

The



SPOTLIGHT

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A QUARTERLY PUBLICATION BY SOLAR ATMOSPHERES

NOVEMBER 2005

Solar's Furnace Technology Awarded Patent

Solar Atmospheres Inc. announces the assignment of US Patent No. 6,936,792: "Furnace Cart and Load Transfer System for High Temperature Vacuum Furnaces and Process." The patent was issued August 30, 2005.

The car bottom vacuum furnace design allows heavy work loads up to 24 foot in length with a load capacity in excess of 50,000 lbs. The design permits processing at temperatures up to 2750° F in high vacuum to 10⁻⁵ torr. Furnace design includes 300HP gas quench fans and heat exchangers for fast heating and cooling cycles to ambient temperature in a 24 hour time period.

Solar Atmospheres, Western PA has installed and operated two car



50,000 lb. load on Solar's newly patented "transfer system"

bottom production furnaces. Bob Hill, President of the facility, states, "Furnace capability enables 24 hour, 7 day operation for annealing and hydrogen degassing of large titanium orders. Material configuration and size vary to include coil, sheet, bar, rod, and plate for aerospace and other industrial applications.

According to William R. Jones, Solar's CEO, a third car bottom furnace order has been placed with Solar Atmospheres Manufacturing for delivery January 2006. This order will be Solar's third 50,000 lb. capacity furnace to keep up with the titanium industry requirements that are oversold at this time.

Vacuum Heat Treating Achieves BAC Specification

Solar Atmospheres, Western PA, successfully vacuum heat treated two CH47 Chinook helicopter carrier development parts for Triumph Gear, Macomb, MI. The challenge for Triumph and Boeing engineers was to minimize distortion, typically associated with oil quenching, yet attain BAC Specification 5617.

The carriers, 4340M alloy steel, support the internal planet gears within the transmission of the helicopter. Each carrier was 407 lbs., 26 inches high, 24 inches diameter with a maximum cross sectional thickness of 1.562 inches.

Due to the complex geometry of the carriers, the company's first priority was to find a Boeing approved heat treating facility with high pressure, gas quenching capabilities. To successfully heat treat after final machining, with minimal distortion, an exception to the BAC specification was allowed, but only for the quenching media. So in lieu of oil or martempering per BAC 5617 Rev R, gas pressure quenching was allowed. Solar Atmospheres, Western PA was chosen because of its furnace quenching capabilities and processing experience.



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Investing for the Long Term

The benefit of investing employee time and company resources in an industrial association is *not* immediately evident. Hand shaking, small talk and eating banquet chicken will not add much to this month's bottom line, but keeping a long term perspective is important. With a long term commitment, companies can realize significant benefits from involvement in the various industrial communities that it services or has a professional relationship.

Professional and industrial associations are important places to make a contribution, as well as a source for networking. Solar has made a commitment to contribute to industrial associations by presenting technical talks and assuming organization responsibilities. These commitments have particular importance in the global economy. If "no man is an island" the same can be said for each business enterprise. What is critical to maintain the long term networking commitment is the desire to contribute and make a difference in a particular industry. In other words, a company must look beyond itself. It is Solar's belief that this perspective is critical for American manufacturing to advance and be competitive.

Complimenting the industrial commitments is the networking exposure that can translate to a bottom line advantage. Several benefits that Solar has realized are marketing opportunities, new customers, targeted advertising channels, and most importantly, friendships. Professional and industrial associations help establish the company's brand among peers as well as prospects. Specifically, marketing opportunities are public relations and advertising channels such as shows, web site links and news releases. Building personal or relational business contacts can result in new employees or a key consultant at a critical decision making time. Other advantages offered include educational and R&D information.

Whatever your industry, there is opportunity when investment is made in the associations that support your endeavors. Involvement is a company decision and at Solar we consider the time and expense worthwhile for the bottom line as well as making an investment in American manufacturing.

Investing in ASM

The Spotlight has highlighted Solar's involvement in American Society of Materials (ASM) as a professional association. ASM has over 40,000 members around the world. At the end of September, ASM held its national conference and exhibition in Pittsburgh, PA. Solar participated extensively to promote our work and contribute to the development of the materials and heat treating industry.

