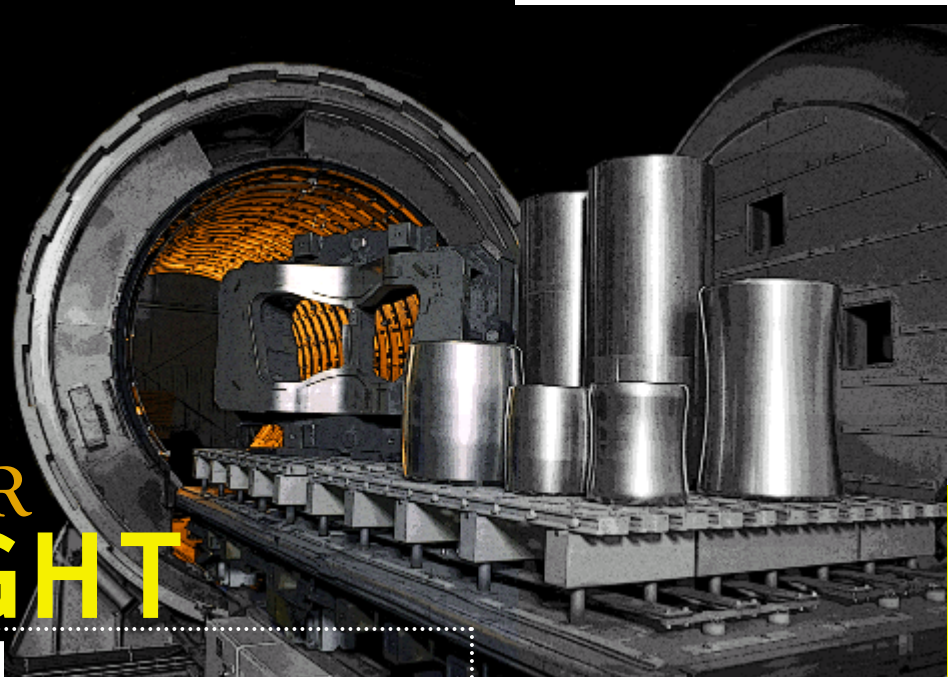


INSIDE THIS ISSUE

SOLAR TECHNOLOGY CENTER
PAGE TWO

QUALITY DEPARTMENT GROWS
PAGE THREE

RESPONSIVE CUSTOMER SERVICE
PAGE FOUR



THE SOLAR SPOTLIGHT

To outsource or not to outsource? For many smaller companies, outsourcing their heat treating needs is the best alternative due to furnace, operational and maintenance expenses. For larger companies, questions arise due to the lean manufacturing impetus to outsource. During the next year, a series of Spotlight articles will provide a clear rationale for outsourcing.

Successful outsourcing has been researched by Accenture, a global management consulting firm, in a report entitled "Driving High-Performance Outsourcing, Best Practices from the Masters." Accenture reported the key outcomes or objectives that companies establish for successful outsourcing. Specifically, objectives should be considered that not only affect the immediate bottom line, but will have both short and long term benefits.



FOUR PART SERIES

1. Attaining Business Objectives
2. Developing a Partnership vs. Finding a Provider
3. Managing an Outsourcing Relationship Effectively
4. Measuring Success

Accenture stated that profit advantages are better understood from a clearer appreciation of cost reductions, improved efficiencies and management flexibility derived from outsourcing. Measuring all the costs of doing work in-house and understanding all the benefits of outsourcing are critical for a more accurate analysis.

By adapting the Accenture theme, *The Spotlight* will explore why outsourcing heat treating can greatly contribute to increased profitability and attain management objectives.

(PART ONE BEGINS ON PAGE THREE)

A QUARTERLY PUBLICATION BY SOLAR ATMOSPHERES

NEW 24-FT FURNACE IN PRODUCTION

Solar Atmospheres, Western PA, now has two vacuum furnaces, 56" x 56" x 288" long, operating 24 hours, 7 days a week. This means with just these furnaces, up to 100,000 lbs. of material, parts or assemblies can be processed at any given time. This is a unique capability for vacuum heat treating anywhere in the country and probably in the world.

foot, 2 bar quenching furnace is housed in a 16,000 square foot plant expansion at Hermitage, PA. Bob Hill, President of Solar's Western PA plant, is thrilled to have another 24 foot furnace because of its performance and needed capacity due to processing demands. Bob states:

