In The News

Browning Introduces Aerospray™

Browning Thermal Systems, Inc. has announced the entry of its AEROSPRAY™ Hypersonic flame spray system to the market. The AEROSPRAY™ operates solely on compressed air, does not use expensive pure oxygen, and is "regeneratively" air cooled. Thus, the compressed air passes through the cooling jacket, then travels into the combustion chamber where it mixes with the fuel oil or propane for burning. The new process has been named "HVAF" (high-velocity air fuel), as opposed to "HVOF" (high-velocity oxygen fuel).

The lack of water cooling and the fact that the torch does not employ the use of any 0-rings makes the system very efficient and trouble free. AEROSPRAY™ is capable of spraying 25 lb/h (11.4 kg/h) of tungsten carbide-cobalt powder with high efficiency rates and coating hardnesses ranging from 1250 to 1450 DPH. Lower melting point metallics are sprayed using shorter nozzles and produce extremely dense, oxide-free coatings. AEROSPRAY will operate continuously with no nozzle clogging. Machine mounted and handheld models are available. Samples and lab reports are available on various coatings upon request.

Circle No. (4) on Reader Service Card

Multiple Channel Heat Exchangers

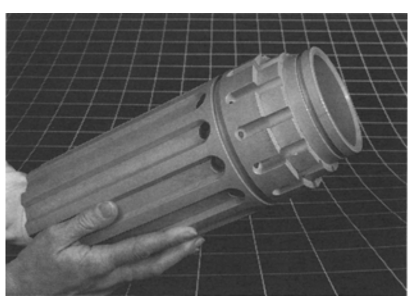
Tek-Temp closed loop liquid-to-liquid heat exchangers are designed to provide compact, convenient, low-maintenance, portable sources of refrigerated coolant for a wide variety of applications. Cooling capacities from 3000 to 170,000 Btu/h (3.2 to 180 MJ/h) are available.

Tek-Temp solid-state systems offer the flexibility of a variety of microprocessor interface conveniences. Programmable cooling or heating is made possible through the use of the computer interface or internally programmable voltage ramp routines. The heat exchangers are designed with stainless steel reservoirs and spiral coiled heat exchange tubes for efficient thermal transfer characteristics and high heat removal rates. All services to the systems are quickly and easily accomplished from the top of the unit and require no access panel removal. An energy-efficient compressor runs only when cooling is required and is protected to ensure long, trouble-free life.

Circle No. (5) on Reader Service Card

Plasma Arc Torch Body, Machined from Polypenco® Peek

The body for a plasma arc torch, which is used in the refining of metals and superalloys, is now machined from polyetheretherketone (PEEK) thermoplastic tubular bar. Plasma Energy Corporation, Raleigh, North Carolina, uses Polypenco® PEEK tubular bar from The Polymer Corporation, Reading, Pennsylvania, to make the complex part. The plasma arc device in this particular application operates at power levels from 50 KW to 4 MW, depending on torch configuration.



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The PEEK torch body, which is about 11 in. (30 cm) long and has an OD of about 4.6 in. (11.7 cm), houses a ceramic gap insulator, front and rear electrodes, and a stainless steel vortex generator. The torch body has four key functions: (1) distribute cooling water to the rear and front copper electrodes, (2) routes the arc gas to the vortex generator, (3) electrically isolates the electrodes and their associated parts from the rest of the torch, and (4) exactly positions the internal components.

Polypenco PEEK has a continuous service temperature of 480 °F (249 °C), and it has a low thermal coefficient of expansion. It can operate in steam and in pressurized water up to 480 °F, and it has excellent chemical resistance. The material is strong and impact resistant. Furthermore, Polypenco PEEK has good dielectric properties, including high surface and volume resistivity and high dielectric strength.

