In The News

Education

ASM International offers the following four instructional courses at ASM Headquarters, Materials Park, Ohio, USA that are of special interest to thermal sprayers:

Quantitative Metallography, 27-29 April 1993: This course stresses the practical aspects of extracting quantitative information about materials microstructure from metallographic images and covers (1) basic concepts of stereology (definitions, measurement parameters); normal polished section images viewed in the light microscope; (2) global structural measurements (volume fraction, specific surface areas, intercept lengths, contiguity of phases, directionality); (3) projected images (transmission images of transparent matrices, truncation of features, and measurement of dispersed particles); (4) distributions of size, shape, position, orientation; fundamental statistical interpretation of data; (5) capabilities of automatic and semiautomatic image analysis systems, and manual measurement strategies; hands-on instrument sessions with technical specialists; and (6) advanced topics of surface curvature, gradients, analysis of shape, application to SEM, TEM, and other image-producing instruments, image processing, surface measurements of roughness and dimension (including stereoscopy).

The instructor is John C. Russ, Research Associate and Visiting Associate Professor, Materials Science and Engineering Department, North Carolina State University. Mr. Russ is a noted expert in the fields of image analysis and measurement, as well as scanning electron microscopy and X-ray microanalysis; he is the author of *Practical Stereology*.

Circle No. (3) on reader service card.

Metallography of Plasma Spray Coated Materials and Superalloy Coatings, 13-15 April 1993: This course is designed to familiarize students with techniques that will provide a clearer representation of plasma-sprayed coatings and superalloy casting macro/microstructures. Microstructural interpretation including phase identification procedures of these materials requires proper preparation techniques. Examination of superalloy castings for microporosity definition will be emphasized, with various metallographic techniques for use in achieving a better understanding of castings. Much of the course activity will require students to perform hands-on preparation and evaluation of samples using state-of-the-art equipment.

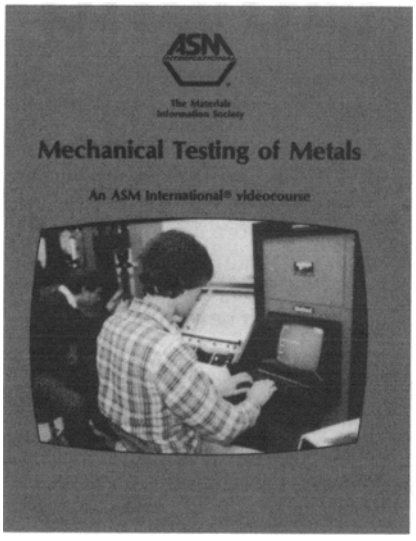
The program includes: (1) an overview of specimen preparation procedures applied to plasma-sprayed coatings and cast superalloys; (2) instructions and hands-on operation using current techniques; (3) use of vacuum infiltration procedures where needed; (4) understanding the relation between procedures and the resultant microstructure; (5) identification of phases using interference layer techniques; (6) proper use of automated polishing equipment to determine sample integrity; (7) etching and etchants—chemical electropolishing procedures; and (8) instruction and operation of optical equipment—metallurgical microscopes, metallographs, and photomicrographic cameras.

The instructor is Arthur Geary, Senior Materials Engineer, United Technologies Corporation, East Hartford, CT. He has accrued 31 years of experience in metallography and recently has devoted considerable effort to automating metallographic specimen preparation. His responsibilities have included metallographic management in addition to the development of advanced techniques to bring an engineering approach to materials characterization.

Circle No. (4) on reader service card.

Mechanical Testing of Metals, 19-23 April 1993: This basic course will include lectures to define and discuss testing properties and the fundamentals and applications of mechanical testing in metalworking industries, as well as laboratory demonstrations, including compilation and interpretation of data for practical applications. It is intended for employees of industrial firms whose products or services require control and evaluation by mechanical testing. Those involved in areas such as product development, quality control, design and process engineering, production, supervision, sales, and purchasing will find it valuable.

The course will feature hands-on tensile testing and Rockwell hardness testing using automated equipment. The following companies have contributed equipment to the mechanical testing laboratory: United Testing Systems, LECO, Buehler, Wilson Instruments, Newage, Metlab, Inc., Leitz,



Mechanical Testing of Metals

Errata

The staff of the *Journal of Thermal Spray Technology*, in good faith, always tries to ensure the accuracy of its editorial material. We apologize to the authors and organizations concerned for the omissions that occurred in previous issues:

The cover photograph of Vol 1, Issue 2 should have acknowledged the Laboratory of Prof. H-D. Steffens, The Institute of Materials Technology, University of Dortmund, Dortmund, Germany.

The cover photograph of Vol 1, Issue 3 should have acknowledged Arthur Geary, United Technologies Corporation, East Hartford, CT, USA.

King, Clark and Krautkramer Branson. The following topics are covered: (1) introduction to mechanical testing—mechanical tests in quality assurance, personnel qualifications, statistics, and documentation; (2) instrumentation and calibration of mechanical testing equipment—calibration of universal testing machines, standardization of test specimens, extensometers, hardness testing equipment, specifications, and certification of calibration; (3) hardness testing—static indentation tests, rebound tests, scratch tests, macrohardness and microhardness tests (such as Brinell, Rockwell, Knoop, Vickers, Scleroscope, and file tests); (4) fundamentals of tension and compression testing—standards for tests, elastic/plastic behavior (load/elongation curves), specimen design and preparation, data recording, and interpretation; (5) special applications of tension and compression testing—elevated and subzero temperatures, equipment, specimens, and test performance; (6) shear, torsion, creep, and creep-rupture testing—fundamentals, equipment, specimen preparation, applications and data interpretation; (7) ductility and formability testing—sheet metal bend tests, formability and drawability of sheet metal, bend tests for bar stock, powder metallurgy parts, carbide, cast iron and tool steels, and flare tests; (8) fracture testing—ductile versus brittle behavior, impact tests including Charpy V-notch and Izod, dynamic tear, drop weight, fracture toughness tests; (9) fatigue testing—fundamentals, equipment, simple beam, cantilever beam, rotating, nonrotating, axial, servocontrolled; and (10) computers in mechanical testing—introduction to computer technology, strengths and limitations of computer controls, data recording, repeatability of tests.

The instructor is James Bosscher, Ph.D., former Professor of Engineering, Calvin College, with 35 years of successful materials teaching experience at all levels.

Circle No. (5) on reader service card.

Metallographic Techniques in Specimen Preparation, 3-7 May 1993: This course is one of several MEI courses that are available only on an intensive basis at Materials Park because of required laboratory exercises. The time for learning and acquiring the skill to produce suitable metallographic specimens has been doubled compared to previous courses. The combination of additional instruction and more time to develop skill techniques will enable students to enhance their careers. The various facets of sectioning, mounting, grinding, polishing, and etching will be treated in depth to maximize skill training.

The program includes: (1) introduction and overview of metallographic specimen preparation; (2) proper sectioning of specimens to avoid metallurgical changes—abrasive wheel selection; (3) selection of mounting media and methods for edge retention; (4) proper mounting procedures, abrasive selection, speed and pressure for rough grinding; (5) correct combinations of polishing cloths, abrasives, and extenders—speed, pressure, and time; (6) preparation of etchants and their use to reveal the microstructure; (7) special polish—etch techniques to minimize disturbed metal; (8) specimen preparation using electropolishing and electroetching; and (9) special sequences for soft and hard materials and retention of inclusions and graphite.

The instructor is Arlan Benscoter, Research Engineer, Materials Science and Engineering Department, Lehigh University. Mr. Benscoter directs the light optical microscopy laboratories; he has 24 years of industrial experience as a metallographer at Homer Research Labs, Bethlehem Steel.

Circle No. (6) on reader service card.

