

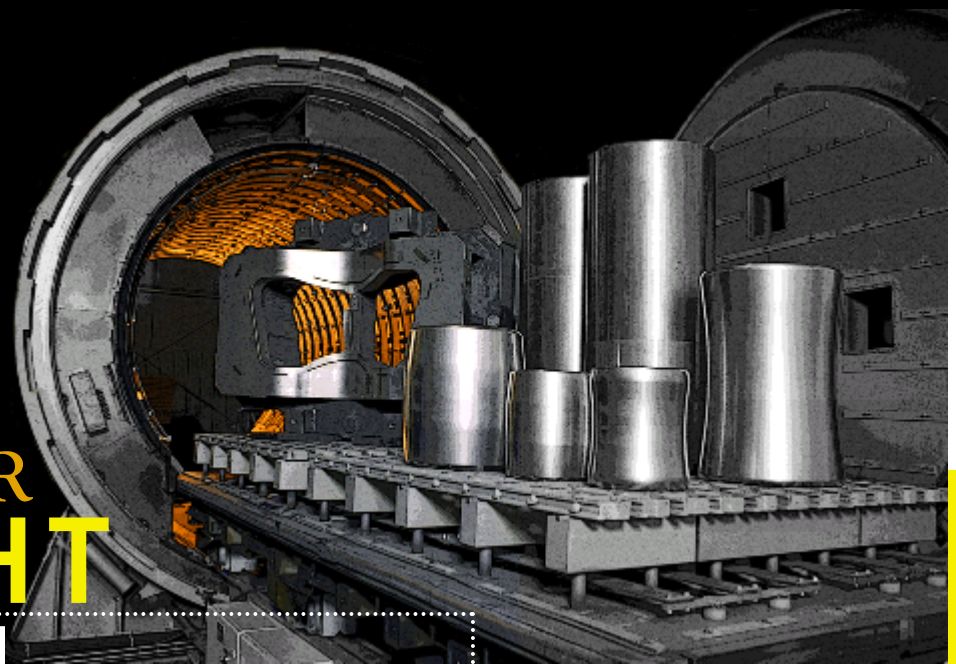
## INSIDE THIS ISSUE

SUCCESSFUL BRAZING  
PAGE THREE

FIVE - S EFFICIENCIES  
PAGE FOUR

VACUUM NITRIDING  
PAGE FIVE

# THE SOLAR SPOTLIGHT



## WESTERN PA UPDATE

A QUARTERLY PUBLICATION BY SOLAR ATMOSPHERES

### New Building / New Furnace

Men's razors are continually increasing the number of blades (the latest 5 + 1 blade is pretty good if you want to pay the price). The point is made in a TV commercial, "Where will it all end?" In reading articles in the Spotlight on the growth of Solar Atmospheres in Western PA, you may be getting the same reaction. "Where will it all end?" We could say, this is the last large furnace, but time will tell.

This month the new 36 foot furnace is being installed in the new 20,000 square foot addition (100' x 200') to the Hermitage plant. The Western PA plant is now 65,000 square feet, with office space,

housing 12 furnaces, including three 24 foot and the 36 foot furnaces. Solar's Western PA plant is the world center of large vacuum furnace production. There are a number of reasons for this, but primarily because Solar listens to our customers who need the advantages of large vacuum furnaces. Bob Hill, President of Solar Atmospheres, Western PA, reports on what their customer base is saying.

*Less post heat treat metallurgical testing.* Instead of running multiple smaller chamber loads with witness pieces, which need individual testing, we can now run one load with one

*(continued on page two)*



### GUN CRAFTSMANSHIP

The 30 small or average sized furnaces (less than six feet) at Solar's plants in Eastern and Western PA are busy 24 / 7 with the heat treatment and braze work of job shops, tool and die, and numerous other metal working industries. Sometimes the work has a very unique application. This is particularly true regarding the hardening and tempering work done for Joseph Brazier LTD, Colorado Springs, CO., a specialized gun manufacturer with a long and prestigious history.

Joseph Brazier LTD has roots going back to the 1700s in England. The company supplied guns to America in the Colonial era, and had a significant role in the development of our country's firearms. George Washington ordered a Brazier gun for his nephew. Throughout its history, engineering patents characterized the company's advancement. This is still the case under the leadership of Karl Lippard. Added to the engineering innovation is the craftsmanship of the gun's detailed engraving. See [josephbrazier.com](http://josephbrazier.com) and [karllippard.com](http://karllippard.com) history for a more detailed information.