Circle No. (6) on Reader Service Card

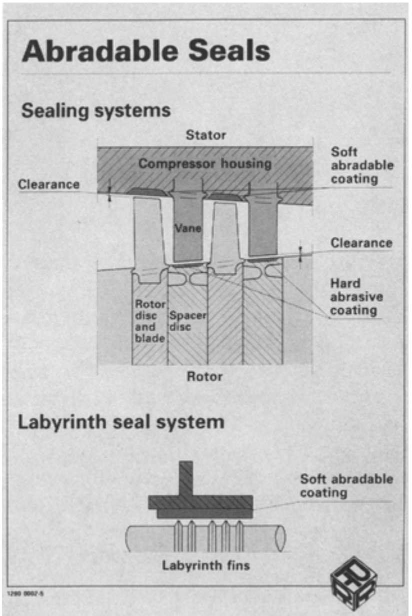
Mounting Wax for Polishing and Cutting

QuickStick™ 135 Mounting Wax is a temporary "wash-away" adhesive that is used to hold metals, semiconductors, ceramics, composites, and optical materials for cutting, grinding, lapping, polishing, and dicing operations. QuickStick™ 135 is a clear, low melting point adhesive that exhibits high strength yet is completely soluble in acetone. Its hard, brittle characteristics prevent loading of cutting blades and grinding media, allowing for more efficient processing.

Circle No. (7) on Reader Service Card

Amdry® 2010 Powder Awarded OEM Approvals

Sulzer Plasma Technik, Inc. (SPT), manufacturer of dry-atomized metal powders, announces Original Equipment Manufacturer (OEM) approvals of AMDRY® 2010 thermal abradable coating for turbofan engines. A blend of aluminum-silicon alloy and aromatic thermoplastic polyester powders, AMDRY 2010 has received the OEM approvals from General Electric (specification B50TF222, Cl. A, for over-



Sulzer Plasma Technik, Inc.

haul and repair), Textron Lycoming (specification M 3955, written confirmation pending), and Turbomeca (specification LA657PW 2.0, written confirmation pending).

Also, AMDRY 2010P received approval from the French turbine manufacturer SNECMA. The specification number of DMR 33.099 was assigned by SNECMA. Testing of AMDRY 2010 is underway at other major OEMs.

Thermal spray abradable coatings are used to control internal clearances in gas turbine engines, permitting two components in relative motion to be in close contact without component damage. The abradable coating is applied to the shroud surfaces of jet engines to reduce excessive gaps. Blade tips wear a groove into the soft abradable material, reducing the clearance and thereby producing a tighter fit. The result is an increase in engine efficiency and a decrease in fuel consumption.

AMDRY 2010 minimizes the wear to rotating components in turbofan engines, while providing resistance to service temperatures up to 325 °C (617 °C). The material responds well to mating surfaces of titanium, nickel based alloys, and other superalloy surfaces. It provides a balance among the properties of abradability, erosion resistance, hardness, and compressibility. The deposit efficiency is 70% when sprayed with a Plasma Technik Atmospheric Plasma Spray system. SPT maintains AMDRY 2010 products in stock. A technical bulletin for AMDRY 2010, detailing product quality, characteristics, and spray parameters, is available upon request.

Circle No. (8) on Reader Service Card

Calculate Your Thermal Spray Costs

A simple "thermal spray cost calculator" to determine the cost of any thermal spray coating has been developed by Hobart Tafa Technologies, Inc., Concord, New Hampshire. Based on slide rule principles, the calculator can be used for the immediate determination of each major cost, e.g., materials, process, labor and, of course, total cost.

The handheld calculator is simple to use and provides instant data on various coating materials such as, for example, tungsten carbide, cermets, and aluminum alloys. This includes rapid determination of the amount of material required as based on the area to be coated in square feet, coating thickness in mils, spray rate in pounds per hour, and gun time required in hours. Material cost is then determined from the calculated feed material required and material cost in dollars per pound. Total process operating cost can be readily calculated from the relevant parameters (e.g., gun time required (hours), labor cost per hour, etc.).

The thermal spray cost calculator is available, without charge, from Hobart/Tafa (Concord, New Hampshire).

Circle No. (9) on Reader Service Card

Sermatech Review

Sermatech Review is a quarterly newsletter that publishes recent news from Sermatech International Inc. Items in the 1992 Fall issue (No. 42-1) include "New Mobile Coating Unit Applies Plasma Coatings," "Hot Section Coatings," "Industry News," "News from Sermatech," and "MCrAlY+X Coatings Applied Using the High Velocity Gator-Gard Plasma Spray System."

