

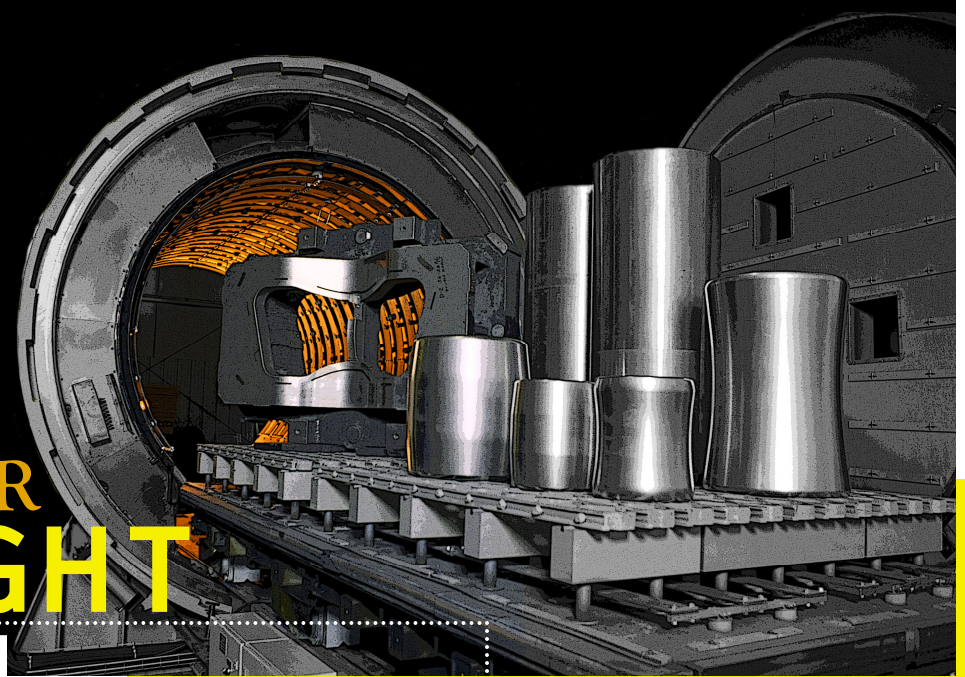
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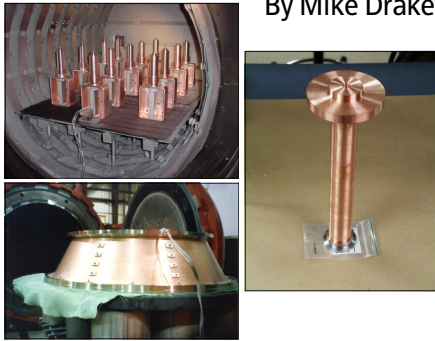
THE SOLAR SPOTLIGHT



A QUARTERLY PUBLICATION BY SOLAR ATMOSPHERES

DESIGNING TO BRAZE

By Mike Drakeley



Copper parts are not the primary braze application at Solar, brazing stainless parts with nickel alloy dominates. However, vacuum brazing copper components is done regularly and presents unique challenges for Mike Drakeley and Cal Amenheuser's expertise. Below are three copper brazing jobs that illustrate the capability of Solar's braze team.

The first job not only brazes copper parts, but large, stainless components. The "cone" picture is a chromium / copper alloy approximately 48" in diameter that was brazed to two stainless steel rings, top and bottom, using a gold / nickel filler metal. Stainless backing rings were used to insure that the lower expanding copper alloy cone maintained the proper gap at braze temperature. The assembly was cooled rapidly from brazing temperature to simulate the solution heat treat cycle required on the copper alloy. The

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**As the industry expands,
the need for furnaces
continues to rise.**

The second 24 foot long furnace with a 50,000 lb. load capacity will soon be operational in Hermitage, PA. This additional furnace is in response to the trend by metals manufacturing and processing companies' increased usage of vacuum processing.

The growth of vacuum furnace outsourcing is spurred by the value and quality offered by a large furnace. In fact, another 12 foot furnace is on order for Solar's Eastern PA plant in Souderton. The new furnaces are built by Solar Manufacturing, our sister company in Souderton, PA., using work-tested, large furnace technology. The 24 foot furnace has the unique and patented bottom load truck design that has been used in Western PA for the past five years.

