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INSIDE THIS ISSUE

THE SOLAR SPOTLIGHT

A QUARTERLY PUBLICATION BY SOLAR ATMOSPHERES

AEROSPACE:
MAKING THE MOST OF LARGE FURNACES

At Solar Atmospheres, large furnaces are multiplying like rabbits. Even though news headlines emphasize the negative, the reality is that most sectors of American manufacturing are growing (4.7% growth in 2006). Certainly economic and manufacturing downsides are ever present in a shifting and changing economy, but change, although painful, is necessary. Change, within a free market economy, causes manufacturing to adjust and develop new technologies, such as large vacuum furnaces.

Revolutionary advances are underway in aerospace engineering and manufacturing. Aerospace is invigorating a significant sector of manufacturing in the world, including Solar. One specific advancement is the use of composites and titanium for new aircraft. Solar is deeply involved in this new technology because of its investments in large furnaces and their applications.

Over the past decade, Solar invested in large furnaces, even when manufacturing was slow. However, this was a measured risk based on the increasing demands for titanium. Solar Atmospheres worked with Solar Manufacturing to develop large furnace technology. Now, as aerospace demands increase, Solar is prepared for the volume and processing demands of the work. Solar's investment in large furnaces, which cost between $2 to 4 million, and production experience have advanced furnace technology and processing cycles. (see titanium article).

Unique capability is the primary marketing claim for Solar, and the message is true. Solar not only has the largest commercial vacuum furnaces in the world, but three 24-foot furnaces are operating at Solar's Hermitage plant. Now a new claim to unique capabilities will occur mid 2008. A 36-foot vacuum furnace is *on order* and will be operating in Hermitage within a year!

Solar's new 36-foot furnace will be installed in a second plant addition at Solar's Western PA location. This is a huge investment for Solar, but is made based on established aerospace and titanium contracts. For the first time in decades, aircraft sales, "both commercial and defense increased simultaneously" (Teal Group, as cited in *Modern Machine*

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SOLAR ATMOSPHERES

ALL EYES ON QUALITY: RENOVATED LAB

"One of the most capable metallurgical laboratories of any commercial heat treating company in the country," remarked Don Jordan, head of Solar's Technical Center. Having worked for an international independent testing lab, Don's assessment has merit. In May, the testing lab room (20 x 30 feet) was completely renovated, floor to ceiling. Apart from the facelift of paint and an epoxy floor, expanded shelving and cabinets were installed to hold test blocks, hardness testers, and the many devices that are needed to do accurate testing and analysis. All the cabinets have rubberized counter tops to protect parts.

An updated expansion of the LCD furnace data monitoring and informational screens give a 21st century feel and look to the room. Monitoring and communications might not seem like a quality procedure, but as with all manufacturing and business endeavors, communication is the dynamic that keeps quality and production in-sync. In particular, daily production 'huddles" are held in the Quality lab. The "huddle" is the time when one shift is finishing, and the next shift meets with them to review the work schedule. Having the information screens and furnace monitors as a reference point for those discussions will only improve communications.

As "one of the most capable" metallurgical laboratories, the equipment inventory is impressive. Adjoining the renovated testing laboratory is second room that focuses on micro hardness testing. The list of equipment in these two rooms includes a Nikon, Epiphot...Epiphot model metallograph. This precision optical microscope provides observation and photography of microstructures up to 1,000X magnification with 5 turret mounted objective lenses. A second tool is a 6 mega-pixel resolution digital camera used with the metallograph. This laboratory system also provides hard copy photomicrographs, indexing, and permanent storage. To improve turnaround, Solar invested in an automatic grinding and polishing head / specimen holder for microspecimen preparation. Among the several hardness testers is a $50K New Age computer controlled microhardness tester, with an automatic moving stage.

In-house testing is an integral part of the added customer services offered by Solar. Outside testing by an independent lab is also integral to Solar's quality system when required, to verify the quality processes and meet customers' specifications with every job.

