

In The News

Publications and Information

Posters from Miller Thermal, Inc.

Miller Thermal, Inc. Appleton, Wisconsin, is offering two posters free to both the public and companies interested in learning more about the thermal spray industry.

One poster features the different forms of thermal spray: plasma spray, arc spray, high velocity oxygen fuel, powder flame spray, wire or rod flame spray. The poster is particularly useful for teaching purposes and those interested in learning the basics of thermal spray technology.

The other poster is a spray coating selector guide. It features information on different types of coating, general qualities of the coatings, typical applications and other information. This poster is useful for those interested in learning the specifics of particular applications.

Circle No. (5)

Gorham Advanced Materials Institute

The Gorham Advanced Materials Institute announces a new multiclient study titled, "CVD/PVD Coatings: Assessments of New Deposition Technologies, New Applications, New Business Opportunities, and Market Forecasts 1991-2001."

This study is based upon inputs from a questionnaire survey of potential subscribers, the results of previous business/technical conferences on coatings, and the results of our previous multiclient studies on the subject of PVD/CVD, Sol-Gel, Diamond, and Thermal Spray Coatings.

Circle No. (6)

ASM International Source Study

ASM International announces that the new study "Protective Coating Proc-

esses 1990-91" is now available from Materials Information. Derived from international databases, this report provides more complete and specific coverage of the development, analysis and selection of engineered materials for the protective coatings industries. Protective Coating Processes 1990-91 is a comprehensive guide to research and development in the areas of *thermal spraying, deposition coating and surface finishing* from July 1990 to November 1991. The report is comprised of a printed report as well as a PC disk which has a data base.

The activities of over 800 organizations are represented and more than 1000 case studies are reported as they relate to research, advances and commercial enterprise in the area of coatings designed to protect against corrosion, oxidation, wear, and other degradation systems. The list of substrate and coating materials includes not only steels and the ferrous and nonferrous alloys but also new engineered plastics, polymers, composites and ceramics. "Protective Coating Processes 1990-91" covers new developments in the properties and capabilities of coatings and advances in the technology of protective coating application. References focus on the assessment of their performance, the selection of coating materials and the impact of process parameters. Numerous sources review protective coatings designed for high-temperature applications, for metal production and for specific industrial needs including automotive and aerospace.

References include the procedures used to analyze, evaluate and monitor protective coatings and performances, as well as the investigative results achieved. The characteristics and performance of organic, oxide, ceramic, diamond and powder-based systems are highlighted. Additional sources feature diffusion coatings, hard coatings and coatings applied as thermal barriers.

The PC diskette included with the printed report offers expanded search

capabilities to locate references for every word or group of words, or to restrict the search to a specific subset of references, such as books or articles. Complete instructions for use of the diskette are provided.

Circle No. (7)

NTSC'93—Call for Papers

The 1993 National Thermal Spray Conference will be held from 7-11 June at the Anaheim Convention Center, CA, USA. The Organizing Committee has been announced as:

Division Council Chairman: Mr. Merle L. Thorpe, Hobart TAFE Technologies, Inc.

Conference Chairman: Dr. Ronald W. Smith, Drexel University.

Technical Program Chairman: Dr. David Houck, GTE Products, Inc.

Proceedings Editor: Dr. Thomas Bernecki, BIRL of Northwestern University.

Abstracts are due at ASM International by July 15, 1992 and should be sent to:

**Lisa Hemeyer
Senior Conference Administrator
ASM International
Materials Park, OH 44073-0002
USA**

**Phone: (216) 338-5151
Fax: (216) 338-4634**

The abstract must include company name, address, telephone, and fax numbers for all authors and co-authors.

Circle No. (8)

Computer Evaluation of Sieve Analysis

Brinkman Instruments Inc, Westbury, New York is offering a free demo diskette which shows all the features of

SP1000 computer evaluation of sieving analyses. The complete package offered by Brinkmann/Retsch provides a quick,

accurate, and complete evaluation of any sieving process.