Circle No. (10) on Reader Service Card

Corrosion Case Histories

"Corrosion Case Histories 1991: Processes and Prevention" consists of a book and two diskettes that allow case history searches in corrosion applications and research. Over 1100 case studies are presented concerning the technical and business activities of some 850 organizations involved in the field. The report comes with two database diskettes, to run on an IBM or compatible PC, which facilitate quick retrieval of specific details. This industry report details developments in improved corrosion-resistant materials along with advances in protective coatings and other corrosion-inhibiting processes.

Circle No. (11) on Reader Service Card

Spheridization Technology—A Detailed Announcement

Sylvania Chemicals and Metals, Towanda, Pennsylvania, has announced full-scale industrial production for the manufacture of spherical powders. The newly available capacity along with advanced control technologies enable the Critical Spheridization™, alloying, and densification of a wide range of powdered materials heretofore limited in use by their inherent morphologies. Because spherical particles possess ideal microflow characteristics, spherical powders offer advancements in materials performance.

Two processing methods are used in the production of spherical powders. The choice of method depends on desired materials properties and particle size. A brief description of the processes follows.

Critical Spheridization™ (patented by Sylvania) takes place while a material is in its liquid state and is suitable for virtually any material with a sufficiently large differential between its melting and vaporizing temperatures. Although Sylvania researchers have shown the plausibility of creating spherical materials ranging from refractories to organic polymers, the main thrust of Sylvania's development efforts has been in the area of very high melting point metals, composites, and alloys. The process uses an electromagnetic arc within an inert gas atmosphere to create a high-temperature, contaminant-free environment, which is highly suitable to the processing of particulate materials (Fig. 1a). This process allows spheridization of both single and multi-component materials. Metals, ceramics, and compounds may be processed in their homogenous forms.

Composites or alloys may be created by means of Critical Spheridization™. The process is useful in the development and manufacture of critically specified alloyed composites that contain high melting point materials, such as tungsten, molybdenum, tungsten carbide and ceramics. This method yields precise spherical powders in median sizes ranging from 5 to 150 µm. Figure 1(b) shows an example of angular as-received tungsten carbide that has been uniformly spheridized to about 35 µm in diameter (Fig. 1c).

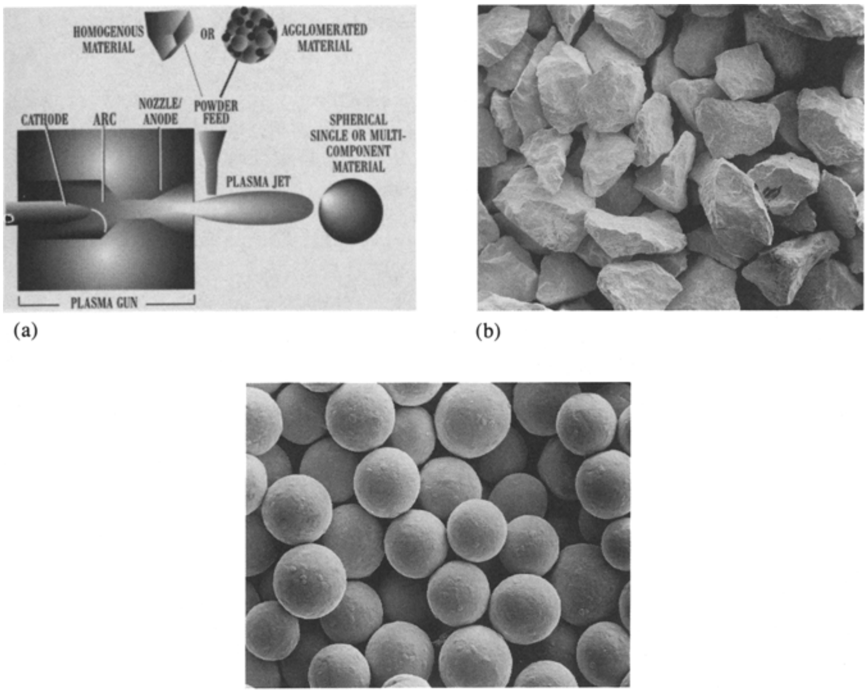


Figure 1 (a) Schematic of the Critical Spheridization™ process. (b) Scanning electron micrograph of as-received tungsten carbide powder that has been processed to achieve the spherical morphology shown in (c).