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*

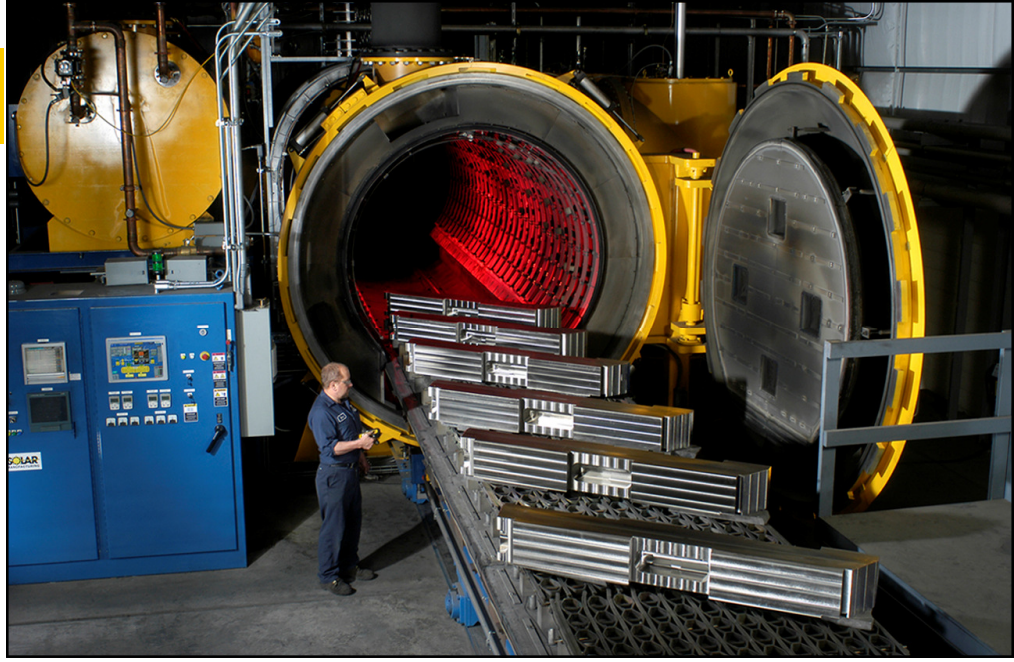
Aerospace continued from page one...

Shop). The new 36-foot furnace is designed to stress relieve titanium structural weldments. Bill Jones, Solar's CEO, states "The new furnace is the largest vacuum furnace order placed with Solar Manufacturing in 2007 or anytime previous. This furnace hot zone is 36' deep x 6' x 6' and can handle a work load of 100,000 lbs at 2650°F and 10^{-5} Torr."

Solar Manufacturing, Solar Atmospheres' sister company, is building the furnace based on their engineering experience over the past decade. Solar Atmospheres' large furnace processing and maintenance have been direct catalysts to advancing furnace engineering technology. No other furnace manufacturer has this experience. Added to the furnace technology is a patented bottom load truck with double entry furnace design that provides a convenient platform for material loading and production efficiency. This will be extremely important in the next year as aircraft demands ramp up to full production.

Solar is benefiting from growth of the titanium and aerospace industries. Aerospace and aircraft production, with new and ever more demanding specifications, have been sources for positive change in manufacturing, including vacuum heat treatment. Solar's furnace capability and experience have enabled it to be the right vendor, at the right time.

SOLAR & TITANIUM



If you are in Orlando, FL, between October 7-9, stop by the new 20-foot Solar booth during the Titanium 2007 conference at the Rosen Shingle Golf Resort. Bob Hill and Mike Drakeley will be manning the booth to discuss titanium and its applications.

Solar started degassing primary titanium product in the mid 1990s. The 10- and 12-foot furnaces would sometimes hold 15,000 lbs of titanium coil, testing their capacity limits. Titanium demand was on the rise and the need for vacuum heat treatment was growing. Consequently, since a number of the titanium producers were located in western Pennsylvania and in Ohio, in 2001, Solar opened a plant in Hermitage, PA.