Circle No. (9)

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

Equipment and Materials

Filtration of Overspray

The overspray from thermal spraying operations presents a variety of very difficult air cleaning problems. Aluminum and silicon bronze have an average particle diameter of less than 0.5 micrometers. Zinc, although much larger in size, usually has significantly heavier dust concentrations and is difficult to remove from fabric surfaces. Lead and chromium are potential health hazards requiring careful attention to hood design and extremely efficient final filters. The "PulsePak II" from Snyder General, Louisville, Kentucky, offers the best available approach to thermal spray applications. Its aerodynamic design and unique cartridge configuration are well-suited to this challenging application.

Circle No. (10)

Compact Gas Atomizer

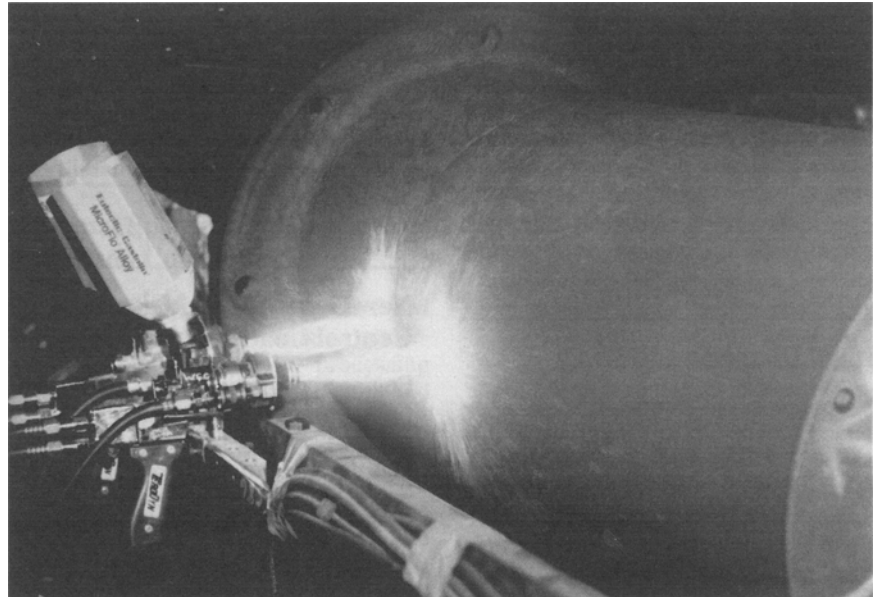
The 'HERIMIGA' 75/3VI is a new compact inert gas atomizer from PSI Ltd., East Sussex, United Kingdom. It has been designed for use in laboratories where space is limited—it has a "foot-print" of 5 × 7.5' and is only 6.5' high and requires no special installation. It has an induction heated crucible which holds 3 kg and is easily replaced. Key features of this atomizer include: high-efficiency cyclone, variable particle-size control of 10 to 100 microns, totally vacuum tight and therefore suitable for production of pyrophoric powders, and rapid solidification rates of 10⁻³ to 10⁻⁶ C/sec.

Circle No. (11)

Multi-Fuel TeroDyn System

Eutectic Corporation, Flushing New York, has introduced the new generation TeroDyn System 2000, Model III. With multi-fuel capabilities, it can spray a wide variety of wear, corrosion, and heat resistant coatings for OEM and maintenance applications.

The system 2000, Model III can use either acetylene, propylene, MAPP, propane, or hydrogen fuel; which now al-



TeroDyn[®] System 2000 torches working in tandem provide high speed coating for foundry lift cylinder.

lows the choice of safer, more economical energy sources. In addition, the system has the capability to spray polymer materials, as well as low temperature metals, ceramics, and conventional alloy powders.

