera head. These commands are generated first by creating a master timing pulse that is synchronized with the camera video and then by introducing electronic delay in the laser trigger and shutter channels to compensate for other inherent optical and electronic delays. Triggering commands can be generated externally to coincide with events of interest such as the pulsing of a laser or the impact of projectiles on targets.

The controller also serves as a power source to the camera unit and provides a means to adjust the sensitivity, shutter speed, frame rate, and double-exposure functions of the camera. It includes a video frame storage capability that is programmed to repeat a video frame produced by the camera head until replaced by a new frame. This removes the flicker observed in the raw camera video when operating the system at frame rates of 15 Hz or lower. The controller includes a built-in 6 in. monochrome video monitor and a video recorder/playback unit incorporating a standard 8 mm miniature tape cassette. Standard NTSC output is provided for integration with video devices or computer frame grabbing boards.

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Is your company providing a unique service or product? Send your profile to the Editor for presentation in this space.

Industry Panorama

International Thermal Spray Association Formed

In a move that reflects a new mission and new purpose for the organization, Metallizing Services Contractors (MSC) voted to become International Thermal Spray Association (ITSA)—a name that more accurately describes the activities of its members, as well as their market focus. The organization, founded in 1948, has been a prime mover in the development of commercial applications for thermal spray in North and South America and is now exerting considerable influence in international markets as well.

According to the ITSA newly-elected chairman, Daniel W. Parker of General Plasma in East Windsor, Connecticut,

expanding its membership to include more United States and International members. For membership information, contact Daniel Parker at (203) 623-9901 or Gary Ritchie at (213) 232-2371.

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Thermal Spray Division Activities ASM International®

The purpose of the Thermal Spray Division of ASM International is the collection and dissemination of technical information concerning the performance, processes, properties, and applications of thermal spray. The Division is structured of several committees that channel information obtained from research, applications, equipment, materials, and testing to its members. It essentially directs the future of thermal spray technology.

The conversion point of the Thermal Spray Division and the thermal spray industry is the annual International Thermal Spray Conference and Exposition, which is designed to facilitate application of the latest ongoing research in commercial applications, as well as to provide a forum for interaction between thermal spray users and R & D personnel. The conference (this year, 29 May-5 June, Orlando FL) features a week-long agenda of technical sessions on engineering and process science covering a variety of thermal spray subjects with a concurrent exposition to enhance the technical sessions.

Since its organization in 1986, the ASM Thermal Spray Division has been one of the Society's highest growth areas. Organizers of the 1991 ITSC in Pittsburgh report that the event, highlighted by preconference tutorial sessions and the presentation of 90 papers heard by 1,314 attendees (including more than 60 international visitors), was the most successful to date. In addition, 69 organizations participated in the Exhibition.

In addition to conference programming, the Division displays increased committee activity. The Education Committee, chaired by Dr. Ron Smith, Drexel University, spearheaded the development of several thermal spray education courses held at the ASM Materials Park location during 1990-91. Currently a thermal spray home study course is being produced and will be available in Fall, 1992.

During Winter, 1992, an industry focus group comprised of Division members will undertake a study of thermal spray process emissions in an effort to address existing and expected state and federal regulations. The project will include the best available and most appropriate control technology.

A new Division Industrial Technology Committee is also being organized to help bridge academic and industrial interests and broaden OEM acceptance of thermal spray technology. This interface is expected to result in an agenda to guide the direction of R & D efforts.

The Division membership endeavors to identify and meet the informational, educational, and networking needs of the industry it represents, including manufacturers, distributors, contractors, and users. The membership is comprised of workers, scientists, and engineers from industry, government, academia, and national laboratories. The general areas of interest that are addressed include:

- Equipment and processes
- Automation and mechanization
- Controlled atmosphere and vacuum conditions
- Feedstock materials
- Manufacturing and processing methods
- Materials and coatings characterization, testing, evaluation
- Nondestructive evaluation and quality assurance
- General applications
- Refurbishment
- Coating functionality

Research and development on thermal spray processes has generated significant insight concerning deposition processes, coating characterization and evaluation, process characterization, post-processing, materials, and thermal spray science and technology. A synergistic approach is often employed that involves teams from government, industry, university, and the national laboratories working together and with the ASM Thermal Spray Division to address industrial concerns and problems and to expedite technology transfer.

Thermal spray coatings are now designed for specific properties, which reduce the need for expensive base materials. Being up-to-date and knowledgeable concerning thermal spray technology and related research allows designers to incorporate the coatings at the design phase of manufactured components. Materials, design, and manufacturing engineers who specialize in surface enhancement technology, representatives from companies that maintain equipment/components in industry, and scientists and engineers involved in applications and/or research engineering have found access to the latest industry information just one of many benefits of affiliating with the ASM International Thermal Spray Division. If you are interested in joining ASM and participating in the activities of the Thermal Spray Division, contact Gary Ritchie, Thermal Spray Membership Committee 213/232-2371; D.J. Varacelle, Jr., Thermal Spray Public Relations Committee 208/526-9341; or Edward J. Kubel, ASM International® 216/338-5151.