*(continued on page two)*

**SOLAR**  
ATMOSPHERES

*continued from page one*

Solar 's commitment is to operate "with an awareness and appreciation of the value of our customer's parts while in our care." When the gun receiver parts came in there was a heightened sense of this value statement because of the detailed artwork. With "white glove" handling, precise temperature controls and the bright, clean finish of vacuum heat treating, the parts meet the high Joseph Brazier standards.

The S-7 tool steel was hardened and tempered in Solar's alloy fixturing baskets. Furnace runs are usually filled with parts, but just a few pieces were in the furnace for this furnace cycle. The value of the parts was considerable since the finished shotgun range up to \$65,000! High part values are not unusual for a Solar furnace run, but the *artistic detail* caught the attention of Dan Barszcz, QA Assistant. Dan took special interest in the parts and oversaw all phases of the processing. He is eager to continue processing more of the artistic receiver parts.

Solar is appreciative of the trust all our customers have in our abilities and attention to detail. Solar aims to consistently attain very high standards to satisfy all customers, even those with such unique applications.



*Heat Treated Joseph Brazier rifle part for a \$65,000 shot gun!*

This month, a new Solar brochure is being released. In the age of the web, why use brochures and catalogues? This is an important question that can help clarify each media's purpose and whether both are needed.

Looking at the retail industry may shed some light. Sales through the web have continued to increase each year, but December mailboxes were still filled with catalogues from clothing, tool and other retailers without end. With each catalogue I think, "I didn't ask for this". However, if the publication is targeted well, appreciation of the information outweighs the challenges of organizing and disposal. Still, why do they send all this stuff? The point is, printed literature provides awareness, and complements the web's purposes.

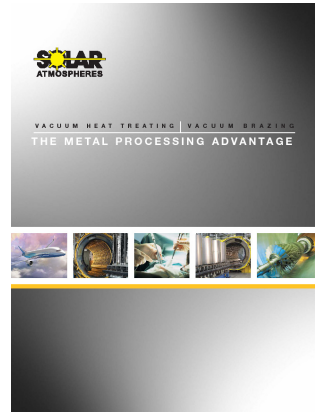
Solar's web site now has up to 2,500 visitors per month and the trend has been upward since its inception ten years ago. Significantly, more and more visitors are requesting quotes and information from our site, including established customers. The web is not only a place to investigate, but has become an additional means of communication.

So why a new brochure? Like the retail industry, the brochure is an introduction, an advertising handshake where you can touch and feel to begin a conversation. Solar uses the brochure as an introduction to what we do. The objective is to encourage contacting Solar via the response alternatives, including the web.

Continuing the personalization theme, the brochure not only gives an overview of who we are, but with today's in-house printing capabilities, it can be personalized with sell sheets suited for a particular industry. Additionally, a brochure may sit on someone's desk for awhile and can be read where there are no computer screens.

To summarize, the brochure is a proactive introduction and the web is a place to investigate and respond. This is apparently how the retail houses see it. Will this change with the Generation X'ers? Probably, but the baby boomers are a nostalgic group, appreciate an easy on the eyes read, and the relaxed excursion of brochure browsing.

Five years ago Solar put furnace and part pictures on a CD in the now retired brochure. At that time, the web was slow on graphics, but no longer. In a few months those furnace and part pictures will be on a new video for viewing from Solar's web site. Perhaps this move foreshadows the future of brochures. Time will tell. Needless to say, if you would like the newest touch and feel brochure, give me a call, or email, [rdl@solaratm.com](mailto:rdl@solaratm.com). Or, you can always check out the web site.



## Western PA Update

*continued from page one*

- **Economies of production.** Customers need their parts "yesterday" and the large capacity furnaces fulfill their turn-around needs.
- **Finished goods ratios.** The goals are to produce less machining chips and nearer net shapes, which dictates the ever increasing need for less distortion. Inert gas quenching dramatically minimizes distortion.
- **Eliminate typical post heat treat operations.** For example: pickling, shot blasting, sand blasting, descaling, burnishing, and passivation.
- **Enhanced pyrometry control.** The ability to thermocouple in 48 different locations - no guesswork.
- **Maximized cooling rates.** Quenching is done with two 300 HP motors at 5000 RPMs and a very light inert gases such as helium.
- **Newer alloy development.** that is predicated on the advantages of vacuum - no carburized layers or decarburized layers.
- **Robust load car design.** Keeps critical parts straight at extremely elevated temperatures.

Is this the final addition of large furnaces for Solar in Western PA? Time will tell, but the razor company that claimed their razor had the ultimate blade count, was announcing their new four blade razor!