Model III is an advanced version of the TeroDyn System 2000. With 20% more power, it provides up to 110,000 BTU's per hour to accommodate high-volume production rates. A distinctive feature is the use of powder modules which attach directly to the torch. For long duration repair work and production runs, the torch can be modified to operate with a TecFlo powder feeder.

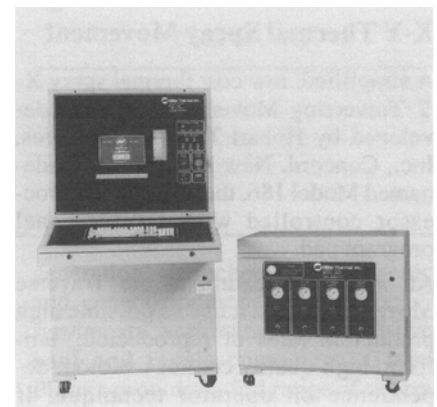
Circle No. (12)

Computerized "Net Plasma Energy" Control

Miller Thermal, Inc., Appleton, Wisconsin, introduces the Model 4500 Computerized Plasma Control. The Model 4500 was developed through a cooperative effort between Miller Thermal, Inc. and Battelle Memorial Institute of Columbus, Ohio. The newly designed

plasma control system improves control and repeatability of the application of coatings such as aluminum oxide, chromium oxide, nickel, and cobalt alloys, or tungsten carbide-cobalt.

The system uses sophisticated data acquisition hardware and software to monitor and record the pertinent plasma spray data. The propriety software program processes the data to obtain a value designated as the "net plasma energy".



Model 4500 Computerized Plasma Control from Miller Thermal, Inc.

Incorporating the net plasma energy value into the automated control system consistently provides peak process performance and coating quality.

The Model 4500 has been over seven years in the making. The computerized system replaces manual adjustment of voltage and current with computer control of the net plasma energy. Net plasma energy is actual energy output of the plasma arc. By controlling net plasma energy and making corrections to the plasma gun instead of at the power source, the Model 4500 compensates for energy losses to heating water, resistance in the cables, and normal gun component wear.

Circle No. (13)

Small Diameter ARC Gun

A unique small diameter (1.75") extended length (up to 4 feet) arc gun is now being introduced by Hobart Tafa Technologies, Inc., Concord, New Hampshire. The design makes it possible to arc spray previously inaccessible areas such as internal surfaces of small diameter cylinders and remote or hard-to-reach internal sections of engines or components.

The extended length arc gun is available either as a complete unit or as a retrofit. Extensions are 1.75" outside diameter in lengths from 12 inches to 60 inches.

Among major applications are zinc and aluminum corrosion protective coatings; dimensional restoration of machine elements; deposition of electrically conductive coatings; pump liners; and rebuilding of aircraft engine components.

Circle No. (14)

X-Y Thermal Spray Movement

A simplified, low cost thermal spray X-Y Traversing Movement has been developed by Hobart Tafa Technologies, Inc., Concord, New Hampshire. Trade-named Model 186, the unit is microprocessor controlled with a front panel program pad.

An important feature of the Traverse Movement is that it makes possible high production rates of reproducible, uniform, high-quality coatings without dependence on operator technique. If desired the Traverse Movement can be

set to spray in one or two directions for both vertical and horizontal strokes with automatic spray-off between strokes.

Stroke length can be programmed from 0 to 44 inches (0-112 cm) horizontally and 0-22 inches (0-56 cm) vertically in 1/10 inch (2.54 mm) increments. Speed can be programmed horizontally in three ranges; low, medium and high (7.5-125 in/min); (15-250 in/min) and (2.5-41.7 ft/min); and the vertical speed can be programmed from 15-250 in/min.

The simple mechanical design and rugged construction ensure reliability and durability.

Circle No. (15)

New Generation of Clearance Control Coatings

Engineered Coatings, Inc., Rocky Hill, Connecticut, has introduced EnCo-CC, a new generation of thermal spray coatings designed to minimize tip clearance in rotating parts. The smaller the clearance, the greater the efficiency or power of the equipment.