ITSC '92: 29 May-5 June 1992, Orlando, FL, USA International Thermal Spray Conference and Exposition

With the presentation of more than 260 technical papers, accompanied by 70 commercial exhibitors from 19 countries, the 1992 International Thermal Spray Conference promises to be the premier, world-class forum for the exchange of important new technical and commercial thermal spray information on applications, materials, processes, equipment, and testing/characterization. With a more than three-fold increase in papers and exhibits since the last international conference, ITSC '89, held in London, the Orlando event reflects the tremendous growth in interest and use of thermal spray technology in recent years.

ITSC '92 has been organized by ASM International on behalf of the Select Committee on Surfacing and Thermal Spray of the International Institute of Welding (IIW). In addition, seven professional organizations in the U.S., Europe, and Japan have contributed expertise and assistance as co-sponsors of this significant international event.

A unique opportunity to learn about new developments in thermal spray applications, materials, technology, and science from worldwide leaders in this rapidly growing field, ITSC '92 affords a wide range of resources to those who

may be seeking solutions to specific materials or applications problems. In addition to a full week of oral presentations and posters, the conference features a special session of invited papers reviewing important developments in thermal spray technology from countries around the world to foster mutually beneficial interactions among members of the worldwide scientific, commercial, and user communities.

Those who wish to take full advantage of the learning opportunities available at ITSC '92 will want to sign up for one or more short courses on basic or advanced aspects of thermal spray technology. The courses will be offered at various times during the week and weekend preceding the general conference. An extensive social program has also been arranged to provide opportunities to meet and network with other conference participants. In addition, conference attendees and their families can enjoy leisure time at Disney World, Epcot Center, and several other local attractions conveniently located near the conference hotel.

For advance registration or additional information, contact Lisa Hemeyer, Conference Coordinator, ASM International®, Materials Park, OH 44073-9998, USA; 216/338-5151; Fax 216/338-4634.

Notables

Jack Kittle Joins H.C. Starck Inc.

Jack R. Kittle has recently joined H.C. Starck, Inc. as the Technical Manager, Amperit Thermal Spray Powders in the United States. Jack brings 35 years of experience in thermal spray coatings as a developer, applicator, end user, and powder manufacturer. He has been very active in the Thermal Spray Division of ASM International since its inception and is currently serving as Exhibit Chairman for ITSC '92. Jack can be contacted at Hermann C. Starck, Inc., 280 Park Avenue, New York, NY 10017.

Jack Ritchie and Merle Thorpe Honored by ASM International®

Jack Ritchie and Merle Thorpe were inducted into the 1991 Class of Fellows at the Materials Week meeting of ASM International.

The banquet for the awards was held at the Hyatt Regency Hotel, Cincinnati on Tuesday 22 October.

Jack is the President of Bender Machine, Inc., Vernon, California. His citation reads, "For pioneering developments in coating leadership in the advancement of thermal spray processes."

Merle is the President of Hobart Tafa Technologies, Inc., Concord, New Hampshire. His citation reads, "For outstanding contributions to the technical development and management of companies in the fields of plasma sprayed coatings and plasma chemical synthesis systems."

Jack and Merle join an outstanding group of thermal spray technologists, engineers, and scientists who have made exceptional contributions to the field. Congratulations!

Daniel Parker is Elected Chairman of ITSA

Daniel W. Parker of General Plasma (East Windsor, Connecticut) is the inaugural Chairman of the new International Spray Association (ITSA). He can be contacted at (203) 623-9901 for further information.

Thermal Spray Scholarships Awarded by ITSA

The first International Spray Association (ITSA) scholarships for advanced thermal spray studies were awarded to Lysa Wasielesky of the State University of New York at Stony Brook (SUNY) and Mahesh Mohanty of Drexel University. The awards were made during the ASM Materials Week '91 by ITSA executive committee member, Jack Ritchie, and secretary/treasurer, Gary Ritchie. Accepting the awards on behalf of the students were Dr. Ronald Smith of Drexel and Professor Herbert Herman of SUNY.

This marks the first annual presentation of the ITSA Scholarship Awards, which were established by the organization last year. ITSA Chairman Daniel W. Parker described the scholarship program as "a vitally important step in supporting the quality of growth in the thermal spray industry, an industry which is becoming increasingly sophisticated in terms of application requirements."

Ms. Wasielesky is currently studying for her Master's degree in Materials Science, with a focus on thermal spray coatings and processes. Her major area of interest is the tribology of HVOF coatings, especially the wear behavior of aluminum-bronze coatings.

Mr. Mohanty is a researcher with the center for the Plasma Processing of Materials at Drexel where he is completing his M.S. studies. "The ITSA scholarship," says Mr. Mohanty, "will enable me to continue here for a Ph.D. I am very grateful for the opportunity to continue my studies, because I believe thermal spray has a tremendous future. On behalf of myself, the research department and Drexel University, I wish to thank International Thermal Spray Association for this honor."

International Thermal Spray Association was established in 1948 to promote thermal spray technology. It is one of the sponsors of the National Thermal Spray Conference. For 1992 scholarship information, contact Albert Kay, ITSA Scholarship Chairman, ABS Industries, 1031 Lambert Street, Barberton, OH 44203-1689, (216) 753-8458.

International Thermal Spray Association Scholarship recipient Lysa Wasielesky (left) with Professor Herbert Herman of SUNY.