The use of titanium continues to grow as does the need for vacuum heat treatment. Solar was fortunate to have in-house engineering knowledge and the resources to respond to the growing demands, and the Western PA plant became the home of the world's largest commercial vacuum furnace, (see *Aerospace* article). You could say the rest is history, however, it is not only history, but the present and future.

With increased demands and applications for titanium processing, many furnaces at both Solar locations process titanium. A great deal of secondary titanium products, in the form of sheet, plate and coil, are annealed. At the corporate plant in Souderton, the hydriding and dehydriding of titanium is now a growing market. Titanium weldments are being stressed relieved at both plants. Titanium forgings are also solution annealed in Western PA. Other cutting-edge vacuum processing of titanium includes vacuum brazing and creep forming.

With greater demands, throughput of titanium material, parts, and assemblies had become a major challenge, but Solar Manufacturing's engineers were ready. The results were double-door vacuum furnaces. From either furnace end is a part load truck or two load trucks per furnace. This system dramatically improves turnaround efficiency. While one part load is in the furnace, the other load truck is set up for the next furnace run. Unloading and loading can often take several hours so this system avoids such delays.

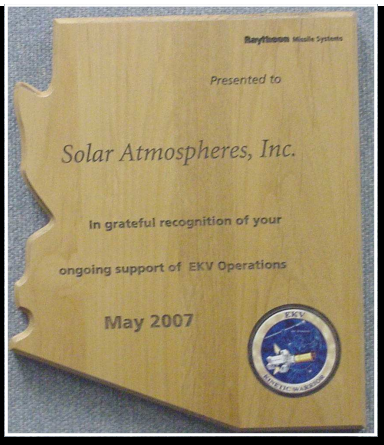
What once was the material of the future has become the material of "now". Solar's involvement in titanium processing development has been an adventure that has not ended. Visit Solar's booth at the International Titanium Exhibition and either Bob Hill or Mike Drakeley will be glad to discuss your involvement with titanium.

KUDOS FROM RAYTHEON

Solar's message, the *Metal Processing Advantage*, summarizes the unique capabilities, consistent quality and responsive service offered to customers. These objectives are achieved through a daily effort for every job that comes through our doors. However, the character of a company also becomes evident in the unusual, the out of ordinary. Recently a Solar team in Souderton responded with processing expertise, and attention to detail in a challenging situation. Below is a statement of appreciation from Raytheon. The plaque (see picture) was given in appreciation for the work successfully accomplished.

"Conax Florida toroid liners are used on a composite wrapped, high pressure gas storage bottle for the Exoatmospheric Kill Vehicle (EKV), a land based missile defense system component. These bottles are mission and safety critical such that their structural integrity is essential. The bottle liners consist of four titanium alloy parts welded together and then vacuum heat treated to accomplish a complete solution anneal.

"Solar Atmospheres' experience and capability with the vacuum heat treatment of titanium proved crucial for the successful accomplishment of this process step. The EKV program at Conax was therefore able to deliver finished toroids on schedule for next assembly operations and avoid a costly line down situation for their Raytheon customer. Thank you



Solar Atmospheres for coming to the rescue and for your continued EKV program support."

-Bob Morris, Materials and Processes Engineering, Raytheon Missile Systems, Tucson, AZ.

OPEN HOUSE, HELICOPTER DRAW OVER 200 TO SOLAR OF WESTERN PA

June 2nd, the day of Solar of Western PA's Open House, had arrived and Steeltech, supplier of Solar's furnace grids, flew down in their helicopter. Bob Hill's plan was to place the helicopter on the 24 foot load truck to demonstrate the furnace's size. Consequently, Bob Sandora's challenge was to place the $400k vehicle safely on the load truck.

Bob Sandora was sitting on the plant floor pondering the task, probably saying a few prayers. Third-shift furnace operator, Alan Chlpka, asked what he was trying to do. Bob stated his problem and Alan gave the answer to Bob's prayer. Alan explained, "The hub above the blades is called the "Jesus Nut" and is used to lift helicopters." Alan had been a military mechanic for 10 years and regularly performed this task. Bob used the "Jesus Nut" that balanced and lifted the vehicle into place.