Large furnace technology is a new resource for manufacturers and primary / secondary metals processors. Other than the capacity advantage, the vacuum furnace's controlled environment enables metallurgical and part specifications to be achieved with minimal distortion. Precise temperature processing, the use of various gases and improved gas

quenching all add up to minimized distortion and bright clean parts while metallurgical properties are achieved for demanding part applications.

The development of the aerospace industry in the 1960s pushed vacuum heat treating and brazing to new levels. This trend continues with the demands of aerospace engineering and the use of more titanium and other light and strong materials. Long titanium parts are being processed for the aerospace industry and Solar expects that this market will continue to growth for several years.

Solar's large furnace technology is tested and developed through the 24/7

(CONTINUED ON PAGE THREE)

SOLAR
ATMOSPHERES

Keepin' Spry: Spotlight on Glenn Slotter

Information Technology Supervisor hands the reins over to the next generation of computer gurus.

Over the past 20 years, computers in manufacturing have become critical for a company's existence. Every phase of a company's operation, from communications to production, have become computer dependent with each new hardware and software advancement.

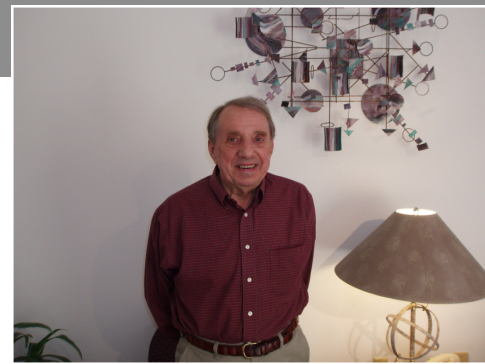
Solar has been guided through a decade of emerging computer technology by the efforts of Glenn Slotter. For ten years, Glenn has overseen the installation of several generations of computers and servers that has enabled Solar to keep up. This is no small feat considering both the constant changes at Solar as well as the frantic developments of computer technology.

Glenn has recently retired as Solar's IT Manager, even though he is still operating with several megahertz of energy. Since Glenn is not bashful about his age, at 76 he is probably one of the oldest in this field. The significance is that ten years ago, when

most people think about going on cruises, Glenn was developing and using new skills in a very fast paced technology. If you know Glenn, you are not surprised.

Spry and eager to meet the challenges of life and service, Glenn maximizes the opportunities of the day. He grew up in the Hatfield area, close to Souderton and graduated high school just after WWII. Glenn found employment, but joined the US Marine Corps after the start of the Korean War and rose to the rank of Staff Sergeant in his three year stint. The life lesson from his time in the Corps is to "Set your mind on a worthwhile task and have confidence that through discipline and hard work - you can do it."

Having an entrepreneurial spirit, Glenn developed Slotter Motors, AMC & Jeep, in Lansdale, PA. In 1978, he sold the business and got involved with the new computer technologies seeing the potential for business. With experience in system sales and consulting, Glenn started a computer business for sales, accounting and manufacturing. It was a tumultuous time in the computer world and although he later went in another direction, Glenn stayed on top of the devel-



oping technology.

In 1979, as one of the original VFS company stockholders (predecessor to Solar Mfg.), Glenn had an interest in the advancement of Solar's vacuum processing. In 1996, he became an employee with the responsibility of keeping up with the computer technology and applications needed at Solar. To accomplish this job, Glenn relied on wisdom as well as trial and error. His years of experience enabled him to have the right balance between patience and perseverance.

Glenn's perspectives on this subject are helpful, "Changes in business methodologies, that had taken four or five years in the past, can now occur in a month."

Glenn's wisdom, "is to stay loose, never

(CONTINUED ON PAGE FIVE)



Mike Johnson assumed sales manager responsibilities in September.

SOLAR WEST'S NEW SALES

2005 was a year of transition for Western PA's sales personnel. Mike Johnson, Quality Assurance Manager for the past four years, assumed sales responsibilities in September. The advantage of moving from Quality is that Mike knows Solar's customers, their work and the processes needed to meet metallurgical specifications. As Tim Steber, Regional Sales Manager, has stated, "Every job has its own personality" and Mike Johnson knows those "personalities".

The greatest challenge was to make sure the Quality Department was in good hands prior to his transition.

Gary Armour and Paul Brinker have taken over these responsibilities and Western PA's Quality program is operating smoothly.

Aggressively pursuing and following up leads is a primary objective of Mike's. and several new customers have resulted from this effort. Mike has brazing expertise that will help expand Solar's brazing market by identifying beneficial customer applications. Having attended the PRI show (motorsports) in December and the Pacific Design/MDM show in February, Mike has a growing appreciation for Solar's service opportunities.