ASM Videocourses

ASM International is offering video training programs on topics such as Practical Heat Treating, Metallurgy for the Nonmetallurgist, Corrosion, Elements of Metallurgy, Nondestructive Testing, Mechanical Testing of Metals, Principles of Failure Analysis, Principles of Machining, and Welding Inspection and Quality Control. Contact ASM concerning a preview offer for these tapes.

Circle No. (7) on reader service card.

Thermal Spray Technology Videocourse

"Thermal Spray Technology," an eight-tape, full-color videocourse, provides an understanding of thermal spray processing science for each thermal spray coating process. Advancing into many new and sophisticated applications, thermal spray is no longer limited to traditional applications associated with wear and corrosion. Coatings are increasingly being applied for decorative effect, implant prostheses, and electrical isolation/conduction applications. The implementation of surface modification and coatings has assumed an increasing role in meeting current complex technological needs.

This series presents the theory and practice of coatings, including coating application and characterization and testing. Practical coating systems for electric arc, flame, and plasma applications and practice, and interaction of thermal spray coatings with materials, are examined. The eight-part series covers:

- *Surface Science*: Wear, corrosion, hardening, carburizing, nitriding, electroplating, electroless plating, phosphating, vapor deposition, and hardfacing
- *Equipment and Theory*: Combustion and electric wire-arc—thermal spray history, basic theory of coating processes, porosity, bonding, application, combustion spray processing and equipment, material feed, deposit characteristics, and HVOF
- *Equipment and Theory*: Plasma spray, theory of the fourth state of matter, air plasma spray, powder feed, particle distribution trajectory, LPPS plasma spray variations, material feed systems, controls, consoles and power supplies, ancillary equipment, safety, and hygiene
- *Processing and Design*: Bonding, cleaning, processing, masking, temperature control, spray pattern, process variation, automation, fusing, densification, finishing, and stripping
- *Materials*: Material production methods, particle classification methods, quality control, materials specification, and standards
- *Applications*: Aerospace, automotive, biomedical, ceramic and glass, marine, nonskid, electronics, printing, processing industries, and textiles
- *Testing and Characterization*: Methods and mounting, variations in test equipment, metallurgy and materials, grain size, bonding, coating buildup, response generators and variations, metallographic procedures, sectioning, vacuum impregnation, mounting materials and techniques
- *Testing and Characterization*: Preparation and procedures, specimen preparation, grinding, equipment, abrasive types, material reaction, deformation and smearing, polishing concepts and procedures, etching, lubricants, hardness and tensile testing.

"Thermal Spray Technology" will be of value to those who are new to the field, or those who provide technical support in purchasing, sales, and administration. Process, application, development and design engineers, as well as researchers and quality control personnel, will also find this series beneficial. This videocourse (modeled after the popular written course of the same name) uses a professional narrator and provides technically reviewed instructional materials developed by a panel of industry experts.

Circle No. (8) on reader service card.

Thermal Spray Techniques & Technologies

A four-day course on "Thermal Spray Techniques & Technologies" will be offered on March 15, May 24, August 9, and October 25 by The Hobart Institute of Welding Technology. "Thermal Spray Techniques & Technologies" has been designed to meet the needs of companies that are investing significant resources in thermal spray technologies. It combines classroom learning with hands-on experience. Course topics include fundamentals of thermal spray coatings, principles of thermal spray processes (plasma, high-velocity oxyfuel, wire arc, and flame), equipment and control principles, critical coating process steps, thermal spray coating structure characteristics, coating materials selection, and more.

Circle No. (9) on reader service card.

ITSA 1992 Scholarship Winners & Call for New Candidates

International Thermal Spray Association Scholarship Chairman, Albert Kay, has announced that two SUNY, Stony Brook, NY, students have been named 1992 recipients of the association's annual award. The awards, presented at the ITSA Spring '92 meeting in Orlando, have enabled Robert Gansert of Port Jefferson, New York, and Jan Ilavsky of Czechoslovakia to pursue advanced studies in thermal spray coatings and processes.

Mr. Gansert is currently conducting research for a U.S. Army Corps of Engineers program for the rehabilitation and maintenance of highway infrastructures. The Thermal Spray Laboratory at SUNY has focused on the application of automated thermal spray systems for such structures as dams, flood gates, and bridges that are exposed to deicing salts and marine environments. His research will support that effort.

Mr. Ilavsky is pursuing a Ph.D. degree through his studies at the SUNY Thermal Spray Laboratory. His graduate research covers a large variety of problems in thermal spray coatings and thermal spray free-standing forms. Mr. Ilavsky is also participating in a study on the use of thick thermal barrier coatings for diesel applications in conjunction with Caterpillar Inc.

Two one-year $1500 scholarships will be awarded to qualified students from the United States and the international community who are matriculating in advanced thermal spray coatings or processes at a North or South American accredited university and who have at least one more year of thermal spray studies to complete. The scholarship program, along with numerous other ITSA programs, supports the Association's goal of "advancing the state-of-the-art in thermal spray technology."

Circle No. (10) on reader service card.

New Literature and Information

Bibliographies on Ceramics, Polymers, and Composites

These computer-generated bibliographies are produced from the Engineered Materials Abstracts database and provide a low-cost alternative to a customized database search. Coverage is international, and the bibliographies include journal articles, conference papers, reports, and patents.

Each bibliography contains 100 to 300 references, together with subject, author, corporate author, and trade names indexes. Each reference includes the title, author(s), bibliographic source, and original language of the paper. In most cases, there is an abstract in English summarizing the content of the paper.

Some of the larger bibliographies are split into different time periods for greater manageability. Each part is sold separately, and customers should be careful to note which part or parts (A, B, etc.) they require. Earlier material is available on request. Examples of bibliographies of interest to the thermal spray community include:

Shaping and Forming Ceramics from 1986 to June 1992, 238 references (order No. C302). Forming of unfired green ceramics, production of powder compacts, near-net shaping, casting and molding techniques.

Nondestructive Testing of Ceramics from 1986 to 1988, 208 references (order No. C401A). From 1989 to June 1992, 246 references (order No. C401B). Includes ultrasonic, acoustic emission, radiography, and other inspection methods.

Surface Finishing of Ceramics from 1989 to 1990, 234 references (order No. C701A). From 1991 to June 1992, 191 references (order No. C701B). Coating processes and coatings on ceramic materials, polishing, metallizing.

Ceramics in Engine Components in 1989, 236 references (order No. C1001A), in 1990, 186 references (order No. C1001B), and from 1991 to June 1992, 237 references (order No. C1001C). Fabrication, design; performance; mechanical and thermal properties; quality control and testing; reliability; joining techniques; materials selection; materials development.

Corrosion Mechanisms and Oxidation of Ceramics from 1988 to 1990, 261 references (order No. C1501A). From 1991 to June 1992, 167 references (order No. C1501B). High-temperature oxidation and corrosion resistance, chemical stability, effects on properties.

Biocompatible Materials for Implants and Prosthetics from 1989 to 1990, 213 references (order No. Z1001A). From 1991 to June 1992, 157 references. Properties, testing methods, materials selection, includes dental applications.

Weight Reduction in the Automotive Industry from 1986 to June 1992, 137 references (order No. Z1004). Development of lightweight materials, design and performance of components, materials selection and substitution, materials properties.

Weight Reduction in the Aerospace Industry from 1986 to June 1992, 145 references (order No. Z1004). Development of lightweight materials, design and performance of components, materials selection and substitution, materials properties.

Advanced Materials for Automotive Components: World Business Brief for 1990, 173 references (order No. BZ1001A) and from 1991 to June 1992, 213 references (order No. BZ1001B). From ceramic turbochargers to plastic air dams to composite leaf springs, the current

generation of automobile relies heavily on nonmetallic materials to provide design advantages at a lower cost.

Circle No. (11) on reader service card.