During the past year, Solar has made significant investment in ASM. Bob Hill was Co-chair of the International Conference and Exhibition contributing a great deal of time and energy. Solar provided speakers, and at the exhibition Solar had two booths, one for Solar Manufacturing and one for Solar Atmospheres.

Four presentations were made by Solar employees. Bob Hill gave a paper on hydrogen versus helium quenching. The paper gave an overview of the safety precautions of hydrogen that must be in place to use this effective and cost savings quenching gas. Mike Moyer gave Solar's perspective on the value of NADCAP and ISO Certifications for the operational effectiveness of a company. Bill Jones focused his presentation on the development of Solar's carburizing process and Solar Manufacturing's new insitu quenching carburizing furnace. Lastly, Magnetic Specialties' (Division of Solar Manufacturing) Mike Afflerbach presented the innovations of MS power saving transformers and how they function.



Bill Jones received the Bodeen Award at ASM's annual awards banquet in September.



One of the highlights of this year's ASM event was the **George H. Bodeen Award** given to William Jones, CEO, of Solar Atmospheres. As one of the most prestigious awards in the heat treating industry, ASM established this award "to recognize distinguished and significant contributions to the field of heat treating through leadership, management of engineering development of substantial commercial impact." Congratulations are due to Bill as he is recognized for his *many* decades of investment in advancing furnace and processing technology.

Investing continued Page 5...

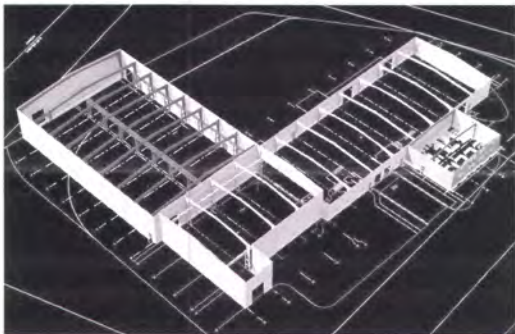
Growing Spaces - Update



Anne Connelly enjoys new furniture as she performs her many duties as the company receptionist in Souderton.

capable of case hardening gears and other parts that need an extended wear life surface. Load capacity is 1500 lbs.

The furnace's capability is unique with a super quenching ability produced by a



Solar Atmospheres Western PA floor plan after new addition is completed next spring. The plant will have 34,000 square feet.

Solar Manufacturing moved into its new location at 1983 Clearview Road, right next door to Solar Atmospheres at 1969 Clearview Road, Souderton. The move went quickly and smoothly which is important because of new furnace orders. In addition to the new 24 foot furnace being constructed for Solar Atmospheres, Western PA, Solar Manufacturing has received an order from O.C. Tanner, Salt Lake City, UT, for a 2 Bar furnace. The 18" high x 12" wide, 24" inch deep furnace will be used to heat treat tool steel for the manufacture of recognition awards. Furnace delivery is scheduled for February 2006.

After its public debut at the ASM Heat treating show exhibition, *Solar Atmospheres'* new vacuum carburizing furnace will soon be operating in Souderton, PA. The six foot long hot zone is



New carburizing furnace on the floor at Solar Atmospheres.

300 HP motor with a 5000 RPM Robinson fan wheel. Trevor Jones, Project Engineer, says, "The capability of this furnace is unprecedented and will enable super quenching to achieve desired surface and core hardness."

Solar Atmospheres, Western PA is progressing with the expansion of its facility. The land development plan was approved by the City of Hermitage and ground breaking occurred last month with the expectation of the building being completed next March. New furnace delivery, including the new 24 foot furnace chamber, will occur shortly thereafter. The new offices will be completed later in the year. Bob Sandora, Vice President, stated that the building is needed because the current capacity is now being stretched to its limit with product and furnaces.

Corporate R&D Team Established

Critical to Solar Atmospheres' value statement is its commitment for the advancement of processing and vacuum furnace technology. Finding a better cycle, better quenching times, improving energy efficiency and a myriad of engineering and service capabilities have been developed amidst the daily routines of Solar as a heat treating facility.