Our new furnace's technology is time tested. Since 2001 Solar has been heat treating 24/7 in the first 24 foot

(CONTINUED ON PAGE FIVE)

Manufactured by Solar Manufacturing in Souderton, PA, the new 24

FOCUS ON QUALITY: DEW-POINT

By Mike Moyer, Corporate Quality Manager

"It's a wet world" says Bill Jones as he wipes the water droplets from the side of his glass of iced tea. "See this? Water is everywhere; you just don't always see it". That was a very basic and true lesson, and typical of what we hear from Solar's CEO. If you think daily about that statement, you will increasingly notice that airborne water plays a critical role in our lives.

Please allow me to explain. Air at a particular temperature can hold only so much water. Air holding the maximum possible amount of water is said to be saturated. Warmer air can hold a lot more water than cooler air (it's the same with sugar into water). The rule of thumb is that raising the

(CONTINUED ON PAGE FIVE)

Airborne water plays a huge role in vacuum heat-treating too, as it is everywhere and is the enemy. So what is the "dew-point", and what does it have to do with our process?



THE SOLAR TECHNOLOGY CENTER

By Virginia Osterman, Ph.D.



In the heat treat business development and enhancement of new technologies are key factors in remaining competitive. With this in mind, Solar Atmospheres, has established The Solar Atmospheres Technology Center and the Research and Development Committee. The technology center and R&D committee were created to provide continual advancement of already cutting edge technologies established at Solar Atmospheres. Objectives are to develop and improve various vacuum material processes, equipment designs and to provide any research and development support to Solar Atmospheres' customers.

The goal-oriented technology center has achieved success in the research and development of Solar Atmospheres' patent pending, "Low Torr Range Vacuum Carburizing Process", and provided guidance in the development of the Solar Manufacturing's patent pending, "Low Torr Range Vacuum Carburizing Furnace". The new vacuum carburizing process and furnace provide new market potential for both Solar Atmospheres and Solar Manufacturing.

The new vacuum carburizing process has been successfully advanced from the research and development stage to a production process. Customer parts have carburized on a regular basis in a small production furnace outfitted to meet the process requirements and now processed in the new Solar Manufacturing Vacuum Carburizing Furnace, introduced to the public in September 2005.

The vacuum carburizing process provides metallurgical benefits such as prevention of intergranular oxidation

(IGO), the ability to prevent or control the formation of carbides, and clean surface parts with uniform case depths. The use of an insitu 10 bar gas quench minimizes distortion of the carburized parts. Other customer benefits of the process include customized cycle development for specific applications and needs, shorter cycle times for reduced costs, efficient parts handling for improved quality and turnaround, and automation of specific cycles to ensure reproducibility. As an added benefit, Solar Atmospheres also has a state-of-the-art metallurgical analytical facility to provide detailed metallographic analysis of the parts after processing.

The Technology Center and the R&D Committee consist of a group of scientists and engineers with various backgrounds. The committee Chairman, Don Jordan is the Vice President and Corporate Metallurgist of Solar Atmospheres. Harry Antes has a PhD in Materials Science and Engineering and brings 40 years of experience in metallurgical processes to the group. Virginia Osterman, Technical Director for Solar Atmospheres, has a PhD in chemistry with several years experience in research and development. Trevor Jones, a recent graduate of Penn State University is the Project Engineer on the team.

While the team works on improving the vacuum carburizing process, they also work on customer projects that help in the successful process development of their parts. The R&D team is working on several new projects with the hope of introducing new and improved technologies for the future.

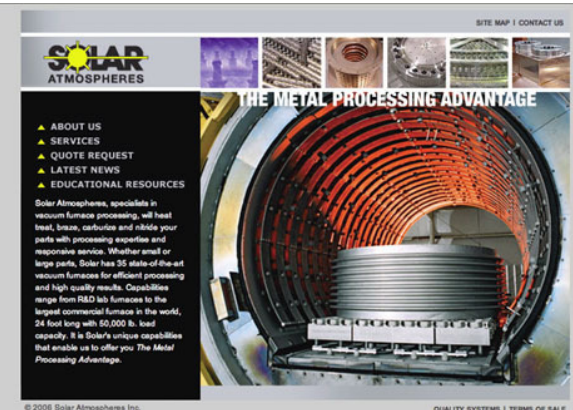


The Solar Technology Center in Souderton, PA

REVAMPED ON THE WEB

It has been nine years since Solar launched its first web site. Technology and the importance of the web have only continued to advance, making internet communications one of the most critical forms of communication for business.