ITSA Offers an Information Kit

The International Thermal Spray Association (ITSA) is offering a new information kit and brochure that outlines association activities, membership qualifications, new thermal spray programs, and a retrospective of ITSA's role in the thermal spray industry.

Circle No. (12) on reader service card.

A Cost Comparison of Seven Thermal Spray Processes

A new technical bulletin, "Cost Comparisons for Various Thermal Spray Processes," has been developed by Hobart Tafa Technologies, Inc., Concord, NH. Included in the bulletin are detailed cost data on seven thermal spray processes, including powder flame spray, wire flame spray, wire arc, HVOF hydrogen, HVOF propane, and HP/HVOF kerosene.

Three major elements of the processes are evaluated, including deposit rate (lb/h), gun operation ($/h), and cost to deposit one pound of material (including electricity, gases, air and water but not labor, parts or material). Cost comparisons, for identical end results, range widely from $2200 versus $100 for a boiler restoration project. Also, cost per pound of material deposited between various processes can range from $10.43 to $0.40.

In addition to the calculated comparison, explicit cost calculations are provided (with stainless steel as the example) for all seven processes for both manual and robotic applications, including labor, overhead, feeds, investment, and amortization. Complimentary copies of "Cost Comparison for Various Thermal Spray Processes" are available from Hobart/Tafa.

Circle No. (13) on reader service card.

Characterization of Materials

Characterization of Materials, by J.B. Wachtman, Butterworth Heinemann, is written for the many physicists, chemists, materials scientists, metallurgists, ceramists, chemical engineers, and others who are interested in learning about materials characterization. In addition, for characterization specialists who need a concise source on techniques outside their area of expertise, this book provides an integrated overview of this broad subject. It provides a survey of major characterization techniques used to determine composition and structure from raw materials to finished parts to materials and structures in service. Characterization is essential at all stages of processing, design, and use of materials to determine the composition and structure (including microstructure) that control materials properties.

Circle No. (14) on reader service card.

Materials Science and Engineering

CRC Materials Science and Engineering Handbook, J.F.Shackelford, Ed., is intended to provide a number of useful features to practicing materials scientists and materials engineers. The Handbook provides a comprehensive source of data for engineering materials presented in an easy-to-follow format based on materials properties. Tabular data are supplemented by numerous graphics. The *CRC Materials Science and Engineering Handbook* incorporates data from a broad spectrum of other materials sources (e.g., major professional societies in the materials field, such as ASM International and the American Ceramic Society). It also provides up-to-date data on such topics as the annual materials cost survey, the annual materials engineering survey, and the annual materials engineers' salary survey.

Circle No. (15) on reader service card.

ITSA Membership Growth in 1992

Daniel Parker, Chairman of the International Thermal Spray Association (ITSA) reports that 1992 was a year of growth in terms of membership and new industry commitments. ITSA restructured its organization charter late in 1991, enlarged the scope of its involvement in the thermal spray industry, and launched an international membership drive. "The result," says Chairman Parker, "was a heavy volume of membership inquiries during the year from the U.S. and abroad."

Companies accepted for membership in ITSA during 1992 included Alloy Sales (Richmond, British Columbia), Air Products & Chemicals (Allentown, PA), Ceramcoat-Setech (Australia), Norton Company (Worcester, MA), Hoffman Blast Room Equipment (Plano, TX), Sermatech International (Limerick PA), Browning Thermal Systems (Enfield, NH), Sulzer Escher Wyss (Portland, OR), HC Starck (Goslar and Laufenburg, Germany, New York City, and Newton, MA), Advanced Materials Technology (Tempe, AZ), Praxair Specialty Powders (Indianapolis, IN), Flow International (South Kent, WA), and Zircoa (Solon, OH).

The expanded international membership now includes contract thermal spray shops, equipment builders, suppliers of consumables, and research associates. Chairman Parker stated that, "The present scope of the membership reflects the organization's expanded commitment to supporting both the quality and the breadth of international thermal spray growth in the coming decades—decades which will demand a higher level of technology, technical personnel and market awareness, worldwide." In October 1992, ITSA representatives Daniel Parker, Merle Thorpe, and Roger Kaufold met with officials of ASM International at Materials Park to forge a closer working relationship between the two organizations, both of whom share a common commitment to the growth of the international thermal spray industry.

Current ITSA programs include an annual Scholarship Program, cosponsorship of the International Thermal Spray Conference (Kobe, Japan, 1995), TS93 (German Welding Society, Aachen, Germany, March 3-5, 1993), and the National Thermal Spray Conference (Anaheim, CA, June 7-9, 1993). They provide support for the Industrial Study Group for Environmental Compliance, the development of universal thermal spray and TQM standards, industry research programs, and a customer service guarantee that encourages expansion of the thermal spray market.

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

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

Industrial History of the ITSA

The history of 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 almost all major advances in technology, equipment and materials, industry events, education, standards, and market development in North and South America.

In a move that reflects an expanded global mission, as well as one that reflects the present scope of thermal spray technology, Metallizing Services Contractors voted to become International Thermal Spray Association in October 1991. Under its new charter, the Association will build on a history of active industry involvement to promote thermal spray technology worldwide.

Early Beginnings

The metal spraying industry began in the early 20th century when Dr. M.U. Schoop of Zurich, Switzerland, developed the first process for spraying metal and, subsequently, the first equipment to spray metal in wire form. Early commercial applications for the "Schoop Process" or "metallizing" occurred in Germany and later in France. Schoop subsequently sold his rights to a German firm known as Metallizator, which then made and sold spray units in Europe, England, and the United States beginning in the early 1920s. Among the early US companies to adopt the technology were Metal Coatings Company and Metalweld of Philadelphia and Metallizing Company of Los Angeles. Early applications included the coating of railroad tank cars, US Navy ship tanks, coal barges, and the spraying of the emergency gates for the Panama Canal.

Applications for industrial plants accelerated during the Depression, and during this decade, the greatest push for what was then known as "flame spraying" occurred. Four entrepreneurs—Larry Kunkler, Rea Axline, Charles Boyden, Sr., and Charles Stipp from the Metallizing Company of America—were largely responsible for pushing metallizing to the front of the American industrial scene. In 1932, Rea Axline (a subsequent founder of Metco) exhibited his company's "Three-in-one Metallizing Unit" at a meeting of the Galvanizer's Institute at the Hotel Statler in St. Louis. Sixteen years later, the American Metallizing Contractors Association, the predecessor of the International Thermal Spray Association, was founded in the same hotel. The meeting was arranged by Walter B. Meyer of St. Louis Metallizing Company and William H. Fatka of Metallizing, Inc. of Chicago. Soon they were publishing a newsletter, *AMCA News*, to share new thermal spray technology information and identify new market opportunities for members.

With the advent of World War II, the American thermal spray industry went into high gear, with the members of the Association playing a key role in providing the "metallizing" desperately needed for replacement parts for industrial equipment. Walter Meyer and Tom Lufkin of Tranter Manufacturing Company worked with the Army in the China-Burma-India theater. Knowles Smith of Dix Engineering Company worked with the Navy. By the end of the war, metallizing was firmly established as a major industrial process. Applications included large elevated water tanks, tuna fishing boats, chemical industry tanks and tank cars, capacitor castings, and pipe.

In response to an increasingly sophisticated market, the Association drew up industry specifications for the application of corrosion-resistant coatings and spelled out the methods of inspecting them. These were distributed to engineering firms, designers, and educational institutions throughout the world and resulted in increased business opportunities for the entire metallizing industry. The advent of fusible alloys, flame spraying of ceramics, and plasma spraying soon followed.

