

# the hot zone news

## ***Solar Manufacturing Delivers***

Recently, owners of Singapore-based commercial heat treater Twin Vac Industries visited Pennsylvania to inspect their new SAMI furnace and approve it for shipment. Mr. Soon Cheng Choon and his wife spent several days overseeing the tests and touring the Solar facilities in Souderton. It was a great opportunity to get to know Mr. and Mrs. Soon and them to know us.

Since 1989, Twinvac Industries has provided quality heat treatment services to both manufacturers as well as mold and tool makers. Starting with only several furnaces, Twinvac has grown into a highly qualified international heat treater, with the latest addition to its facility being a Solar Manufacturing furnace model HFL-6648-2EQ.

The furnace features a high efficiency, graphite insulated hot zone consisting of four layers of 1/2" thick graphite felt with a FlexShield hot face. Operating temperatures reach a maximum of 2500°F, with the work zone measuring 42" wide x 42" high x 48" deep, meeting the latest specifications of AMS 2750D, and load capacity at 4000 pounds. Thin-profile, curved graphite heating elements heat work loads rapidly and uniformly, while the improved, tapered graphite gas nozzles direct quench gas directly on the work load for optimum gas cooling.

The newly designed 2-bar external gas quench system consists of a 100HP motor and a Robinson radial fan wheel and diffuser. SolarVac 3000, a state-of-the-art, interactive control system, provides the ability to monitor, control, and display information graphically to enable an operator to quickly understand the status of the furnace.

The furnace was shipped in February 2007. ☀



*Pete Reh, Soon Cheng Choon and his wife and Jim Nagy with the new vacuum furnace*

## ***Contract signed with Super Systems***

Solar Manufacturing and Super Systems, Inc have signed an agreement for the marketing, manufacturing, and supply of a new line of Vacuum Purge / Recirculating Gas Nitriding furnaces.

SAMI has designed and will build the new furnaces at their Souderton, PA plant utilizing Super Systems' electronic temperature and flow control panels supplied from Cincinnati. Early tests indicate increased production cycles and with quality equal to ion nitriding with white layer reduced to little or none. The

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## New corporate brochure

A newly designed and updated corporate brochure is now available from Solar Manufacturing. The 12-page, full-color booklet contains company background information, a look at products and services offered and an overview of corporate capabilities.

Also available is a complete literature and sales kit, featuring product sell sheets with complete specifications, features and benefits and photos. The latest sell sheet describes Solar Manufacturing's replacement hot zones and compares the insulation and watts per square inch to other manufacturers' designs. Other sell sheets include information on Solar's car bottom furnaces, production furnaces, control systems, load trucks and aftermarket parts.

To view the corporate brochure, visit [www.solarmfg.com](http://www.solarmfg.com) or request a kit by calling Solar Manufacturing at 267.384.5040. ☀

## ASM Detroit, Sept. 2007

Visit Solar Manufacturing's display at the ASM International Heat Treating Society trade show in Detroit, this September from at the Cobo Center. Learn more about Solar's diverse product line and how we can help you with your furnace needs. We hope to see you there!

Location: Cobo Center, Detroit, Michigan

Dates: September 16-20, 2007

Booth #: 819



# In the Zone...

Aftermarket activity has been hot this year with a number of new hot zone orders. We have received orders for replacement hot zones for Ipsen International furnaces, Vacuum Furnace System furnaces and Surface Combustion furnaces. Hot zones delivered and installed this year include an Ipsen International model HR-50x48, HR-26, VFS model HIQ-3836, HL-50x72 and model HL-50.

Two hot zones were converted to curved graphite elements from molybdenum. These were staggered power terminal feed through designs. The patent

pending Daley ring was used to complete the element conversion.

Solar Manufacturing has successfully rebuilt a VFS model HL-50 hot zone in the field converting it to graphite elements. The complete rebuild was done in the field to reduce cost and minimize furnace down time. The graphite board was cut in the field, existing standoffs used and replaced with new where needed. The rebuild was completed in five days including removal of the hot zone and installation.

Looking forward, business looks good with several new orders expected the second quarter.



### THE HOT ZONE SPECIALISTS

Solar Manufacturing is proud to be gaining a name in the heat treating industry as the hot zone specialists. Our engineers can improve your existing hot zone design. Our high efficiency hot zone requires less than 6 watts per square inch at 2400°F. The maintenance-friendly design consists of a .040" flex shield hot face backed by four layers of 1/2" graphite felt insulation. High velocity gas nozzles can improve cooling up to 43%.

*Have a process or furnace question?  
Call Dennis Hiddemen at 267-384-5040 ext. 510.*

# Twin production furnaces installed

In 2006, Solar Manufacturing announced the receipt of a contract for four vacuum brazing furnaces worth several million dollars. Recently, two of these furnaces were installed in the shop of an HVAC component manufacturer in the North-eastern USA.