Since technology has advanced, Solar's web site has also been updated to provide current and more accessible information about Solar. The content of Solar's web page continues to expand and currently contains service descriptions and capabilities, corporate information, metallurgical and processing information, Solar articles and publications, updates on shows, furnaces listings, RFQ links, news releases, maps to both plants and more. Visit us at www.solaratm.com.



The Solar Spotlight is a quarterly publication of Solar Atmospheres

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SOLAR ATMOSPHERES WESTERN PA EXPANDS QUALITY DEPARTMENT

Bob Hill, President, announced an expansion of the Quality department at Solar's Western PA plant in Hermitage, PA. Due to sales growth and a 16,000 square foot plant extension, Gary Armour has been retained as Quality Manager and will be assisted by Paul Brinker, who has been promoted to Assistant Quality Engineer.

Gary Armour has over 20 years experience in the heat treating and metallurgical industry. As a Metallurgical Engineering graduate from Grove City College, he has worked in engineering, management and sales positions at companies that include Sunbeam Equipment Corporation, Abex/Electro Alloys Division, Seco/Warwick and Peter's Heat Treating. Armour has developed corporate Quality Management Systems that led to the acquisition of ISO 9002:2000 company certification. He has published articles in *Heat Treating* and *Industrial Heating*.

Paul Brinker has been with Solar Atmospheres, Western PA for five years serving as Production Group Leader for the heat treating and most recently as Office Manager. At previous employment, Paul was Production Manager for International Specialty Alloys. His new role is to assist Armour in maintaining and developing quality standards at Solar's Western PA facility that include AS:9100:2004, ISO 9001:2000, NADCAP and Boeing approvals.

Bob Hill is confident that the plant's quality systems program will be further developed under the direction of Armour and Brinker. Increased work and new furnaces have expanded demands on quality and these two men bring excellent practical experience and knowledge. ✨



Paul Brinker and Gary Armour join the Quality Department

SUCCESSFUL OUTSOURCING PART ONE: ATTAINING BUSINESS OBJECTIVES

A primary business objective of outsourcing, promoted by the Lean Manufacturing philosophy, is to enable management to focus on the manufacturer's primary task. Attaining this objective by outsourcing is determined by whether or not heat treating is a primary task that gives a competitive advantage for doing the work in-house.

The viewpoint of a commercial heat treater is that in-house heat treatment is usually not a manufacturer's primary task that gives a competitive advantage. In fact, commercial heat treating can give a competitive advantage because of its specialization and investments. On an objective level there are a number of points that should determine if the heat treater's analysis is valid. The points include a heat treater's investment in furnaces, equipment, procedures and certifications. Certainly, cash flow



Solar heat treats thousands of parts a day

advantages, management and business flexibility are also critical analysis points.

If the heat treater is on top of his game, this focus will enable the outsourcing company to reap the benefits without investing the time, energy and cash. Heat treatment companies continually maintain quality certifications and standards. Just as critical are the investments made in new technology and furnaces to provide state-of-the-art processing. Consequently, outsourcing also adds the ability to grow without investing in a new furnace and associated expenses. With the tightening of material specifications and the need for more sophisticated equipment, furnace costs increase. Outsourcing heat treat work can decrease or eliminate the costs for capital, floor space, down equipment times and technical upgrades.

Management effectiveness is a business benefit that will not always be discovered on the balance sheet.

(CONTINUED ON PAGE FOUR)

RESPONSIVE CUSTOMER SERVICE



Melissa Delgado responds personally to customer's needs

A critical component of the *Metal Processing Advantage* has nothing to do with processing metals; it's the "softer side" of the business - customer service. In Solar's Annual Survey, a number of people comment on the responsive service from all Solar employees. The response effort starts with the initial phone call, fax or email and continues throughout the entire processing. A high energy level characterizes responsive customer service at Solar.