In 1976, the Association cosponsored, with the American Welding Society (AWS), the first International National Thermal Spray Conference held in the United States. The event took place in September of 1976 in Miami Beach. Contemporary accounts described the event, which drew 515 people from 28 countries, "as the most successful international conference to date." Eight members of the Association presented technical papers at the event, "receiving international recognition for their contributions to the world body of technical knowledge." This event paved the way for ITSA sponsorship of the National Thermal Spray Conference.

Association members were also important contributing authors and researchers for the AWS manual, "Thermal Spraying—Practice and Theory Application." Published in 1985, this was the first definitive work on thermal spray produced in the United States.

The Role of ITSA Today

Today, ITSA is working to raise the level of awareness of general industry and government on the advanced capabilities of thermal spray technology and the vitally important problems it can solve in terms of keeping its member nations competitive, safe, and forward-moving. Thermal spray applications have moved from a traditional base in aviation to encompass ground-based turbines, automotive, biomedical, electronics, highway infrastructure, and virtually every other industry. According to 1991 figures, the thermal spray market is expected to reach $2 billion by the year 2000.

The ITSA mission in the 1990s is to return real value to its membership in terms of prestige and business opportunities and to make contributions to the industry as a whole. The Association charter calls for the active support of total quality management (TQM) and the quality of thermal spray growth through the ITSA scholarship program, through the support of responsible environmental studies, by working cooperatively with the industry in the writing of universal standards and specifications, through the development and exchange of technical information, through advertising and industry participation, and by promoting a code of business ethics that imbues confidence and satisfaction among consumers of thermal spray coatings.

National Thermal Spray Conference & Exposition

With nearly 200 contributed papers from more than 20 countries, a sold-out exposition, keynote and plenary presentations, and workshops and education courses, the 1993 National Thermal Spray Conference & Exposition (NTSC '93), 7-11 June 1993, Anaheim, CA, will be a "must attend" event for the thermal spray industry.

NTSC '93 is sponsored by ASM International and cosponsored by the American Welding Society, the International Thermal Spray Association, the Japanese Thermal Spraying Society, the High Temperature Society of Japan, and Deütscher Verband für Schweisstechnik e.V. NTSC '93 follows the world's largest thermal spray event—ITSC '92, the International Thermal Spray Conference & Exposition. Held in 1992 in Orlando, this event, hosted by ASM International and cosponsored by numerous international technical organizations, drew more than 1500 attendees.

The 1993 presentation of NTSC will run concurrently with AeroMat '93, the Advanced Aerospace Materials/Processes Conference and Exposition, also sponsored by ASM. AeroMat '93 will provide a technically intensive forum, addressing materials developments for all aspects of aerospace structures and propulsion applications, integrating military and commercial aerospace industry technology.

The theme of NTSC '93 is "Thermal Spray Technology: Growing to Serve Industry in Surface Protection and Materials Processing." Thermal spray technology has grown to serve many technical interests. NTSC '93 conference organizers say that forums such as NTSC "provide an unparalleled opportunity for researchers and engineers to communicate, and continue to assist the thermal spray community in informing, educating and sharing the technical successes and capabilities of thermal spray."

The more than 35 conference sessions will address the following topics: modeling, commercial developments, mechanical properties, statistics, ceramics, materials interactions, biomaterials, diagnostics, post-spray processing, applications, commercial developments in equipment and processes, high-velocity spraying, HVOF, spray forming; materials, processes, wear, infrastructure maintenance and repair, surface processing (joint with AeroMat), wear characterization, pretreatment, plasma torch design, plasma processing of materials, microstructure/porosity, environmental issues, plasma processes, and coating characterization.

One highlight of the conference is the presentation of a joint AeroMat/NTSC/ManTech '93 Plenary Session, featuring nearly a dozen high-level government and industry leaders, who will provide an array of overviews on domestic and international aerospace-related programs. The Plenary theme will be "Aerospace Technology in a Changing World." Speakers will represent organizations such as NASA, Watervliet Arsenal (Army), Pratt & Whitney, Wright Laboratory, Mitsubishi Heavy Industries Ltd., Deutsch Airbus GmbH, Office of Science and Technology Policy, Hobart TAFA Technologies Inc., Douglas Aircraft Co., Aluminum Association Inc., and Aerospace Industries Association of America Inc.

An NTSC '93 Keynote presentation will be made on Monday afternoon by John (Jack) Simon, FASM, Manager, Government R & D Programs, General Motors, Washington, DC, and ASM International Vice-President, who will discuss thermal spray challenges in the automotive industry. Additionally, a symposium, "Spray Forming—Advances in Manufacturing Technology," addressing research activities in the field of spray forming of materials, will be open to NTSC '93 and AeroMat '93 conference attendees.

Joint conference programming between AeroMat '93 and NTSC '93 will be presented in the area of surface processing and will allow registrants for either conference to attend these sessions for no additional fee. Event attendees will also be able to attend several plant tours being given by local companies.

Organizing committee members include Mark Smith, Sandia National Laboratories, Albuquerque, NM; Chairman of the ASM Thermal Spray Division, Ronald Smith, Drexel University and the Center for Plasma Processing of Materials, Philadelphia, PA, NTSC'93 Conference Chairman; and David Houck, Engineered Powders Group, Chemical and Metallurgical Division, GTE, Towanda, PA, NTSC '93 Technical Program Chairman.

The concurrent Thermal Spray Exposition, 8-10 June, will include more than 70 exhibitors displaying the newest technologies, products, and services in thermal spray processes and equipment. The Exhibits Chairman is Jack Kittle, Hermann C. Starck, Inc., Crestview Hills, KY. The Thermal Spray Exposition will be held jointly with the AeroMat Exposition. A reception open to all attendees will be held in the exhibit hall on Tuesday evening and an NTSC banquet will be held on Wednesday evening.

A special feature of NTSC '93 will be the ASM International/NTSC Metallographic Exhibit 1993. This exhibit is intended to further the progress and development of the science and art of metallography through exhibits, awards, and publications throughout the world.

Numerous education courses and workshops will be presented during the event. They include Thermal Spray Coating Technology, Advances in Thermal Plasma Spraying, A Practical Introduction to Experimental Design for Materials Processes, Metallography of Plasma and Thermal Sprayed Coatings, and Basics of Thermal Spray. Proceedings for the conference will be issued at the event.

Circle No. (17) on reader service card.

Advanced Materials—The International Trade Dimension

National Institute of Standards and Technology, Gaithersburg, MD, May 10, 1993

The Federation of Materials Societies, Suppliers of Advanced Composite Materials Association, US Advanced Ceramics Association, International Trade Administration, and the National Institute of Standards and Technology of the Department of Commerce will sponsor a one-day seminar/workshop on the international dimension of advanced materials and how the Department can help US firms explore the international marketplace. The meeting will address all the usual questions relating to exporting, as well as case examples to illustrate the essential ingredients for successfully approaching the international market.

The tentative program includes speakers on such topics as US Government Policy Concerning the Advanced Materials Industry, US Competitive Position vis-a-vis Japan and Western Europe, Opportunities for US Advanced Materials Suppliers in the International Market, Doing Business Overseas—Case Examples by US Advanced Materials Suppliers (ceramics, polymer, metals and composites), How NIST Can Help US Suppliers of Advanced Materials to be Internationally Competitive; Export Control Considerations—What the Government Will Let You Sell, Decision to Export—What's Involved, Financial Exports—Sources and Methods, and Export Services of the US Department of Commerce.

There will be an opportunity on the following day to visit the different divisions of the NIST Materials Science and Engineering Laboratory and to meet with representatives of various government agencies, such as Commerce, the Small Business Administration, and the Export-Import Bank in downtown Washington. Assistance will be provided in making appointments at these agencies upon request.

Circle No. (18) on reader service card.