Over 200 people attended the Open House and toured the plant, viewing the new plant addition, now holding Solar's two new 24-foot furnaces. The new, 5,000 square-foot office addition was also open for inspection and elicited several "oohs" and "ahhs" for the improvements.

Many photographs were taken of the helicopter, new furnaces and building addition. Everyone enjoyed the picnic and most importantly, the subsequent helicopter flight went well. It was a good open house.

Steeltech's helicopter helps demonstrate the size of Solar West's vacuum furnace

BARNDT'S OFF TO FLORIDA

Annual vacations to visit family in Florida had their effect. Al and Janet Barndt decided to make the trip permanent. Having worked at Solar for 16 and 10 years respectively, Al and Janet headed south May 18th to put down roots in the Sunshine state.

Both contributed significantly to the efficient flow of work in shop orders and accounting. Their skills and dedication to Solar were greatly appreciated. The Barndts are missed professionally and as a couple that brought a hardworking and joyful spirit to Solar. The Solar family offers its prayers and best wishes for Al and Janet in their new place under the sun.

EUTECTICS & *MELTING POINTS*

Eutectics: "A material, predominately one of a specific microstructure, made up of one or more phases formed simultaneously during solidification of two or more elements. A eutectic alloy melts to become a free running liquid at a single temperature, which is lower than the melting point of any of its components." [Critical Melting Points for Metals and Alloys]

The key phrase in this "eutectics" definition for heat treating metals is "lower than the melting point of any of its components". The practical implication is to prevent contact of two metals that could form a eutectic during processing, a potential mistake that could cause much damage. The headline is "Beware". For this reason Solar published the *Melting Points* booklet for our own use and to assist others who are involved in the heat treatment of metals.

The current edition was published in 2005 and compiled by Virginia Osterman, Ph.D. Originally the publication was compiled in 1997 by the late Charles Burns, Vice President of Quality at Solar. The newer and expanded compilation has new charts and gives the range of material melting points based on the variables of measuring metal temperatures. Definitions and terms from the *Melting Points* booklet, including the melting point of "eutectics," has been added to the Glossary under Educational Helps on Solar's web site (www.solaratm.com). Metal processing manufacturers and universities have found the booklet a handy and valuable reference.

Over 1,000 booklets have been distributed since its first publication in 1997, and Solar continues to offer two booklets free of charge with a small handling fee ($2 per booklet over two copies) for quantity requests. Serving as a quick visual reference in shops and laboratories, a Eutectics poster (30" x 40") with common eutectic melting points, that is posted in Solar shops, is also available free of charge upon request. Email info@solaratm.com or call 800.347.3236.

A NEW BEGINNING

By Mike Moyer, Corporate Quality Manager

It has been almost two years since hurricane Katrina hit the Gulf Coast. Although not the deadliest natural disaster recorded in the USA, it was the most devastating in terms of personal tragedy. Unfortunately, stories of personal tragedy are still being written as a result of this massive storm. On the other hand, stories of hope and new beginnings are being written as well. I know this because I have seen it first hand. I had the privilege of traveling with 17 other people from the Souderton area to Bayou La Batre ("*by-a-la-bat-tree*") Alabama with the Mennonite Disaster Service (MDS) from January 20-27. The trip was most special to me as three of the other volunteers were my 17 and 15-year-old sons and father-in-law, Les Teale, Solar's Human Resources Advisor.

Although Bayou La Batre was not hardest hit by Katrina, it was hit hard nonetheless. Most of the roofs you see in that area are new. In the bayou, a lot of people live in mobile homes and those homes are easily damaged or destroyed by a strong hurricane such as Katrina. Many of these people are still in need of help and are limited in their ability to help themselves. This is where MDS comes in.

Shortly after the hurricane, MDS took up shelter in several gulf towns. In Bayou La Batre, they set-up accommodations in an empty strip mall for the volunteers who they knew would come. A trailer that housed eight showers was sent by the Methodist church to provide for the volunteers who they knew would come. The Lutheran Church took up residence next-door to the Mennonites to do the social work, choosing which people were to be helped by the volunteers who they knew would come. Boy did they come.