Large Furnaces

(continued from page one)

processing of materials and parts at Solar's heat treating plants. The original 10 foot long furnace was installed at the Souderton plant in 1992 and Solar now has ten large furnaces in operation. The value of these workhorses is not only processing large parts and assemblies, but large loads of parts for efficient production. Large baskets or fixturing are used to process drawings, tubing coils or straight lengths, journals, castings, weldments, ingots and billets of primary and secondary materials. Processes performed include annealing, degassing and stress relieving.

The new furnace is relieving the backlog of titanium materials to be processed so it is apparent that the 24 foot furnaces are critical for Solar's services and for the advancement of manufacturing. ✨



The Spotlight's New Look and Design!

Many readers of the Spotlight have expressed appreciation for the newsletter. The quarterly publication's objective is to keep in touch, promote Solar's services and introduce our people. Thanks to your feedback, we know that goal has been achieved.

Regarding the quality of the publication, the bar has been raised by Solar Manufacturing, who now publishes their own newsletter, *The Hot Zone*. The new publication is full color and the impact is felt as soon as you pick it up. There was only one possible response, *The Solar Spotlight* will now be published in color with a new masthead and graphic design, thanks to the layout contributions by Erin Royce. I hope you will enjoy the Spotlight in its new, vibrant format. Robert Lacock, Editor. ✨

MANAGER

Some objectives and goals for 2006 include new work for the smaller furnaces, with the Midwest and the medical device market as targets. A monthly goal of Solar's sales department is to strategically plan contacting customers and prospects. The objective is to understand changing production needs and provide responsive services. To this end, Mike Johnson's expertise and efforts will reinforce Solar's ability to offer *The Metal Processing Advantage*.

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CAMCRAFT CHOOSES SOLAR

Due to production efforts, Camcraft in Hanover Park, IL, has honored Solar Atmospheres, Western PA, as one of its prime suppliers. Solar performs a harden and temper process on small 4140 components used by Camcraft in its automotive related business.

Camcraft, a family owned business, specializes in manufacturing hydraulics and flow components for the automotive and off-road vehicle markets. Camcraft's modern, 85,000 square foot facility is located outside of Chicago. Because of its innovative engineering emphasis, Camcraft is a leader in manufacturing fuel systems and control valves. In 2005, Camcraft was commended for its "outstanding employee development services" by the Chamber of Commerce, with the presentation done by Chicago's mayor, Richard Daley.



Bob Hill, President at Solar Western, says "Past efforts to service Camcraft will be matched and exceeded. It is a pleasure to work with the people of Camcraft and Solar is thankful to have them as a customer."



Mike Afflerbach, President of Magnetic Specialties (MSi), Solar's newest company, announced increased profits from two sources - acquisition and growing sales. In January, Magnetic Specialties Inc. purchased the assets of Magnetran Inc., Voorhees, NJ, that resulted in a greatly expanded customer base and significant growth.

Magnetic Specialties has two distinct, but somewhat similar product lines, custom magnetics and industrial power supplies including the FCS-2000 Smart Power Supply. All MSi products are custom designed to meet customer requirements. Magnetran provides custom magnetics similar to Magnetic Specialties in mechanics, but designed for different industrial applications.

Magnetic Specialties had been servicing the industrial heating, electrical measurement and control, industrial automation, electrostatic precipitator, and military contractors. Magnetran's customer base includes manufacturers of semiconductor equipment, nuclear medicine equipment, electrical supply houses, induction melting, and medical devices.

Even though the customer bases of both companies are diverse, the mechanics of the products are similar, which allows an almost transparent merger. Also, since bringing on some employees from Magnetran, improved lean manufacturing procedures have been instituted. The merger will use the best assets of each company resulting in a more complete provider of custom magnetics and power supplies.

Surging sales required Magnetic Specialties to hire new employees, including a number of Magnetran people. Guy Leonard, Sahoanh Thach, and Kantilal Mistry will all work in the plant producing the Magnetran products. Magnetran's electrical engineer, Ramesh Mistry, was hired to help make a seamless transition and will greatly assist in the future growth of Magnetic Specialties. Former Magnetran president, George McCauley, has been retained as an outside sales representative. Nancy Fels was hired to help with the increased demand for MSi products. The enlarged company will use the Magnetic Specialties name to market the broadened product line.