Connecticut Leads the Nation with First "Ceramitized" Bus Fleet

Greater Bridgeport Connecticut Transit District officially launched its fleet of new Detroit diesel buses this fall at a community event that included Mayor Joseph Ganim of Bridgeport and officials of the surrounding communities that Bridgeport serves. Bridgeport Transit scored a "first in the nation" with the arrival of an all GPX Diesel-4 Coated bus fleet, a fact Bridgeport announced with the posting of "This engine has been ceramitized for your health" signs on their buses. "Ceramitized" refers to the ceramics that are used to achieve thermal barrier protection in the GPX coatings, a technology developed for the aerospace industry, but one which is now helping transit, trucking,

and power-generation industries meet Clean Air Act regulations.

Charles Standley, Assistant Director of Maintenance, attributed the achievement of the nation's "first" to a spirit of cooperation among the agencies and companies with whom he worked. "The cooperation between Greater Bridgeport Transit District; the EPA in Washington, DC; Detroit Diesel Corporation, in Detroit, Michigan; FCS Inc. of Centerbrook, Connecticut; and General Plasma definitely contributed to our winning effort."

Mr. Standley, who arranged for Bridgeport Transit's new order of TMC buses with Detroit Diesel Engines to be Diesel-4 coated at the factory said, "It was Bridgeport's goal to operate the cleanest diesel bus fleets in the nation—without a particulate trap." In an independent test performed by Bridgeport Transit under NYC DEP-monitored conditions, ceramic-coated engines demonstrated the ability to eliminate smoking, reduce carbon dioxide and carbon monoxide emissions, as well as to reduce fuel cost.

Adapted from QE™ NEWS from General Plasma, Number 13/ Fall 1992.

Circle No. (19) on reader service card.

Concern for Zinc as a Hazardous Material

Zinc, essential for human health, animal growth, and plant life, and a primary material used in protective coatings and cathodic protection anodes, has been proposed by the US Environmental Protection Agency (EPA) for inclusion in the list of hazardous materials.

The EPA proposed rule to designate zinc as a potentially hazardous waste, published in the May 20, 1992, "Federal Register," put the corrosion community into a regulatory alert. Previously, zinc was never included as a hazardous waste under the Resource Conservation and Recovery Act with such metals as lead, chromium, cadmium, and other toxic metals. The EPA abruptly altered its position on zinc and proposed that it be designated as a hazardous waste when its leachable levels exceeded either 70 or 700 parts per million. At levels between 70 and 700 ppm, special handling and manifesting would be required. At levels above 700, zinc would be classified as hazardous and would require treatment before disposal.

Zinc is not normally regarded as toxic to human health, although California and Michigan have placed restrictions on the disposal of zinc because of concerns about its effect on aquatic life.

NACE and other associations, both trade and technical, prepared statements and documentation against the proposed regulation. NACE's response was prepared by a Technology Resource Team of the Government and Intersociety Committee of the Public Affairs Committee. The NACE letter to the EPA asked that the proposal be re-evaluated and that zinc not be listed as hazardous waste because it is essential for human health and is a keystone in the prevention and control of corrosion.

Circle No. (20) on reader service card.

BIRL Creates Highway Coatings and Materials Center

BIRL, Northwestern University's industrial research laboratory, has established a Center for Coatings and Materials for Highway Construction. The Center, which is located at BIRL, is the result of a $400,000 Federal Highway Administration contract awarded in July 1992.

Finding economical, environmentally safe methods of paint removal and recoating is the Center's initial 18-month project. Of the 134,000 US steel bridges currently in need of repair, almost 90,000 are coated with lead-based paint, the primary means of corrosion protection before 1975. The escalating costs of safely removing and disposing of lead, as well as the number of bridges needing repair, have severely strained highway maintenance budgets.

Led by Dr. Thomas F. Bernecki, principal investigator for the project and a nationally recognized expert on coating processes, BIRL researchers will examine the following areas of bridge rehabilitation: long-term maintenance and repair costs, safe removal and disposal of existing paint, testing and application of new coating materials, automation of cleaning, inspecting and recoating, and technology transfer.

"The bridges and roadways of the nation's infrastructure are lifelines of commerce, essential for national economic growth," said Bernecki. "Developing the technology to renovate 134,000 bridges is a major challenge that calls for long-term dedication, hard work, and cooperation among government agencies, researchers, and the private sector. The Center will act as a focal point to identify and prioritize the problems, work to find solutions, and then transfer those solutions to highway agencies and contractors in the most efficient manner."

BIRL researchers will design and construct a unique laboratory test chamber to evaluate the environmental impact of various coating-application and paint-removal processes. The test facility will analyze pollutants generated by removal as well as fumes and volatile organic compounds (VOCs) released by coating systems. In an attempt to determine future removal problems, researchers will test experimental coating systems as well as those in current use.

One of the coating technologies upon which investigators will focus is thermal spraying, particularly with metallized coatings. This proven technology is used on almost all bridges in Europe, but is considered too expensive in the United States. Unlike paint, thermal spray coatings can be applied in high humidity or low temperatures. BIRL will field test thermal spray metallized coatings at various US locations to measure exposure to different weather conditions.

Other innovative aspects of the program include developing a generic economic model to determine lifecycle costs of various bridge rehabilitation options, using new electrochemical techniques for accelerated testing of corrosion protection, and determining the feasibility of developing an inexpensive hand-held device for measuring surface conditions prior to recoating. Approximately 80% of coating problems are caused by improper surface preparation.

BIRL researchers will call upon the expertise of Northwestern University faculty in Materials Science and Civil Engineering Departments as well as those at the J.L. Kellogg Graduate School of Management and the university's interdisciplinary research centers, including the Center for Advanced Cement-Based Materials, the Traffic Institute, the Transportation Center, the Steel Resource Center, the Center for Quality Assurance and Failure Prevention and the recently established Infrastructure Technology Institute. In addition, industrial consultants such as coating contractors, equipment manufacturers and waste management experts will contribute to the center. Various state highway departments also will participate in testing research results.

BIRL is located in the Northwestern University/Evanston Research Park, about 30 min north of downtown Chicago. Established in 1987 to promote the rapid transfer of technology from laboratory to marketplace, the 130,000 ft^2 R & D laboratory contains about $13 million of

equipment, most related to coatings and materials processing characterization and inspection.

Circle No. (21) on reader service card.

Industry News

Falmer Thermal Spray

Starting in 1961 as a one-man business, Falmer Associates, Lynn, MA, has grown to fill an operating space of 7,000 ft^2 and to generate annual sales of a half million dollars. Certifications as a women-owned business, that are transferable to other jurisdictions, are held with the State Office of Minority and Women Business Assistance (SOMWBA), the Massachusetts Water Resources Authority, Massachusetts Highway Department, and the Massachusetts Small Business Purchasing Program. Falmer is primarily a commercial coatings job shop. However, they do have experience with military work. Falmer sprays coatings on a small-scale production basis through the use of an XY automated machine.

The 32-year-old company specializes in ceramic (alumina, chrome oxide, and zirconia) and carbide plasma coatings, as well as stainless steel coatings. Falmer Thermal Spray provides custom coatings for commercial, military and R & D markets. Typical applications include speedy repair of worn machinery surfaces, ceramic and carbide coatings on wire drawing capstans, guides, and rollers, and coatings for semiconductor manufacturing equipment industry. Support machining, grinding, and superfinishing is available in-house for fabrication and finishing services.

Meyers & Daughters

It's an oft-told tale of bureaucratic boondoggling. A worker starts to paint a bridge. By the time he finishes, the beginning of the bridge is rusting again. And so, the painting begins anew. Stacy Meyers, a Wheaton graduate of '83, her mother, Rita, and sister Lisa Meyers Henderson (an '89 graduate) have two words for governments and industries looking to solve such wear and corrosion problems: thermal spray. Their company applies metal, ceramic, carbide, and plastic coatings to machine parts and structures—like the aforementioned bridge—solving a wealth of problems for a variety of industries.