By pooling the varied talents of resourceful individuals, Solar has now established an R&D team. This group has been gathered to integrate the practical wisdom of the vacuum heat treating experiences at Solar and the developing needs of the metals manufacturing industry.

Each member on the committee has a particular role. Guiding the efforts of the team is William R. Jones, CEO at Solar. To understand and explain the physical and structural changes that occur in the heat treating process, the metallurgical

knowledge of Harry Antes, Ph.D., consultant, and Don Jordan, Vice President of Heat Treating, will be most crucial. Virginia Osterman, Ph.D., Technical Director, brings a chemistry perspective to evaluate material transformations. As Project Engineer, Trevor Jones, has the responsibility of processing parts for analysis and evaluation by the team.

The objective of this team is to keep Solar on the edge of vacuum furnace capability and processing. Current projects include the refinement of the vacuum carburizing cycle with insitu high pressure gas quenching. Future projects involve nitriding and nitrocarburizing.

Integration of furnace technology, materials science as well as processing capability makes Solar R&D effort unique. This strategy is central to Solar's objective to continue offering our customers "The Metal Processing Advantage."

Carburizing Articles Published by Solar R&D Team Members

Two members of the Solar R&D team recently had two articles published on and the findings and development of Solar's vacuum carburizing process. Each article presents the labor of all members on the R&D team.

Harry Antes, Ph.D. is a consultant for Solar. Harry has a number of years doing metallurgical work for industry as well as teaching at Drexel University in Philadelphia. He is also a Fellow of ASM. In the August issue of *Heat Treating Progress*, published by ASM International, Harry Antes "proposed a technique of determining the actual required flow rate of the carburizing gas into a furnace to provide the necessary amount of carbon for a given work load."

Virginia Osterman, Ph.D. and Technical Director at Solar, had an article published by *Industrial Heating* in the September 2005 issue. Her article, "Development Experience in Low-Torr Range Vacuum Carburizing" gives a detailed description of Solar experiments and findings in advancing vacuum carburizing in an insitu gas quenching furnace. Ginny has worked in the metals industry for a number of years prior to her new role as Technical Director at Solar.

Both articles are available from Solar. Please contact Bob Lacock if you would like a copy, rdl@solaratm.com.

**"Life is divided into three terms - that which was, which is, and which will be.
Let us learn from the past to profit by the present, and from the present to live better in the future."
William Wordsworth, SITE LINKS**

Vacuum continued from Page 1...

To achieve part specification, the components were preheated at 1400°F and held for 30 minutes based on readings from work thermocouples placed inside the customer supplied test pieces. The final austenitizing temperature was performed at 1600°F ± 25° and held for 105 minutes. The gas was circulated by a 300 HP motor at 5000 RPM and pressure quenched at 10 bar helium. Once cooled to room temperature, the components were tested at 62 HRC hardness and dimensionally checked. Inspection confirmed minimal geometry change. Subsequently, the components were double vacuum tempered and sent back to the customer for grinding.

The advantages of gas pressure quenching compared to liquid quenching have become increasingly evident. Lean manufacturing goals no longer allow the ordering of excess material and machining time to compensate for distortion caused by oil quenching. Machine and set-up time is another critical factor for choosing vacuum. The advantages of finishing a part in the green (soft) stage, prior to heat treating, versus re-fixturing a distorted part in the hardened state offers time and cost savings.

"Successful vacuum furnace hardening of components to attain optimal metallurgical properties reinforces the need to prescribe a cooling rate rather than a quench media."

Bob Hill, President, Solar Atmospheres, Western PA



UPCOMING SHOWS

Fabtech
November 14-16
McCormick Place
Chicago, IL
Booth # 10095

**AMS Medical Devices
and Materials**
November 15-17
Boston, MA
Booth # 36

Performance Racing
December 1-3
Orlando, FL
Booth # 1936

**Power-Gen
International**
Dec. 6-8
Las Vegas, NV
Booth # 1332

For specific show information and passes, please contact Bob Lacock, 800.347.3236, rdl@solaratm.com

Vacuum Brazing Die Inserts

Solar Atmospheres, Eastern PA, vacuum brazed 36 cavity die inserts in an injection mold die. Comar Plastics, Buena, NJ, refurbished inserts to save the time and expense of purchasing new parts.