The merger of the companies will contribute to the future by providing one overhead structure for the expanded product line. This will provide customers with greater product choices and customer service. ✨



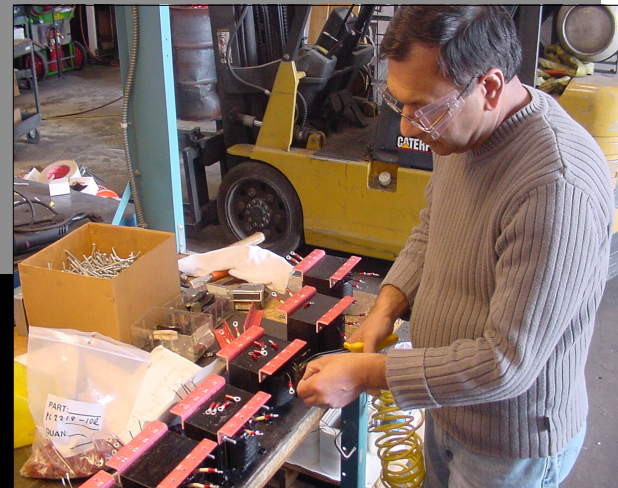
Sahoanh Thach is all smiles at MSi

assembly was then vacuum age hardened to increase the copper cone's strength. Graphite plates were used as a brazing base to help maintain flatness during thermal cycles.

The second job brazed an OFHC copper round shaft to a stainless ring. The stainless ring was nickel plated to a depth of .0005". The plating allowed brazing with silver / copper (BAr-8), which has a liquidous temperature of 1436°F. This temperature is too low to reduce chromium oxide on the stainless part. Under vacuum, nickel oxide will reduce at this temperature without flux. Partial pressure argon is used when brazing with this alloy to minimize evaporation of the filler metal.

The third job involved large copper fittings that were brazed into the side of OFHC copper boxes. Filler metal was copper / silver (BAg - 8). Boxes were set on graphite with the bare joint facing straight up. This orientation allowed gravity to feed the filler metal into the braze joint. Because of the fitting weight, the open box, and the soft nature of copper at brazing temperature, the part had to be supported. A stainless bar was used to transfer the weight of the fitting through the part. Ceramic buttons were placed between the stainless bar and the copper part. This eliminated the possibility of brazing the fixture to the part, if some of the filler metal ran into this area, since ceramic will not braze to the copper on stainless.

These jobs illustrate metallurgical knowledge, processing experience and furnace capability to successfully braze at Solar. If you have design or braze questions, contact Mike Drakeley at mjd@solaratm.com or Calvin Amenheuser at cba@solaratm.com.



Guy Leonard works on the custom magnetics

Glenn Slotter (continued from page two)

give up, learn, and move on."

Glenn continues to keep spry through the disciplines of life and work. In fact, he still comes into work each morning to assist Solar's new IT Corporate Manager, Josh Isaak. Having been assisted by Josh for the past six years, Glenn now assists Josh! Josh knows Solar computer operations and continues to advance his own skills at such a pace that Glenn states, "He has drained me dry. I have great confidence in Josh moving Solar forward."

Glenn's priorities in life are his Lord, family and church, and for the first time, fishing. He has been an elder in his church for 40 years. Glenn and Betty, his wife of 52 years, appreciate the last ten years with Solar. Solar is very appreciative of Glenn's good humor and vitality that he has brought to his work. He is an inspiration to keep learning and moving - to stay spry. ✨



Mike Moffit uses the micro hardness tester

Recent equipment additions and upgrades to Solar Atmospheres' Quality Laboratory have greatly improved its metallurgical service capabilities. Solar's vacuum carburization research and development program initiated the improvements.

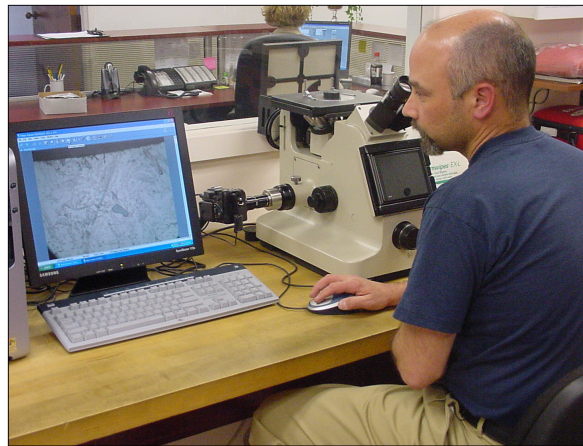
Added capability started with the purchase of a Nikon, Epiphot model, metallograph. This precision optical microscope provides observation and photography of microstructures up to 1,000X magnification with 5 turret mounted objective lenses.