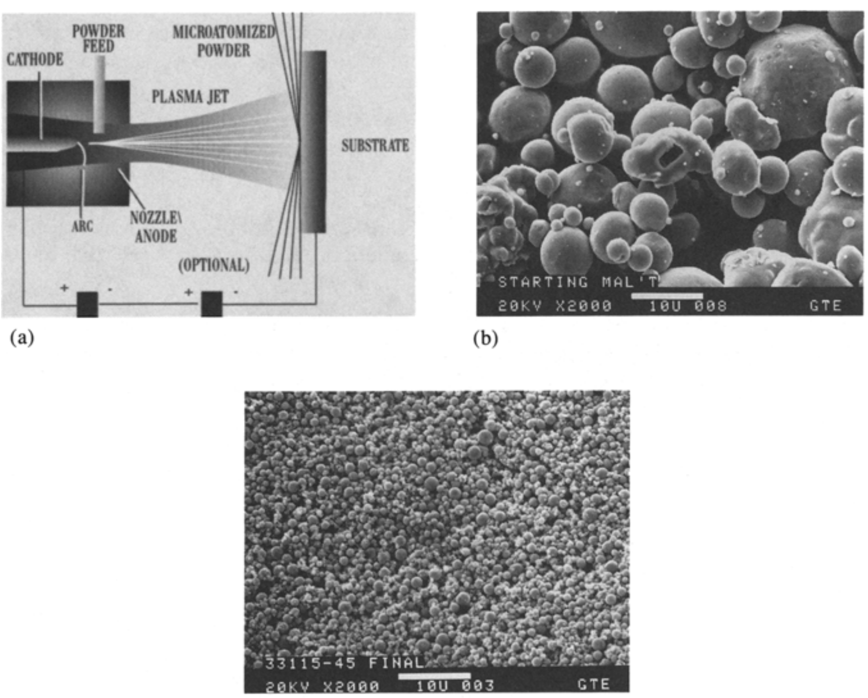


Figure 2 (a) Schematic of the microatomization process. (b) Scanning electron micrograph of as-received copper powder that has been processed to achieve the spherical morphology shown in (c).

Critical Spheridization™ has also enabled the development of spherical powders as varied as aluminum/titanium diboride, molybdenum/chromium carbide, zirconia/yttria, and borosilicate. This process offers opportunities for the development of unique solutions to advanced materials and design problems previously beyond the state-of-the art.

Microatomization is the second technology patented by Sylvania to produce finer spherical plasma-processed particles. Microatomization uses the kinetic energy of coarser hyper-accelerated molten particles to impact on a target substrate where they fractionate into finer particles in the 0.5 to 10 μm range (Fig. 2a). Microatomization is used primarily in the manufacture of proprietary advanced materials. Figure 2(b) shows as-received copper powder that has been micro atomized to a 0.5 to 10 μm range (Fig. 2c).

Selected References

M. Paliwal and R.J. Holland, Production of Fine Powders via Microatomization, *Advances in Powder Metallurgy,* Vol 1-3, Metal Powder Industries Federation, 1989, p 35-44.

M. Paliwal and R.J. Holland, Sr., "Process for Producing Fine Powders by Hot Substrate Microatomization," US Patent 5,124,091, 23 Jun 1992.

W.A. Johnson, N.E. Kopatz, and E.B. Yoder, Plasma Processing Technologies for Production of Fine Spherical Refractory Metal (Alloy) Powders, *Progress in Powder Metallurgy,* Vol 43, Metal Powder Industries Federation, 1987, p 139-162.

D.L. Houck, Powders for Plasma Spray Coatings, *Progress in Powder Metallurgy,* Vol 34 and 35, Metal Powder Industries Federation, 1978-79, p 207-216.