Thermal spray is a generic term for a group of processes used to deposit coatings on machine parts, according to Stacy, who oversees production for the woman-owned and operated company. Coating materials, which range from alumina ceramic to zinc, are heated to a semi-molten state and propelled at high velocity against a base material to form a bond. A layer of zirconia protects valve and piston heads in diesel engines, for example. Aluminum coatings slow rusting on bridges and ships. Carbide coatings help jet engine parts resist wear.

Stacy's father, Newton Meyers, founded Falmer in 1961. The business was strictly sales, matching clients with outside companies that offered the thermal spray technique. "My father really had an inventive mind," Stacy said. "At that point in time, the American wire industry was really on the move."

"The business was in the basement of our house," said Stacy, who, as a result, has many early memories of her father. "We used to do a lot of things together, from baking pies to going out on sales trips. My father had the talent to work for a large corporation, but he decided to forego some of those benefits in order to spend more time with us." Newton Meyers died of a massive heart attack in 1972. Rita Meyers was left with Stacy, 12, an 11-year-old son, 5-year-old twins, and the business. Rita, who had been working as a substitute teacher, considered subcontracting the work. Instead, she took on the full role of president of Falmer.

"She didn't have any experience in the business," Stacy recalls. "But my father kept excellent records and she had been a business teacher. She knew how to read a ledger. At first, she would dread hearing the phone ring," Stacy said. But the company's customers were very supportive. Once an order was shipped short of a few key parts. Instead of getting angry, the customer said, "That's O.K., Rita. You can send them next time."

After graduating from Wheaton, Stacy joined her mother, working as a sales representative. Within a year, the mother-daughter team had increased business by 50%. "Our suppliers would complain, You know what your problem is? You send us too much work!' " Stacy said.

"In this industry, there is a lot of trial and error. In most cases, thermal spray is much less expensive than other solutions, but it's not inexpensive. You have to work closely with a customer and experiment to find

Meyers & Daughters

just the right technique. So we had two problems: getting delivery and getting research work done. When you have those two types of problems, you can't grow. We decided to purchase our own equipment and do the coatings ourselves."

The transition from sales to sales and manufacturing was not without its problems. "I hadn't been in the business that long, so maybe I didn't know any better," Stacy admits. "In a way, we've come full circle," she notes proudly. "My father always wanted a shop."

Many of their present customers watched the Meyers girls, and the company, grow up. But Stacy says there is no problem being taken seriously, "They are very proud of me. People are amazed that we actually went out and purchased the equipment to start our own operation. "

Losing her father at a young age was a traumatic experience, Stacy said, but one that left her stronger and more self-reliant. She found role models in her mother and at Wheaton, "where the president was a woman, where the dean was a woman, where, often, the student answering the questions in class was a woman.

"When someone says to me, 'Oh, you can't do that!' and they will say that sometimes, I know better. One of the best parts of being in a family business is that it allows us to go out and do other things," said Stacy, who recently took time off to serve as a delegate at the National Democratic convention. The flexible schedule allowed Lisa, Falmer's Sales Manager, to serve as assistant varsity soccer coach at a nearby college.

"The three of us have strengths and weaknesses that mesh together well," said Stacy. "My strength is production. Lisa is excellent with details and long-term planning. My mother deals with the lawyers and accountants. Lisa in some ways is the most mature of us all. She is the type of person who will look at my little problems and say, 'Oh, that's a level six problem. No big deal.'"

The spray shop may not be a glamorous workplace, but it suits Stacy. "I like the hands-on aspect. I really don't mind getting dirty. It's incredibly satisfying to make something—so few people do that anymore—to have a piece of machinery in your hand that's going to be used to make semiconductors. "

The company is even discovering artistic applications for its craft. Local sculptors are bringing in their work to be coated with bronze, copper, or other metals. In the shop, such works of art might share a spray booth with missile housings. "It's a good example of the creative uses of the coating process," said Stacy. "This is a good product that isn't used enough."

Adapted from the alumnae magazine of Wheaton College. (Photographs courtesy of Richard Chase)

Circle No. (22) on reader service card.

Southwest Aeroservice is Approved by Douglas Aircraft Co.

Southwest Aeroservice, Tulsa, OK, has recently been approved by Douglas Aircraft Co. to apply tungsten carbide/cobalt wear coatings to new and repaired flap and slat tracks for their DC-9/MD-80 and DC-10/MD-11 aircraft. High-velocity oxyfuel (OVF) Jet-Kote II equipment controlled by a six-axis robotic arm is used to apply the wear coating. The as-sprayed coating is very even, smooth, dense, and tough. The flap and slat tracks were originally coated using a detonation process.

Southwest is also involved in repairing valve bodies, impellers, helicopter swashplate assembly parts, and other aircraft component parts. Southwest also applies coatings using plasma, combustion wire, and powder flame spray. Southwest has a full metallographic laboratory for testing and evaluating the coatings, as well as magnetic-particle and fluorescent-penetrant inspection.

Southwest has complete grinding and machining facilities and can meet tolerances in the tenths of thousands of inches and finishes of 1-2 RMS. This equipment allows Southwest to perform any required premachining or to manufacture special tooling or fixturing as required for each application.

Circle No. (23) on reader service card.

Guyson-Blast Cleaning Systems

As an international supplier of dryblast equipment for cleaning and surface preparation, Guyson, Saratoga Springs, NY, has supplied machinery for many such applications and has an ongoing interest in the thermal spray field. One specialty is automatic blast finishing systems where both airblast and airless turbine blast (wheelblast) equipment is available.

The sister company in the United Kingdom is also involved in thermal spray technology, including participation in a current research project on surface profile and characteristics of abrasive blast finishes prior to various thermal spray coatings.

Guyson Corporation of U.S.A. has developed special expertise in advanced blast media reclamation systems that result in more uniform blast particle size and more consistent effects on substrate surfaces. This is an area of special interest for certain thermal spray applications.

Circle No. (24) on reader service card.

Fisher Products

Fisher Products, Inc., Tulsa, OK, is fast approaching its fourth decade as a manufacturer. Because it is located in the heart of the nation, it is easy and convenient to transact business throughout the United States, Canada, and Mexico. Fisher specializes in manufacturing hard surface coated parts on a turnkey basis for industry. Parts that are coated yield an operating life of from 5 to 30 times that of uncoated parts.

Typical properties produced by these coatings include corrosion resistance, wear resistance, high-temperature protection, x-ray shielding, and improved electrical conductivity, dialectic, or nonmagnetic properties. Fisher Products, Inc. has the personnel and facilities for producing quality parts that require metallized coatings, spray and fused coatings, rod welded coatings, plasma and Rokide coatings, plasma transferred-arc applied coatings, and Jet Kote coatings.

Circle No. (25) on reader service card.

The American Welding Society is mounting a welding history exhibit during the 1994 International Welding Exposition in Philadelphia, Pennsylvania. To create an exhibit worthy of such a momentous industry-wide event, a unique collection of welding-related materials is being sought. Items with display potential are patents, designs, magazine/newspaper articles, equipment, welded products, components, apparel, or anything else that would trace the industry's passage through time. Corporations or individuals who own or can gain access to such materials are urged to contact AWS and confirm their availability. Please do not send any materials at this time. Write 75th Memories, AWS, Marketing Communications Dept., P.O. Box 351040, Miami, FL 33135.

Unique High-Velocity Oxyfuel Spray Gun Design

A new thermal spray gun design that produces spray velocities more than twice that of conventional HVOF guns has been developed by Hobart Tafa Technologies, Inc., Concord, NH. Proven both in the laboratory and in field evaluations over the past year, spray velocity is rated at more than twice the speed of sound (190 m/s, 7200 ft/s).