The second equipment upgrade is a 6 mega pixel resolution digital camera fitted to the metallograph. The camera interfaces with a computer system for real time viewing of structures on a 17-inch LCD screen for multiple viewer observation. The system also provides hard copy photomicrographs, indexing and permanent data storage.

A third addition to the laboratory is an automatic grinding and polishing head/specimen holder for microspecimen preparation. The

automatic polishing unit can prepare six microspecimens at a time. This capability saves considerable time in manual labor that would require doing six specimens, one at a time. The automatic polishing unit is a very desirable equipment upgrade when compared to manual hand polishing because excellent surface edge retention is attainable (eliminates surface "rounding"). Carburized case depth microhardness measurements need to be conducted near the surface, so lack of edge rounding when polishing microspecimens is critical to obtain accurate and precise microhardness results of the case.

The fourth upgrade is a \$50K Newage Testing Instruments' computer controlled microhardness tester, with an automatic moving stage. Fully automated microhardness traversals of carburized case depths are made at selected locations on a sample. The computerized stage control and indentation measuring systems significantly improve test accuracy, precision, and repeatability. ✨



Ken Ortwein tests out the new equipment

Mission

The Mission of Solar Atmospheres is to add significant value to our customer's operations by thermally treating parts, principally in a vacuum environment, with an unwavering commitment to honesty in all relationships.

Guiding Philosophy

We will strive to fulfill this mission while,

- ◆ *performing our work with an emphasis on quality and responsiveness*
- ◆ *Operating with an awareness and appreciation of the value of our customer's parts while in our care*
- ◆ *Forever looking "forward" in the area of technical capabilities*
- ◆ *Demonstrating a willingness to "accept the challenge"*
- ◆ *Providing and maintaining a work environment that is safe, clean and reflects our respect for human dignity.*
- ◆ *Providing our employees with an opportunity for personal growth, challenge and reward*
- ◆ *Maintaining a workplace that is environmentally friendly*
- ◆ *Sustaining long-term growth and profitability*

The Solar Spotlight is a quarterly publication of Solar Atmospheres

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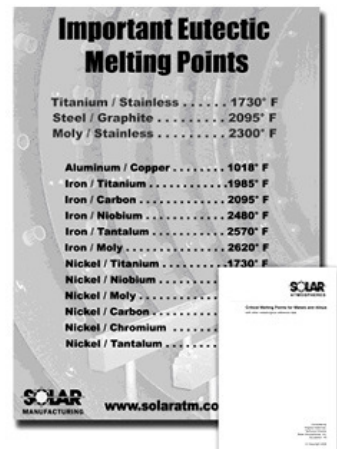
“People travel to wonder at the height of the mountains, at the huge waves of the seas, at the long course of the rivers, at the vast compass of the ocean, at the circular motion of the stars, and yet they pass by themselves without wondering.”

- Saint Augustine

Free booklet and poster offer!

The *Melting Points & Eutectics Poster* offer is still in effect. Solar Atmospheres and Solar Manufacturing offer a *Eutectics Poster* (20" x 30") and *Melting Points Booklet* as a service to our friends. Two posters and two copies of the Melting Points booklet per company are offered free of charge. Bulk copies will be charged \$5.00/copy in excess of the complimentary quantities.

If you are interested, contact Bob Lacock via email rdl@solaratm.com or send a purchase order to Solar Atmospheres, 1969 Clearview Road, Souderton, PA 18964 for bulk orders. Master Card and Visa are also accepted. More information on the publications can be found on the Solar's web site home page at www.solaratm.com.



Important Eutectic Melting Points

Titanium / Stainless	1730° F
Steel / Graphite	2095° F
Moly / Stainless	2300° F
Aluminum / Copper	1018° F
Iron / Titanium	1985° F
Iron / Carbon	2095° F
Iron / Niobium	2480° F
Iron / Tantalum	2570° F
Iron / Moly	2620° F
Nickel / Titanium	1730° F
Nickel / Niobium	
Nickel / Moly	
Nickel / Carbon	
Nickel / Chromium	
Nickel / Tantalum	

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