Each of the Model HFL-7472-2EQ high vacuum pumping systems includes 20" Varian diffusion pumps to allow the furnaces to operate in the  $10^{-5}$  Torr range. Featuring a high efficiency, graphite insulated hot zone consisting of 2" thick high grade graphite felt with a hot face of Flex-Shield, the maximum operating temperature is 2500°F and the load capacity reaches up to 10,000lbs. Thin, curved graphite heating elements heat work loads rapidly and uniformly.

The improved 2-bar external gas quench system consists of a 150 HP motor, a Robinson radial fan wheel, diffuser and a variable speed drive to allow precise control of the quench. Improved, large diameter, tapered graphite gas nozzles will focus quench gas directly on the work load for optimum cooling.

Also featured on each furnace is the SolarVac 3000, an advanced control system developed by Solar Manufacturing to monitor, control, and display information graphically to enable an operator to quickly understand the status of the furnace. The SolarVac 3000 consists of an interactive, Allen-Bradley PanelView operator interface utilizing a 15" color touch screen combined with a Eurotherm Graphic Data Acquisition Video Recorder and an Allen-Bradley programmable logic controller.



*Another vacuum furnace, like the ones pictured above, is in development stages*

## ORGANIZATIONAL ANNOUNCEMENTS



### Corinne Frick

Corinne Frick will be transferring from Solar Manufacturing to Magnetic Specialties on Monday, June 4, 2007.

With the steady growth of MSI and an increasing need for proactive technical support for a few important customers, a new opportunity has opened for someone with keen customer service skills. In her new position, Corinne will report to Mike Afflerbach. Corinne's education and work experience will enable her to excel in this new position at

MSI. Since October 2006, Corinne has methodically assisted Solar Mfg by producing a comprehensive furnace operations manual for our customers. Her labors have produced a fine manual which will serve as the basis for SAMI's manual for years to come.

### Allen Knarr

Allen Knarr has been promoted to Group Leader of the electrical group of Solar Manufacturing, due to his broad experience in all phases of the electrical construction of vacuum furnaces. In his new position, Allen will be responsible for the oversight of all aspects of furnace electrical assembly. He will report to Tom Smith, Production Supervisor, and will assist Tom in scheduling and planning of the work to be done by the electrical group. Prior to joining Solar Manufacturing, Allen was a wireman in the electrical group at Vacuum Furnace Systems for 16 years. He joined SAMI in March 2006 and has proven to be a valuable addition to our production team.



# SAMI SNAPSHOTS

## Meet the New Employees



### Andrew Zuck

Andrew Zuck joins Solar Manufacturing as a Mechanical Designer. He will be designing gas cooling systems, chambers and load trucks in his new position, reporting to Senior Mechanical Engineer, Becky Petry. Andrew received his Associates in Engineering from Bucks County Community College and has worked

for six prior years as a sheet metal mechanic and as an automotive mechanic for one year.



### Gregory Smith

Greg Smith joins Solar Manufacturing as an Electrical Engineer and will be working in all aspects of electrical project design and control systems. He previously worked as an electrical engineer at Vacuum Furnace Systems and as a process engineer at Lucent Technologies and Agere Systems. Greg received his A.A.S in Electronics

Technology from Lehigh Carbon Community College and his B.S. in Computer Science from De Sales University. He is a member of the Institute of Electrical and Electronics Engineers (IEEE).



### Rosemarie Sonntag

Rose Sonntag has joined Solar Manufacturing as the Receptionist and Sales Administrative Assistant. Previously, she worked at St. Luke's Rehabilitation Center as the Billing Office Manager and in 1998 worked at VFS as a Sales Secretary. At Solar, Rose will be assisting the

sales department and performing various administrative duties.

### Doug Kegerise

Doug Kegerise has joined Solar Manufacturing as a Field Service Engineer. In this position, Doug will be commissioning furnace equipment at the customer's site and will be involved in in-house testing and Q.C. Doug has many years of previous work experience as a heat treat supervisor and as a field service engineer for three East Coast vacuum furnace manufacturers. He received his Associates of Engineering at Penn State Berks.

## Patent-pending furnace ordered

Winston Heat Treating announces the placement of an order for an advanced design Vacuum Purge / Recirculation Gas Nitriding Furnace to Solar Manufacturing. The new furnace also will incorporate the latest innovations in automated nitriding atmosphere controls supplied by Super Systems Inc, Cincinnati, Ohio.

William R. Jones, CEO of Solar says, "This horizontal loading, cold wall, furnace is unique with a hot zone 36" W x 30" H x 48" deep and a weight capacity to 2500 lbs, vacuum pump down to 0.1 Torr in 30 minutes, heat to 950°F in 60 minutes, nitride, and cool to 200°F in 60 minutes, yielding a rapid turn around time not typical of classic nitriding furnaces."