These one-step coatings are engineered to achieve a number of benefits in an affordable manner such as the reduction of fuel consumption, improved performance, increased operating efficiency and greater power output.

The clearance control technology expertise is now available for commercial turbo machinery, including turbochargers, industrial compressors, turbo expanders and gas turbines. The abrasible coatings can be designed for specific applications to meet the requirements of exudation, corrosion, and erosion at temperatures from cryogenics to 1600 °C.

Special multi-layer materials meet the challenge of difficult thermal environments, and process controls assure the repeatability of complex coatings. EnCo-CC thermal spray coatings technology makes it possible to optimize the match between the substrate and the coating material by continuously varying the coating composition, including metallics, organics, inorganics, polymers, superalloys, and ceramics. If enhanced shroud abrasability is required, abrasives can be applied to rotating parts.

Circle No. (16)

Electrochemical Corrosion Prevented

A unique method to prevent one of the most pervasive types of corrosion—that caused by electrochemical reactions between dissimilar metals on contact—has been developed by Hobart Tafa Technologies, Inc., Concord, New Hampshire.

Based on Hobart's electric arc spray technology, the method involves coating the in-contact metals with an atomized spray of one of the dissimilar metals. For instance, in copper/aluminum joinings, common in electrical circuits, the connection is sprayed with a 0-.040" thick coating of pure copper. If that coating is then covered with a polymerizing film, such as linseed oil, the corrosion protection is estimated to have a life of more than 20 years.

The special electric arc spray gun looks like, and operates as simply as, an ordinary paint spray gun. However, the coating it lays down is dense and 100% pure metal.

Circle No. (17)

New High Pressure System

JP-5000, a new gun system reported to produce coatings with hardness and toughness equal to or surpassing those of detonation-type guns (D-gun), is being introduced by Hobart Tafa Technologies, Inc., Concord, New Hampshire. The unique system produces a high-velocity oxy-fuel thermal spray and is available for in-house installation and operation.

According to Hobart, comprehensive studies have established that there is a direct correlation between high-particle velocity in the thermal spray (high kinetic energy) and superior coating properties. The particle velocity of JP-5000 (3300-3900 fps) is due to the 150-psi pressure in the combustion chamber which exceeds that of all other HVOF guns. The short dwelling time of particles at temperature in this new system reduces formation of oxides and minimizes solution and illusion of carbides. This maximizes overall coating hardness, strength, and integrity.

Circle No.(18)

Education

Student Scholarships Offered for Excellence in Thermal Spray

The International Thermal Spray Association (ITSA), an organization dedicated to advancing the state-of-the-art in thermal spray technology, is seeking scholarship candidates for its Awards Program. Graduate students matriculating in thermal spray coatings or processes are eligible to apply. Two one-year scholarships of \$1500 are awarded each May to graduate students in an accredited university with at least one more year of thermal spray studies to complete. The awards are available world wide. According to ITSA Chairman, Daniel W. Parker, growth for the thermal spray industry in North America is expected to rise from the current \$650 million to \$2 billion by the year 2000. "The range of applications is becoming much more sophisticated," said Mr. Parker, "and is moving from the aerospace industry to a broader industrial base—including ground-based turbines, automotive, medical and other industries. The ITSA scholarships, along with our other programs, will support that growth."

ITSA, formerly known as MSC, for Metallizing Service Contractors, was founded in 1948 and is recognized throughout the world for its numerous contributions to the world body of thermal spray knowledge. It is one of the sponsors of the National Thermal Spray Conference and a sponsor of the 1992 International Thermal Spray Conference.

Circle No. (19)

Thermal Spray Technology Published Course

"Thermal Spray Technology," an ASM homestudy course providing an understanding of thermal spray processing science, applications and practice, and interaction of thermal spray coatings with materials, is now available from ASM International.