# SUCCESSFUL VACUUM BRAZING

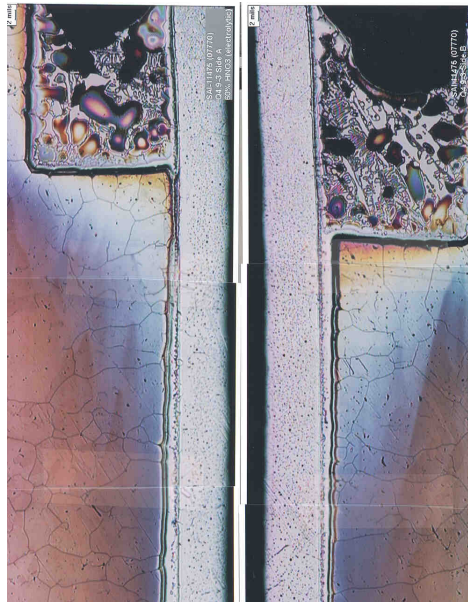
Solar's 30 smaller furnaces in Eastern and Western PA perform several specialized processes as well as standard vacuum heat treating work. There are three vacuum carburizing furnaces, laboratory furnaces for very small parts and cycle development, four ion nitriding furnaces and a vacuum gas nitriding furnace. However, one of the most common small furnace uses is for vacuum brazing.

At Solar's plant in Hatfield, PA (three miles from Souderton) and in Hermitage, Solar's braze departments service numerous industries. This includes analytical instruments, medical, dental, heat exchangers, power generation, aerospace, scientific instruments, valve and numerous other manufacturers.

Vacuum brazing is a batch process that heats the entire assembly uniformly, instead of a localized area, which occurs with torch brazing or welding. Consequently, the advantage is uniform properties throughout the assembly. Components of various configurations can be joined together, which gives design engineers many options. Solar has one assembly that joins tubing, cast and machined parts. Numerous component types can be joined including, formed, drawn and stamped parts.

There are several component design features important for successful vacuum brazing. These include the appro-

appropriate size gap between the components. Properly designed, components allow for placement of the filler metals above the joint area. Most often the braze filler is a slurry of alloy applied by a pneumatic needle. Gravity and capillary action enables the alloy, at the melting point, to fill the joint gap. With the correct joint spacing and fixturing, gravity and capillary action will draw the braze alloy completely through the gap. In certain applications, wire or preforms are used.



*Micrograph cross section of a nickel brazed stainless tube. Filler metal is drawn all the way down the gap.*



The applications of vacuum brazing are varied and are used with numerous metals because of the braze alloy filler options. Stainless steel components most often have a nickel alloy braze filler, although silver alloys are sometimes necessary. Copper components use a silver alloy. Other metals such as invar use gold alloys. Solar has now developed new braze applications for aluminum and titanium assemblies.

The maximum assembly size is determined by the design and furnace dimensions. Solar's new 36 foot long furnace theoretically could process assemblies this long! The longest assembly brazed, to date, is a 12 foot copper assembly used in the electronics industry. Smaller brazements can be just a few or thousands of assemblies.

Solar offers design consultation and provides the best opportunity for successful vacuum brazing. ✨

## SEMINAR ON WEAR & TEAR

A large crowd was not expected, but twelve motivated attendees learned about the development, applications and benefits of vacuum carburizing. Improving wear and tear of metal parts is a manufacturing objective, and vacuum case hardening is a very good alternative. Solar's vacuum carburizing seminar was held November 16<sup>th</sup> to promote and educate our customers on the process's advantages.

Solar's unique vacuum carburizing furnace capabilities, the process and its value were explained in detail. The first talk, led by Bob Hill, covered 40 years of development and how that led to vacuum carburizing for better case properties. Trevor Jones explained



Solar's engineering commitment to the in-situ gas quenching vacuum carburizing process. Gas quenching occurs with a variable speed 300 HP blower fan, specially designed to improve the efficiency of 10 bar processing, which is essential to attain the case hardness. Lastly, Don Jordan explained the metallurgical advantages of the

process. Micrographs revealed improved microstructure and uniformity of the case that can be achieved through Solar's vacuum carburizing process.

After three years of development, each new vacuum carburizing application is still a metallurgical and processing opportunity. New materials with new applications are being discovered each year. The seminar attendees took away a new appreciation for the Solar's development work and the benefits of vacuum carburizing. Sales continue to increase with new and repeat business. As with all our vacuum services, unique furnace capabilities and a dedicated, multi-gifted team are the reasons for Solar's process development (see new seminar pg. 6). **3**

## SPECIAL SEASON, SPECIAL TALENTS

In December, Solar offices were decorated to express the joy of the Christmas season. At Souderton, new quilt decorations were hung from the walls in the front office.



They were the handiwork of Solar's new customer service contact, Marianne Rumler. In Western PA, Lloyd Ramsey, maintenance technician, carves detailed wood Santas and ornaments that are sold around the country.