Steve Thompson, President of SSI notes, "The Solar furnace will use all SSI controls including the complete furnace control panel and gas flow panel for both temperature ramp / soak and nitriding potential. The entire furnace cycle will be fully automatic from load to unload utilizing automated PID recipe control, PLC logic control, gas blending and PC supervision."

Most importantly, John Reger states, "The new furnace promises not only to have faster production for heavier work loads but also improved quality yielding nitriding results equal to ion with white layer reduced to little or none."

The new furnace design is patent pending. —☀—

## Order from China

Solar Manufacturing announces an order for a horizontal loading vacuum furnace from Xi'an BaoDe Powder Metallurgy Co. in Xi'an City, China.

The furnace features a high efficiency, graphite insulated hot zone for operating temperatures up to 2650°F. The work zone measures 42" wide x 42" high x 60" deep and a gross load capacity of 3500 pounds. Molybdenum elements will heat work loads rapidly while improved, tapered graphite gas nozzles will direct quench gas onto the work load for optimum gas cooling. A diffusion pumping system is used for high vacuum applications up to 10<sup>-6</sup> Torr. The newly designed, external gas quench system will consist of a 100 HP motor, fan wheel, heat exchanger, and diffuser.

Northwest Institute for Nonferrous Metal Research Group first developed and specialized in R&D of powder metallurgy for nearly 40 years in China. It is now one of the most important domestic R&D bases and one of the worldwide leaders in the field of titanium, rare, refractory and precious metals. —☀—

# Tech Tip Corner

**"Furnace Heating Rates" by William R. Jones, CEO**

Very often heating rates are specified simply to shorten production process cycles with no thought to operating vacuum level, hot zone damage, or electric power demand. By rapid heating rates we mean over 15°F per minute at higher furnace temperature.

**Vacuum:** Rapid heating can cause severe product out-gassing due to boiling out residual hydrocarbons or water vapor from substrates and will depress the operating vacuum over a short time frame. For example, a furnace may be pumped down to less than 10<sup>-4</sup> Torr and if heated faster than 30°F per minute may drive the vacuum level well into the micron range- even forcing the furnace out of high vacuum to rough vacuum.

**Hot Zone Damage:** Rapid heating can warp or buckle moly heating elements, cause hot spots at bolted graphite element connection points, and break ceramic insulators. Or in a metal shielded furnace, it can damage the heat shields, similar to the heating elements. Over time, this damage can lead to reduced hot zone life.

**Utility Costs:** Rapid heating will peak electric utility power meters, which track power demand over 15 minute periods and gradually reset for another cycle. The result is a series of many pulses over a month's billing period. The demand factor is usually calculated on the single highest peak per month and billing dollars will leverage higher. This is often reported as a "load factor." Faster heating rates compress power to higher levels thus creating power peaks and low load factors.

Often a desirable heating rate cycle is 30°F per minute from ambient to 1200°F, 15°F from ambient to 2150°F, and 5°F over 2150°F. Of course, if metallurgical demands require faster rates, you pay the price and run the cycle- but suffer the dollar penalty, either now or later.

## Order from Singapore

SAMI continues to make in-roads to the vacuum furnace market in Singapore. Recently, an order was received by a captive heat treater in Singapore for a large production furnace.

Featuring a high efficiency, 2" thick graphite insulated hot zone for operating temperatures up to 2650°F, the furnace's work zone measures 42" wide x 42" high x 48" deep, with thermal uniformity meeting AMS 2750D standards. The graphite hearth will be rated for a total work load capacity of 3,500 pounds. Thin-profile, curved graphite heating elements will heat work loads rapidly and uniformly while improved, tapered graphite gas nozzles will direct quench gas onto the work load for optimum gas cooling.

A 35" Varian diffusion pumping system is used for high vacuum applications up to 10<sup>-6</sup> Torr and the external gas quench system will consist of a 100 HP motor, a Robinson fan wheel, heat exchanger, and diffuser. The electrical control cabinet will house the SolarVac 3000 instrumentation which includes the Allen-Bradley PanelView and the Eurotherm 6180A paperless graphic recorder for state-of-the-art operator interface and control. A Hunterdon 255 KVA Variable Reactance Transformer will power the furnace hot zone, balanced across the three phase power source. ✨

*Solar Manufacturing is dedicated to designing and building the most advanced, highest performing, lowest cost of operation vacuum furnace systems in the heat treating industry. Through diligence, hard work and innovation, we intend to build lasting relationships by treating everyone with honesty, respect and integrity, while standing behind every product we produce.*



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### *Super Systems contract continued from page one*

new furnace line is primarily a horizontal front loading, warm wall, furnace for ease of production as opposed to traditional and more difficult to load pit furnaces. SSI provides a completely automated control system for nitriding potential with PC supervision of all process variables. The automated system eliminates prior techniques such as the burette, oil bubbler and manual flow meters proving a high degree of accuracy and repeatability.

The two companies have received their first order from Winston Heat Treating, Dayton, Ohio with other furnaces quoted.

# SOLAR MANUFACTURING

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