Module I of this course, created by the ASM Materials Engineering Institute (MEI), consists of six lessons covering Surface Science: wear, corrosion, hardening, carburizing, nitriding, electroplating, electroless plating, vapor deposition, phosphating, and hardfac-

ing; Equipment and Theory: history, methodology, flame spray coating, HVOF, D-gun, electric-wire-arc coating, plasma spray, material feed, cooling, gas supply, and controls; 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, material specification, and standards; Applications: aerospace, automotive, biomedical, ceramic and glass, marine, non-skid, electronics, printing, processing, industries, and textile; and Testing and Characterization: sectioning, mounting, grinding, polishing, etching, hardness testing, tensile adhesion/cohesion, and powder size/chemistry/phase.

This homestudy course is designed for technologists and technicians. Two Continuing Education Units (CEU) are offered after course completion.

Circle No. (20)

International Services Overview

Miller Thermal Inc. Expansion in Europe

Miller Thermal, Inc. announces further expansion into Europe. Dr. Paul Norman has been appointed Managing Director of the expansion located in Altrincham, Cheshire, WA159RA, United Kingdom.

President Phillip A. Speigle states that Miller Thermal, Inc., Appleton, Wisconsin, with its Alloys International Di-

vision in Baytown, Texas, will provide a full line of equipment and consumables to the thermal spray market in Europe. These products have been developed over a period of years through the former efforts of Plasmadyne (Plasmatron), Alloys Inc. (Plasmalloy Powders), and Metalizing Company of America (Mogul). Miller Electric brought these companies together to form Miller Thermal, Inc. early in 1986.

The company's product lines include, Plasmalloy™ products (a full line of

thermal spray hardfacing powders as well as plasma spray systems, HVOF spray systems, robotic handling systems, mechanical handling systems, turntables, etc.), Mogul™ products (wire flame and arc spray equipment and accessories), sintered carbide parts, and tungsten carbide products for hardfacing.

Circle No. (21)

A Closer Look: Company Profile

General Plasma, East Windsor, Connecticut, USA

Established in 1967, General Plasma has become a leading supplier of contract thermal spray coating services to a growing roster of U.S. and international companies. Headquartered in East

Windsor, Connecticut, and with a second facility in Woburn, Massachusetts, the company is the largest production plasma coating contractor in North America and sole manufacturer of GPX™ Coatings, a unique line of coatings designed for aerospace, automotive, diesel, biomedical, power

generation, petrochemical, electronics, and general industrial applications. In serving its worldwide OEM and overhaul and repair customers, General Plasma provides a full range of contract coating services. These include plasma, HVOF, combustion wire, arc wire, combustion powder spray and fuse, plasma

transferred-arc coatings, coating removal, fluorescent penetrant inspection, diamond grinding, engineering, contact experiment, and joint R&D programs. The company's Quality Essentials™ system (QE) has enabled it to develop an exceptionally reliable method of applying thermal spray coatings that exceed the most exacting industry standards. General Plasma is certified to apply coatings to virtually all aircraft specifications, including Pratt & Whitney Aircraft, GE Aircraft Engines, Garrett Turbine Engines, Allison, Rolls-Royce, Textron Lycoming, Williams International, and others. QE is designed to control the more than 200 variables in the thermal spray process, insure peak performance, and assure repeatability. The company's Center for Advanced Coatings takes an integrated approach to coating development that includes process/equipment selection, cost analysis, prototyping, and production specifications. The center provides application engineering services, joint

R&D programs, reproducibility studies, and materials engineering services to the industry. One of the center's more recent developments has been the GPX Coating Systems.

The GPX Coating Series includes more than 200 coatings, each custom engineered to solve component problems such as wear, heat, oxidation, corrosion, and erosion while maintaining the integrity of the substrate. Coatings include metallics, carbides, plastics, and combinations which are applied to almost any substrate to achieve superior bonding, critical tolerances and desirable surface characteristics. Each coating is designed to meet specific customer criteria such as reduced manufacturing cost, improved part performance, environmental compliance, design flexibility, reclamation of worn parts or improved competitive advantage. Customer-developed GPX Coatings now include GPX-GT37 thermal barrier coatings for GE-serviced gas turbine combustion components,

GPX BioCoatings™ for medical implants, and GPX Diesel Coatings.