Foremost in the effort are Solar's customer service representatives, Melissa Delgado, Eastern PA and Kevin Bekelja, Western PA. Their roles are to provide the information required or direct customer inquiries to the right personnel. Melissa and Kevin know that communicating is

key and this includes listening skills. When the right resource person is not available, needs are recorded so customers understand they have been heard and their requests will be addressed in a timely manner. The point person is critical, but service at Solar is a team effort, by all employees.

Satisfying customer needs requires coordinating a number of actions. Providing timely quotes, scheduling, expediting and quality needs all come into play. Customer services monitor order status, develop hot lists, provide certifications and charts, answer technical and processing status and track billing questions. By the way, special offers of flowers, beer or toys do not sway the sometimes difficult expediting questions (yes, this does occur).

Continual effort is made to maintain and improve communications. Solar sends a *Communication Helps* to all our new customers. It is a summary of contacts at both plants for customer service purposes. It also gives an overview of shipping and work order pointers to facilitate communications. The objective is to get it right.

Solar's culture involves the American work ethic - a strong desire to succeed, improve and compete that flows from an entrepreneurial spirit. The benefit you gain from all of this is responsive customer service.

(continued from page three)

Understanding this benefit results from analyzing the costs of the time and energy of a manager and supporting personnel in heat treating activities. Again, the key question is whether in-house heat treating gives a competitive advantage or if management resources could be better used for a core business activity.

Managerial oversight costs for in-house heat treating includes investing time to purchase furnaces and peripherals, managing quality certifications, on-going furnace maintenance, utility investments and operator costs including training and retraining. In other words, if heat treating is a primary task, it will require initial and ongoing investments along with management and personnel time and effort. All these costs are eliminated or are minimized by outsourcing. This reduction has an immediate and long-term impact on the balance sheet.

Another business objective for outsourcing is to provide strategic flexibility that is limited by investing in furnaces and furnace maintenance. The investment is considerable and locks a company into making all the commitments needed to operate efficiently. In fact, flexibility is a factor not often realized because of the hidden costs of a non-operational or a sporadically used furnace. Downtimes for furnaces are not always planned! When furnace downtimes occur, manufacturers can use commercial services, but will be paying for outsourcing as well as the costs of furnace downtime in his own plant. The latter costs can be considerable which includes the management time in working through furnace problems.

The link between purchasing a furnace, operating costs and business outcomes emphasizes the need to look beyond getting quotes on furnaces to do strategic analysis. Giving up production control is an argument for not

outsourcing from a business perspective. Yet, the current Lean Manufacturing thought is when a good vendor is available, outsourcing is the best alternative. The key is having confidence in the commercial treatment facility. Outsourcing is increasingly considered the best alternative for non-core business activities.

Outsourcing is a learned skill and communication is critical, but successful outsourcing companies learn and improve their proficiency. According to Accenture's study, most outsourcing efforts start at a high level of satisfaction and improve. In fact, after only one year, 76% of those who outsource are satisfied that they have attained their business objectives, including cost reductions. Critical to the effort is finding a commercial heat treater who invests to help attain your objectives. At Solar, we have built our business on this philosophy. ✨

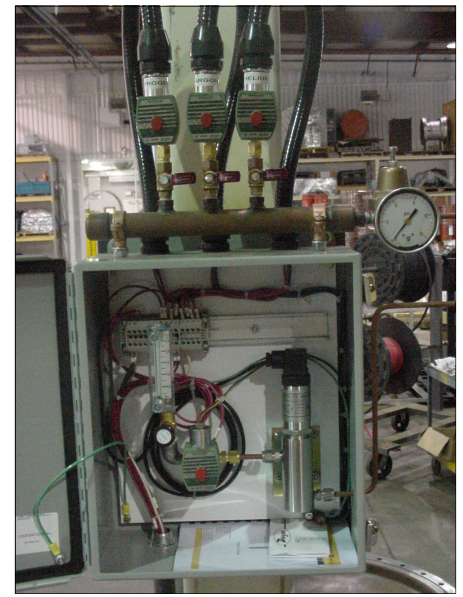
Focus on Quality: Dew Point *(continued from page one)*

air temperature 18°F (10°C) doubles its moisture capacity. This means that air at 86°F (30°C) can hold *eight times* the water as air at 32°F. That is why the air feels “heavy” in the dog days of summer when the humidity is around 90%, because it is heavy.