This high spray velocity and consequent particle impact velocity, coupled with the unique particle accelerator barrel design, produces coatings that equal or surpass those laid down by powder injection and detonation-type guns. Typically, the coatings contain less than 1% porosity and 1% oxides, with tungsten carbide/cobalt hardness equal to pressed and sintered carbide tool bits.

A major feature of the new HVOF gun designed and engineered by Hobart/Tafa (and now designated as JP-5000) is that it operates on refined kerosene (which is equivalent to JP-4 or JP-5 jet engine fuel). This is inexpensive, readily available, and much safer to handle and easier to store than gaseous fuels such as hydrogen, propylene, or propane. Comparable fuel costs per pound of metal sprayed are $14.20 for hydrogen compared to $1.20 for kerosene.

In addition to the thermal spray unit, Hobart Tafa has also designed a system to provide remote operation of the gun from a distance of 100 ft or more. This system makes it possible to use HVOF spraying to repair/restore difficult-to-access interiors of boilers, digesters, incinerators, etc. This pendant operation permits starting and stopping the gun at the remote spray area.

Circle No. (26) on reader service card.

EDO Corp. Announces New Thermoplastic Coating Process

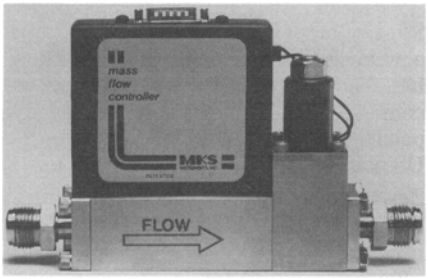
EDO Performance Coatings, a product line of EDO Corporation, Fiber Science Division, Salt Lake City, UT, announces a breakthrough in coating application technology. Using a thermal spray process, EDO can now offer the commercial application of a wide variety of high-performance thermoplastics as coatings. Some of these thermoplastics are able to be used as coatings for the very first time. The patent-pending process is environmentally friendly, with no VOCs. The application consists of one step, requiring no oven curing time.

Thermoplastic coatings can be tailored to provide unique properties, including improved corrosion prevention, even for severe environments, chemical resistance, lubricity with abrasion resistance, thermal, sound, and electrical insulation, and antifouling. Coating services, including custom coating design, development, and high volume production, are available now at EDO.

Circle No. (27) on reader service card.

MKS Offers Instrumentation for Plasma Spray Systems

MKS Instruments, Inc., Andover, MA, offers Mass-Flo™ controllers in full scale ranges from 10 sccm to 200 slm that are used to automate and improve coating repeatability in plasma spray systems. These gas mass flow controllers feature a high-level electronic output to facilitate data recording and controlling as well as provide for remote display of flow conditions. In addition, electronic thermal-based mass flow controllers are used in place of rotameters because they measure mass directly and eliminate the need for pressure and temperature corrections.



MKS Instruments, Inc.

Circle No. (28) on reader service card.

Tough and Thick Thermal Spray Carbide Coatings

Very high velocity thermal spray research has yielded thick (over ¼ in.) tungsten carbide/cobalt coatings that are as hard and strong as tool bit carbides. Macrohardness of the coating is rated as 93 HR15 (or 67 HRC) and microhardness of 1350 DPH. The coatings produced with the JP-5000 gun exhibit structural quality and strength never observed before in thermal spray coatings.

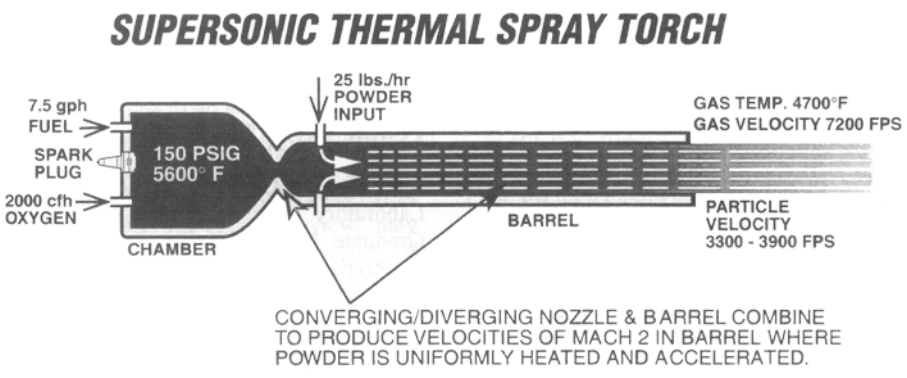
To prove the structural strength of the thermal sprayed coatings, researchers fashioned an actual tool bit. An ordinary steel piece was thermal sprayed with a ¼ in. coating of V-8317 tungsten carbide/17% cobalt and diamond ground to the shape of a tool bit. The cutting surface showed no appreciable wear after several lathe cuts were made on stainless steel barstock at various speeds and feeds.

Circle No. (29) on reader service card.

Spherical Aluminum Bronze Powders

Valimet, Stockton, CA, is offering three grades of spherical aluminum bronze powders. The Superfine grade has an average particle size of 6.5 μm, and the Fine grade has an average of 26.0 μm, as determined by laser diffraction. The Coarse grade is −120/+325 mesh. These materials meet current commercial thermal spray specifications.

Circle No. (30) on reader service card.



Hobart Tafa Technologies, Inc.

Zeiss Microscopes for Materialography

Struers, Inc., Westlake, OH, announces a new business agreement with Carl Zeiss, Inc., Thornwood, NY, whereby Struers becomes the exclusive supplier of an expanded line of Zeiss Microscopes for the US metal/materialographic market.

Zeiss products that are now sold by Struers include the JENAPHOT and JENAPLAN inverted reflected-light photomicroscopes, the JENAVERT upright reflected-light research microscopes, selected stereomicroscopes, and the Zeiss MC 80 /MC 100 microscope camera systems. Struers will also represent the Zeiss AXIOSKOP, AXIOPLAN, and AXIOVERT materialography microscopes with ICS optics.

Circle No. (31) on reader service card.

Struers Sample Preparation for Microstructure

Struers, Westlake, OH, new Rotopol-Pedemat™ is a cost-effective system designed for materialographic sample preparation in low- to medium-volume labs. The benefits of automation include consistency of results, lower consumable costs, controlled parameters, and labor reductions, which are now available to low- and medium-volume facilities. Rotopol-Pedemat™ allows flexibility to prepare diverse materials and easily accommodates fluctuations in sample volume. An ergonomically designed touch pad allows for variable speeds, co- and counter rotation, and adjustable forces to meet the preparation requirements of various materials.

Individual sample fixturing and a unique Interrupt-Inspect-Restart capability make it possible to prepare individual specimens to a desired finish. At any time during the preparation, a sample can be removed, inspected, returned for further processing, and yet remain in plane! Serial sectioning for failure analysis becomes simple, without the need to re-plane. Unlike all other benchtop models, there is no need for "dummy" specimens; therefore consumables and time are not wasted.

This system can accommodate mounted or unmounted samples in either metric or English measure. Additionally, multiple specimens can be prepared in a standard holder or individually under the pressure-pad feet.

Struers

Circle No. (32) on reader service card.

HAWCS Controller from Hobart Tafa

The new HAWCS Controller brings process and motion control to thermal spraying. Choosing the wrong thermal spray controller can be costly in capabilities expansion, money, time, and frustration. HAWCS can operate two or more processes simultaneously while printing environmental reports, performing statistical process control (SPC), and even designing Taguchi experiments, all while you're monitoring and/or reprogramming from your office.

Circle No. (33) on reader service card.