Supporting the company's coating application services is a state-of-the-art coating removal services facility. Coating removal services are controlled by laboratory microscopic evaluation to insure safe removal of coatings without damage to the substrate. Brazed joints or other coatings are protected by special masking materials. The Quality Essentials system is an integral part of the coating removal process and guides the component through every step of the coating application process. Services include abrasive strip, precision grind strip, chemical strip, electrolytic strip, fluorescent penetrant inspection, laboratory inspection control, R&D for new coating removal procedures, FAA approval and, GE and PWA approval.

Circle No. (22)

Industrial Panorama

Gorham Advanced Materials Institute

Gorham Advanced Materials Institute is planning their 1992 Conference and exhibition, "Reassessing the Business Opportunities in the Thermal Spray Coatings Market Sector," to be held in the Fall of 1992. This conference is being designed to be attended by senior managers charged with the responsibility for business planning, R&D planning, market research, new product/process development, mergers and acquisitions, and strategic partnering. Conference speakers are selected mainly from users of thermal spray coatings and each are asked to address specific problems and needs for the growth of thermal spray coatings in their industry in the 1990's.

Industrial Study Group on Environmental Compliance

Merle L. Thorpe, chairman of the Industrial Study Group for Environmental Compliance reports that the published, two-year study will probably be avail-

able in July of 1992. Reporting on the progress to date Mr. Thorpe said, "Results thus far sustain the view point of many in the industry who believe that we are in good shape in terms of responding to State and Federal environmental legislation as long as we do the right collecting. Our tests and evaluations now point to dry collections as the most desirable environmental policy for our industry. There are some of these installations out there now and they appear to be acceptable. Our task now is to set up the most effective collector performance tests. Final evaluations and actual spray gun tests are scheduled to begin at American Air Filter in April and will continue for the next several months."

The Industrial Study Group met with NIST (National Institute of Standards and Technology) and EPA officials this year to determine whether their proposed methodology and the effluent concentration measurement techniques used in the study would stand up to scientific review by Federal environmental authorities. A second objective was to generate data that would be acceptable to EPA authorities in such

states as California, Texas, Ohio, and Pennsylvania where legislation is sometimes more stringent than on a Federal level. "One of the early problems we faced," says Mr. Thorpe, "was the lack of standardized testing procedures and standardized measurement guidelines for the concentration measurements of some materials. This compounded problems of conflicting and divisive information on environmental standards which varied from locale to locale. Our first priority was to gather all available information, assess the situation, clarify the issues and identify the steps which needed to be taken. Our goal was to make a preemptive strike and establish the thermal spray industry as a self-regulating, responsible industry and, in fact, established ourselves as the definitive source of compliance information."

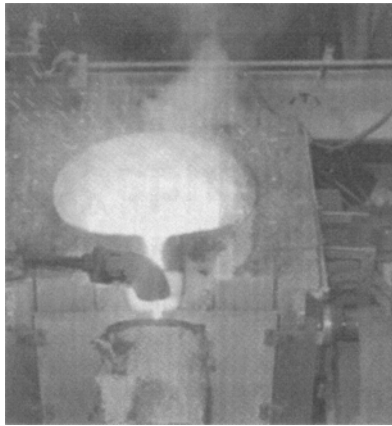
The published thermal spray environmental study will provide the data, test results, and procedural information that industry personnel need to proceed through what is often a maze of conflicting, incomplete information on how to meet compliance standards. Dr. Ronald Smith of Drexel University is charged with the task of compiling a "user

friendly" final report which will simplify and clarify procedures on a state-by-state basis. The Industrial Study Group is supported by Hobart Tafa Technologies, Sultzer Plasma Technik, Miller Thermal, Metco Perkin-Elmer, Zircoa, Plasma Technology, and ITSA. (Reprinted, with permission, from "Spraytime" Vol.1, No.1)