If we cool air without changing its moisture content, eventually we’ll reach a temperature at which the air can no longer hold the moisture it contains. The water condenses, forming dew or fog. The dew-point is the critical temperature at which this condensation occurs. It is a measure of moisture in the air mass. So when we see a dew-point temperature, the higher the number, the wetter and “heavier” the air. This is the simple science. Why Does Solar Care? When Solar processes

customers’ parts, a dry atmosphere is needed because water could react with the metallic elements at high temperature causing surface contamination. Inside the furnace chamber, residual water becomes very “sticky” when we pump to vacuum, and is the primary residual element even during the furnace run.

So where is it coming from? It’s coming from the air. During a furnace run, the inside of the furnace becomes dry from the heat, dry gas, and vacuum pumping action. When the furnace door is open to load the next batch, airborne water “fills” the dryness in an attempt to equalize the furnace humidity level with the humidity level of the room. That is why we always minimize the time the door is opened between furnace batches. It is also the reason the chamber water



Dew Point analyzing system

pressure) to assure a low parts-per-million (PPM) of potential contaminant in the atmosphere. This is about 24 PPM of water vapor. In reality, our gas consistently runs well below 100°F which is about 1.5 PPM. The quality of the gas is sometimes specified in our customers’ requirements. These are usually aerospace customers who have learned a long time ago that dew-point matters.

Solar measures the dew-point of our gas when we receive a delivery and throughout the day, every day. This is done not only to verify the quality of the purchased product, but also to ensure the integrity of our gas storage and delivery system. The gas is sampled at the furthest point from the supply so we will know if any part of our storage and delivery system is cause for concern.

The way the sampling system works is as follows: Each day, a programmable logic controller (PLC) starts the sampling by opening one of the three gas solenoids (argon, nitrogen, or helium). The gas flows across the sensor for 2 hours. At the end of the 2 hours, the next gas is sampled for 2 hours, then the next. During the sampling, the sensor sends a 4-20ma signal to a process recorder which displays the dew-point in degrees Fahrenheit. Once all three gases are sampled, the PLC closes the isolation solenoid to isolate the entire system from the ambient air, keeping the sensor dry for sampling on the flowing day.

This process is performed 365 days a year, and data collected during the process is retained as a quality record. The dew-point measurement of the process gases is just one of many quality verifications that add value to our customers’ product. ✨



New Furnace *(continued from page one)*

furnace. Solar Manufacturing’s patented car bottom, double entry furnace has efficiently run product day after day, year after year. Equally important is the outstanding programming controls that enable heat treating to achieve specified metallurgical specifications. With the new furnace, we are pleased to give faster turnaround. Our multimillion dollar expansion project, where the furnace is housed, will enable growth for the future.

Solar’s Western plant started in 2001 and currently has twelve vacuum furnaces ranging from the lab sized to the two largest commercial vacuum furnaces in the world. Plans for continued growth are in place to service the metals industry across the USA and Canada. A third 24 foot furnace is on order to be placed at an undisclosed location in the Pacific Northwest.

CONGRATULATIONS ROGER JONES

Roger A. Jones, Corporate President, has been involved with the Perkasio Fire Company for 26 years. Because of his continued service as Chief Engineer, Roger is the 2006 Recipient of the Burpee Emergency Services Award. This award has a 34 year tradition and is awarded by the Central Bucks Chamber of Commerce. Roger is responsible for \$2.5 million of equipment and helped develop a maintenance program with outside contractors. As David Worthington, Fire Chief of Perkasio Fire Company No. 1 stated, “Congratulations to a very deserving individual!” ✨



temperature is maintained at a higher temperature than that of the ambient air. If the dew-point of the shop air is 85°F and the chamber water temperature is running at 80°F, water will condense on the chamber wall increasing the residual water in the furnace many times over. That additional moisture would be a nuisance causing longer pumping times and more “out-gassing” during the subsequent run.

Another dew-point concern is the dew-point of process gases. Even a very low concentration of water vapor present during a high temperature process could cause surface contamination of the metal parts being heat treated; especially titanium parts. The dew-point of any gas introduced into the chamber during the furnace run must be on the level of 65°F or lower (at room



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"Follow effective action with quiet reflection. From the quiet reflection will come even more effective action."

-Peter F. Drucker

Upcoming Trade Shows...

IMTS2006

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Orlando, December 14-16



San Diego, October 1-3

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Atlanta, October 31- November 2