UTPlast F-311 Gun and Flame Spray System

UTPlast F-311 Flame Spray Gun is designed to offer the operator a lightweight, user-friendly flame spray gun for use with thermoplastic powders of all types and in all applications. Features include an on/off powder feed, gas mixture, and instant shut-off controls, which are placed on the gun. The unique gas mixing system design prevents flashbacks. The gun weighs 1.97 lb (0.9 kg) so that an operator can handle the F-311 for longer periods of time without the fatigue associated with the heavier more bulky units. It also provides 98% coverage of the target area, which is better than many other flame guns available today. And, finally, the gun is easy to use and economical. It is especially suited for professional application of almost all thermoplastics. Acetylene or propane can be used as fuel gas, interchangeably.

The UTPlast F-311 Flame Spray System is also available as a complete, integrated unit. The package consists of the F-311 Spray Gun, all wiring, and powder feed hoses with quick disconnect fittings, and the electropneumatic control console and stainless steel fluidized bed container mounted on a mobile skid.

Flame Spray System

Circle No. (34) on reader service card.

New Molybdenum Electric Arc Spray System

A new molybdenum wire (99%+) and electric arc spray system has been developed by Hobart Tafa Technologies Inc., Concord, NH. It does not require the use of inert gases and yields aircraft-quality coatings using only compressed air to generate the spray.

A significant characteristic of the new molybdenum system is the consistency of the coatings (e.g., no oxide problem, high bond strength, coating density, and hardness). Functionally, the molybdenum coatings are self-bonding alloys, have good bearing qualities, high resistance to galling, scuffing and pickup, as well as basic wear and abrasive resistance. The Arc Spray 13T Molybdenum wire meets or exceeds these specifications: PWA 1313, Rolls Royce MSSR9507/19, Garrett FP 5045 Type T. A comprehensive Technical Bulletin is available from Hobart/Tafa.

Circle No. (35) on reader service card.

People in the News

Mr. Zhongjian Chen of The Thermal Spray Laboratory at Stony Brook, NY, was a Graduate Finalist for an Award at the Materials Research Society meeting in Boston, MA, December 1992. Mr. Chen's research area is the characterization of vacuum plasma sprayed mechanofused NiAl.

Japan Thermal Spraying Society (JTSS) Celebrates 35 Years

The commemorative celebration of the 35th anniversary of JTSS (formed in 1957) was held in Osaka on July 1,1992. It was followed by the 2-day 55th Thermal Spray Symposium. Upon the invitation of JTSS, Mr. Jack Ritchie, President, Bender Machine Co., presented a paper on "The History of Thermal Spray—Jack Ritchie's Perspective." The content of his 90-min presentation drew 20 written questions from the audience of 110 participants. The unanswered questions will be detailed in a paper titled "Thermal Spraying Technique" (in Japanese). In commemoration of this auspicious occasion, Mr. Ritchie presented Dr. A. Hasui, the President of JTSS, two memorial plates, one from Merle Thorpe, on behalf of ASM International, and one from Daniel Parker on behalf of the ITSA. The plates are now hanging in the head office of JTSS.

Parléz Vous JTST?

The METABAP Group, Paris, France, is selecting presentations from JTST for translation into French to appear in French technical literature. Dr. S.Dallaire's (NRC, Canada) contribution "Thermal Spraying of Reactive Materials to Form Wear-Resistant Composite Coatings" (*JTST*, Vol 1, No. 1), and that of Drs. J. Wolke, J.M.A. de Blieck-Hogervorst, W.J.A. Dhert, C.P.A.T. Klein, and K. de Groot entitled "Studies on the Thermal Spraying of Apatite Bioceramics" (*JTST*, Vol 1, No. 1) are the first to have been selected for this distinction.

Japan Thermal Spraying Society

Send your new product or industry news to Editor Chris Berndt today.

International Thermal Spray Conference Awards

The Thermal Spray Division of ASM International appointed an Awards Committee to acknowledge some of the excellent papers presented at ITSC'92. Judging of the papers was performed by 30 panelists from the North American thermal spray community. Each panelist received a package of papers that were similar in subject content. The judges were asked to rank these papers in order of merit. Guidelines for this ranking were:

- Novelty and originality of the subject
- Presentation format and attention to details such as figures and referencing
- Scientific and engineering merit of the work; i.e., does this work open up new applications or enable better understanding of thermal spray processes and coating?

Each paper was assessed by at least three of the panelists so that some form of averaging could be implemented. The 18 papers listed below were ranked as being of **excellent quality**. The awards consisted of a Certificate of Merit from the Thermal Spray Division of ASM International. Congratulations to all the winners!

These winning papers are listed in presentation order in the ITSC'92 proceedings. It is anticipated that these papers, after further intensive technical review, may also appear in the upcoming issues of *Journal of Thermal Spray Technology*.

Structure and Properties of Plasma Sprayed SIALON Coatings: S. Sodeoka, K. Ueno, and S. Kose, Government Industrial Research Institute, Japan; and Y. Hagiwara, Osaka Electronics and Communication University, Japan.

High-Pressure Plasma Spraying in A Controlled Atmosphere up to Two Bar: D.A. Jager and D. Stover, Forschungszentrum Julich, GmbH, Germany;, and W. Schlump, Krupp Research Institute, Essen, Germany.

A Pragmatic Analysis and Comparison of the HVOF Process: M.L. Thorpe, Hobart TAFA Technologies, Inc., Concord, NH, USA; and H.J. Richter, Dartmouth College, Hanover, NH, USA.

High-Temperature Stability of Titanium Aluminide Matrix Composites Fabricated by Reactive Low-Pressure Plasma Spraying: Y. Tsunekawa, K. Gotoh, M. Okumiya, and N. Mohri, Toyota Technical Institute, Japan.

Spraying of TiN by a Combined Laser and Low-Pressure Plasma Spray System: A. Ohmori and S. Hirano, The Welding Research Institute, Osaka University, Japan; and K. Kamada, Matsushita Electric Works, Ltd., Osaka, Japan.

Vacuum Plasma Sprayed Mechanofused Ni-Al Composite Powders and Their Intermetallics: Z.J. Chen, H. Herman, and R. Tiwari, The Thermal Spray Laboratory, Stony Brook, NY, USA; and C.C. Huang and R. Cohen, Micro Powder Systems, Summit, NJ, USA.

Optimizing the Vacuum Plasma Spray Deposition of Metal, Ceramic and Cermet Coatings Using Designed Experiments: R. Kingswell, K.T. Scott, and L.L. Wassell, AEA Industrial Technology, Oxfordshire, England.

Stochastic Approach to the Modeling of Thermal Spray Coating Formation: V.E. Belashchenko and Y.B. Chernyak, Harvard University, MIT, Cambridge, MA, USA.

Plasma Sprayed Thermal Barrier Coatings on Smooth Surfaces: R.A. Miller and W.J. Brindley, NASA-Lewis Research Center, Cleveland, USA

Advanced Thermal Barrier Coatings Involving Efficient Vertical Microcracks: H. Nakahira, Y. Harada, and N. Mifune, Tocalo Co. Ltd., Kobe, Japan; and T. Yogoro and H. Yamane, Onoda Cement Co., Ltd., Tokyo, Japan.

Application of HVOF Thermal Spraying to Solve Corrosion Problems in the Petroleum Industry: L.N. Moskowitz, Amoco Oil Company, Chicago, IL, USA

Thermal Coating Development for Impulse Drying: W.J. Lenling, Thermal Spray Technologies, Watertown, WI, USA; M.F. Smith, Sandia National Laboratories, Albuquerque, NM, USA; and D.I. Orloff, Institute of Paper Science and Technology, Atlanta, GA, USA.

Investigations on Processing and Wear Behavior of TiC-Reinforced Thermal Spray Coatings: E. Lugscheider, H. Jungklaus, and R. Limbach, Technical University of Aachen, Germany; and R.W. Smith, Drexel University, Philadelphia, PA, USA.

Flattening and Solidification of Thermal Sprayed Particles: C. Moreau, P. Cielo, and M. Lamontagne, NRC, Boucherville, Quebec, Canada.