Circle No. (12) on Reader Service Card

Brodmann & Co. Changes Location

F.J. Brodmann & Company has moved its business operations from Louisville, Kentucky, to a new manufacturing and warehouse facility near New Orleans, Louisiana. The company supplies a full line of consumable coating products such as FloMaster™ powders, spray wires, and rods to the domestic and international thermal spray industry. The FloMaster™ products include metals, metal alloys, metal composites, carbides, cermets, ceramics, bioceramics, supersemiconducting oxides, plastimets, and polymer formulations.

Circle No. (13) on Reader Service Card

Bioceramics Workshop

The Bioceramics Institute and The NYS College of Ceramics at Alfred University

Mr. Z. Chen and Mr. Scott Goodspeed

invite posters for the "Ceramics In Biomedical Applications Workshop" 2-4 June 1993, Alfred University, Alfred, New York.

The use of ceramic-based materials in the human body has grown considerably in the last few years. The goal of this workshop is to provide a format for open dialogue about the role of ceramics as a biomaterial between industry, medical/dental, and university communities. The program includes many invited speakers including: Tom Bauer (Cleveland Clinic), Robert Condrate (NYS College of Ceramics), James Drummond (University of Illinois), Paul Ducheyne (University of Pennsylvania), John Dumbleton (Howmedica, Inc.), Gary Fischman (NYS College of Ceramics), Sam Hulbert (Rose Hulman Institute of Technology), William LaCourse (NYS College of Ceramics), Floyd Larsen (Pacific Materials and Interfaces), Louis Serafin, Jr. (BioPro), Stanley Ross (Periodontist), and Gerd Willmann (Cerasiv).

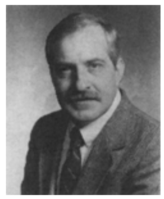
Circle No. (14) on Reader Service Card

Scholarship Award

A **Scholarship Award** was presented to Mr. Z. Chen, a Graduate Student of the Thermal Spray Laboratory, State University of New York at Stony Brook. Making the presentation is Mr. Scott Goodspeed, the Regional Sales Manager of Miller Thermal, Inc.

Circle No. (15) on Reader Service Card

Miller Thermal, Inc. Announces Appointment of Jerry Rankin



Jerry Rankin has been appointed Vice President and General Manager of Miller Thermal, Inc., Appleton, Wisconsin, one of The Miller Group Ltd. Companies. Kenneth L. Booher, President and Chief Executive Officer of Miller Group Ltd., will assume the duties of interim President.

Rankin has been Director of Operations for Miller Thermal, Appleton Division, since 1986. Since 1974, he has served as Miller Electric Manufacturing Company's Data Processing Manager, Systems/Programming Manager, and Director of Information Services. He was previously with the Medical Systems Division of General Electric.

Rankin holds a B.S. degree in Business Administration from Marquette University.

Miller Thermal is a full-line manufacturer of thermal spray products and includes the Alloys International division at Baytown, Texas.

Circle No. (16) on Reader Service Card

Mr. Hiroshi Nakahira—In Memoriam

It is with deep regret that TOCALO Co. Ltd. announces the passing of their President, Mr. Francisco Hiroshi Nakahira. Mr. Nakahira died of cancer on 29 May. He was 66 years old. The funeral ceremony was held at Ashiya Catholic Church on 31 May.

Mr. Nakahira graduated from Osaka University in 1956 and was employed by Toyo Calorizing Ind. Co., Ltd. (the previous company name of TOCALO Co., Ltd.) in 1953. He became the President of TOCALO Co. Ltd. in 1973. He was very active in professional societies, being Vice Chairman of the High Temperature Society of Japan, Vice Chairman of the Japan Thermal Spray Society, and Chairman of the Japan Thermal Sprayers Association.

Mr. Nakahira was well recognized as a pioneer in many engineering fields, as evidenced by a "Special Prize for Contributions to Thermal Spray from the High Temperature Society of Japan" in 1985 and an award from the OKADA Memorial Japan Society for the "Promotion of Welding" in 1990. He also received academic kudos and worldwide recognition with awards for the "Best Paper in 1991 at the High Temperature Society of Japan" and an "Award for Excellence at the 13th International Thermal Spraying Conference 1992."

Mr. Nakahira's legacy to the thermal spray community will remain for many decades—with the commercial markets that he developed, with the engineers and scientists that he trained, and with the many practical and scientific papers that he has published.

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