The refurbished H13 inserts were machined and brazed into the injection mold cavity. Copper wire pre-forms were selected as the alloy filler to ensure braze joint uniformity. Heat treating of the H13 material occurred during the braze run and was followed by two vacuum tempers to attain hardness specifications of HRC 52-54.

Solar was able to accomplish the braze work in less than three working days to meet the manufacturer's production schedule. Parts were then plunge EDM'd to final size.

Hurricane Relief

Solar Atmospheres¹ has made a contribution of two \$5,000 checks, one to the American Red Cross, and one to The Salvation Army to help with the recovery from the recent devastation caused by the hurricanes along the Gulf Coast. As an American company and as individuals we need to help in times of crisis.

Each charitable organization has an on-going involvement to help people in catastrophic circumstances. Solar's contribution is an important response, along with other businesses across the country, since we are part of the nation that supports others in times of need. The following description of each agency is from their web site.

"Each year, the *American Red Cross* responds immediately to more than 70,000 disasters, including house or apartment fires (the majority of disaster responses), hurricanes, floods, earthquakes, tornadoes, hazardous materials spills, transportation accidents, explosions, and other natural and man-made disasters."

"The *Salvation Army*, an international movement, is an evangelical part of the universal Christian Church. Its message is based on the Bible. Its ministry is motivated by the love of God. Its mission is to preach the gospel of Jesus Christ and to meet human needs in His name without discrimination."

Mission

The Mission of Solar Atmospheres is to add significant value to our customers' 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.



Furnaces for Sale by Solar Manufacturing

Several vacuum furnaces are available for quick shipment by Solar Manufacturing. One furnace is a refurbished high performance external gas quenching VFS HL34. Work zone size is 24" wide x 18" high x 36" deep.

Another furnace option is a new 2 bar Solar Furnace with a work zone size of 24" high X 24" width X 36" depth.

If you have interest or questions regarding these furnaces or other options, contact Pete Reh, Sales Manager, pk_r@solararmfg.com, 267.384.5040.

Solar Manufacturing designs and manufactures new and refurbished vacuum heat treating and brazing furnaces with a focus on energy efficiency and durability.

Investing continued from Page 2...

As part of Solar's future involvement with ASM, Roger Jones, Corporate President, recently became an ASM board member that will oversee the direction and policies of this international organization. Roger was appointed to this important position because of his long-standing contributions to many of the ASM committees.

Solar has had sustained growth since its start over 20 years ago and investment in ASM has contributed to that growth. Even though this includes a lot of small talk and banquet chicken, Solar has benefitted from its involvement. We believe and take satisfaction that our contributions to the heat treating and materials industries have advanced American manufacturing.



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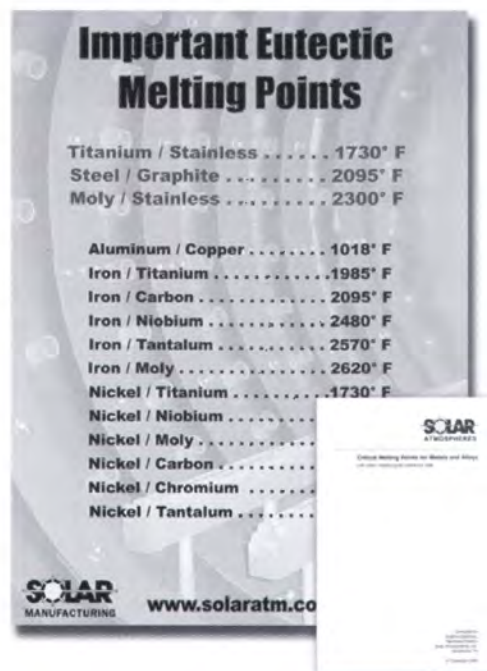
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Free Eutectics Poster / Melting Points Booklet Offer

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.

The *Eutectics* poster editor was Solar's Don Jordan, Vice President of Heat Treating. Virginia Osterman, Technical Director, edited the reissued *Melting Points Booklet*.

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.



The Solar Spotlight is a quarterly publication of Solar Atmospheres

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