Circle No. (23)

Dynamet Powder Products Acquisition

Dynamet Inc., Washington, Pennsylvania, has purchased the assets and business of Cytemp Powder Products. The newly formed Dynamet Powder Products will focus on commercializing its metal powder manufacturing technology in three product areas. One of these products is loose metal powders for thermal spray and brazing applications. These powders can be melted in air or



Tapping the 2000-pound air-induction furnace.

vacuum induction furnaces, gas atomized, and screened to customer specification requirements. Powders are available in experimental or production quantities, and are typically nickel, cobalt, or iron based compositions. Dynamet Powder Products is approved as a

supplier of powders and components for the automotive and aerospace markets.

Circle No. (24)

Alternative Industrial Marketing Resources

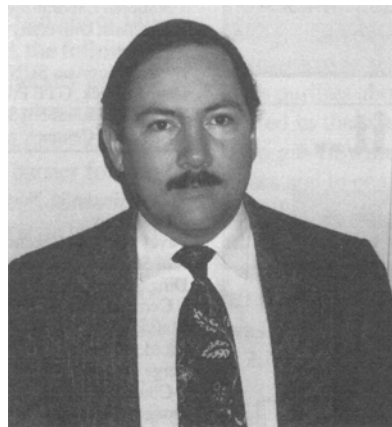
AIM (Alternative Industrial Marketing) Resources has completed numerous market studies and market development projects for firms that offer products and services to the U.S. industry. Dynamet has acquired the services of AIM Resources as part of its effort to implement a more market driven approach. AIM Resources will investigate opportunities for Dynamet powders in various market niches. One area of focus will be requirements for alloyed metal powders for thermal spray and brazing applications. Another objective of this project is to introduce Dynamet to firms that manufacture and repair engine component parts.

Circle No. (25)

Notables

John Mullins Joins Miller Thermal, Inc.

Alloys International, Baytown, Texas, a division of Miller Thermal, Inc., Appleton, Wisconsin, announces the addition of John Mullins to the staff. Mullins has a B.S. in chemistry from the University of Texas, an M.S. in Metallurgy from Georgia Institute of Technology and has completed post-graduate work in management studies at Harvard University. Mullins has over 15 years of experience in the materials field. This experience includes stints with Alcoa, North American Phillips, Advanced Composite Materials, and the Arthur D. Little Center for Product Development.



John Mullins

spray technology. Bob is well known among the thermal spray community and serves on many committees of the ASM Thermal Spray Division.

Maurice Clegg Announces Retirement

Maurice Clegg has announced his retirement from Sherritt Gordon Ltd., (Alberta, Canada). Maurice has been involved with

thermal spray for many years and has published in many areas with a particular focus on "NiCrAl/Bentonite Thermal Spray Powers for High Temperature Abradable Seals". He also served on the Founding Editorial Committee of the Journal of Thermal Spray Technology.

William Butts Starts Consulting Firm

William Butts has recently established his own consulting firm. "WRB Thermal Spray Consultant, Inc." provides technical-oriented consulting/marketing assistance to clients with involvement in thermal spraying, product and equipment development, coating manufacture, and quality characterization and evaluation. Bill brings has some 37 years of experience in the thermal spraying area and can be contacted at (513) 831-2678 (near Cincinnati).

Dr. Robert Tucker, Jr. Appointed Union Carbide Corporate Fellow

Dr. Robert C. Tucker, Jr., a Fellow of ASM International, has been appointed a Union Carbide Corporate Fellow. This is the highest recognition for members of the technology organization of Union Carbide Coatings Service Corporation and recognizes, among many contributions, Bob's extensive original research in thermal

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