Although the Bayou Le Batre center is now closed, there had been a new group every week since the hurricane hit, nonstop, summer and winter, working on over 200 projects restoring people's lives in some way or another. Long-term volunteers stayed there for months on end to keep the facility running and the weekly volunteers and projects organized. This was just one of eleven hurricane-related MDS projects sites; six are still active.

During the short week my group was in Alabama, we worked on five different projects. These projects ranged from total rebuilds to replacing roofs to cleaning up debris. The project where my sons and I worked was a new home to replace a trailer that was totally destroyed by Katrina. The people who took ownership of this new home were unable to rebuild due to financial and medical reasons. They were still living in their tiny FEMA trailer after over one year and were looking forward to moving into their new home. It was completed several weeks after our week-long visit.

This trip reminded me how it is all too easy for us to take *everything* for granted. The most basic human needs are things a lot of people either don't have or have on a limited basis. I encourage any of you reading this and feeling like you need to get involved to do it. You don't have to be a Mennonite or even a Christian, only willing and able. You will not be sorry that you have done something for someone in need, something worth far more to that person than a week is to you. It's called hope and a new beginning.

For more information , visit our website: http://www.mds.mennonite.net/.

QUALITY INVESTMENTS

Because of the boom in aerospace business, Solar in Hermitage has made important investments for the Quality department, primarily with new, outstanding "quality" people. By expanding this department, we are making a greater commitment within the procedures to meet Boeing and other aerospace vendors' requirements. The following new employees are committed to providing the best possible quality and service.

George Kramer joined Solar Atmospheres with seventeen years experience in the metals industry. George started out working for J&L Specialty Steel in 1990, and advanced through several positions, including metallurgist, shop floor supervisor, operating engineer, quality manager, continuous improvement manager, and product development. Since 2004, when J&L was acquired by Allegheny Ludlum, George has worked as manager of the in-process-management for melting and finishing operations. He graduated from the University of Pittsburgh with a B.S. and M.S. in Metallurgical Engineering, as well as earning an M.B.A. from Robert Morris College.

Suzi Generalovich brings over 25 years of experience in the metals industry as the Team Leader – Market Manager for Titanium Forge Products. Previously, she worked as an Area Manager and Customer Relations and Production Planning Supervisor in the steel industry. Suzi has a B.S. from Geneva College and is a member of APICS (Advancing Productivity, Innovation and Competitive Success). She has also achieved the CSCP (Certified Supply Chain Professional) certification from APICS.

Jack Hardesty, Quality Technician, joined Solar Atmospheres in April of 2007. Jack attended the Pennsylvania State University, receiving a BS in Criminal Justice in 2004 and graduated in 2005 from the Ohio Police Officers Training Academy. He worked for one year at the Mahoning County Sheriff's Department in Youngtown, OH. In Mercer County, PA, Jack coordinated the Intermediate Punishment Program as a House Arrest Officer before coming to Solar.

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The Solar Spotlight is a quarterly publication of Solar Atmospheres

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"Be more concerned with your character than your reputation, because your character is what you really are, while your reputation is merely what others think you are."

- John Wooden

quality continued from page five...

Terry Dudzenski, now working in Solar's customer service department, had worked for 38 years in the metalworking industry, a good portion of which he interacted with customers. For 27 years, Terry was plant manager at Fessler Machine, an OEM of rolling mill equipment. While there, Terry also served in the Army National Guard, attaining the rank of Captain along with an Associate degree in mechanical drafting. For the past 4 years, he was Production Manager for CCL Container, an aluminum container manufacturer. Since starting at Solar on January 1, Terry has enjoyed all phases of his new job, but especially when he finds the answers for Solar's customer questions.

Upcoming Trade Shows...

Los Angeles, CA
September 17-20
Booth # TBA

Chicago, IL
November 11-17
Booth # 25053