Marianne is a year round quilter, but the winter quilts are a highlight of her sewing hobby. Since the start of this endeavor, there are now three quilts, each taking 10-15 hours to make. Besides the joy of making and displaying them, Marianne appreciates this personal tradition that gives a sense of history to her quilting endeavors. Because of this, Marianne's quilts are not for sale — sorry.

Lloyd's carvings are a mixture of old European technique and his own innovative style. He has developed a method of combining stain and paint to bass wood (from the Linden tree) or butternut wood, which are good for the detail work. His *Collector Santas* can take up to 20 hours of carving and painting. Lloyd's Santas and ornaments are placed in a number of specialty stores, from Branson, Missouri, where he learned the art, and throughout Pennsylvania



Christmas is a time when people with creative skills, like Marianne and Lloyd add to our joy of the season. Thank you Marianne and Lloyd for sharing for sharing the beauty your hand crafted art with the people of Solar. ☀

## 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.*

*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*

## FIVE - S FOR EFFICIENCY

Solar Atmospheres' Lean Manufacturing Five-S program is underway. Our facility in Western Pennsylvania was the first to be involved with a contracted consultant / facilitator early in the fall of 2007. In Eastern Pennsylvania, the headquarters plant, the Hatfield plant, plus the Solar Manufacturing facility that builds vacuum furnaces, have all started the program.

The Five-S program engages employees at every level to understand the value of taking ownership of their work area to make it organized and simplified. Shop and office action teams established organization goals, and implementation goals. Employees sorted through tools, equipment, and other items in their workspace to discard what was unnecessary and to organize what was necessary.

An improvement is the use of shadow boards for storing tools used in our work

areas. Tools hang from hooks on plywood shadow boards, mounted on walls, or mobile carts. An outline of each tool is drawn on the shadow board indicating the storage location. This system provides highly visual workspace organization — simple to clean up before shift changes.

Due to Solar's growth, floor space is rapidly decreasing. Operations and maintenance personnel made suggestions to increase storage areas by discarding items no longer required, then added shelving, cabinets and storage racks. Each storage area was labeled for specific items.. This type of vertical storage makes efficient use of very limited floor space.

Action teams designed special wheeled carts for storage of furnace baskets, plus custom vertical racks for storing basket, plus custom vertical racks for storing basket liner screens. Mobile carts were

modified to organize lifting equipment such as chains, straps, clevises, eye bolts and hooks. *The result - more efficient heat treating with all employees knowing where specific tools and equipment are located, minimizing time required for tool access.*

Another employee suggested the use of shift communication boards. Strategically placed white boards enable employees to know pertinent information required for work continuity. Tape lines divided the boards for a specific type of communication such as: work schedules, supply orders, furnace assignments, and maintenance issues.

The Five-S program has already brought benefits to Solar plants. The challenge is continuing to use the principles learned and implement the concepts in other areas at Solar. ☀



Solar's objectives are diverse because a company can be many things. One objective is to process parts with the greatest energy efficiency possible. Other objectives are broader, such as helping to educate current and potential workers.

Magnetic Specialties Inc. (MSi), specializing in custom transformer manufacturing, was purchased five years ago to enable Solar service and furnaces to become more and more energy efficient, a key objective.

One of MSi's customized transformers is the FCS 2000 "Smart Power Supply". Smart because the transformer will respond to the commanded power level using full line cycles at different voltage levels. This minimizes the loading on the customers' incoming power lines and switchgear, freeing up capacity. It also reduces demand charge from the utility if you are being penalized for a poor power factor. This is a significant energy savings.



Two FCS 2000 transformers ready for shipment

This minimizes the loading on the customers' incoming power lines and switchgear, freeing up capacity. It also reduces demand charge from the utility if you are being penalized for a poor power factor. This is a significant energy savings.

The FCS 2000 not only saves power, but increases transformer and furnace component life by constantly monitoring the actual resistance of the heating elements and properly scaling the power to prevent damage. Additionally, the FCS 2000 has a fault detector that will safely shut the furnace down if there is a shortage. This protects the furnace and parts being treated.

Another objective for Solar companies is to encourage students. Consequently, when contacted by Pennco Technical School to give an educational tour of the plant, Mike Afflerbach, President of MSi, responded positively. Pennco, started as an electronics school by Philco in 1963, is located in Bristol, PA. Mike led the tour covering the components, types, and applications of transformer manufacturing. He was able to show the students the latest projects and new developments of MSi, which include the larger 500 KVA transformers.



Company objectives are diverse, but investment in the future enables diverse objectives, such as energy and education, to complement each other. ☀

## VACUUM NITRIDING - UP & COMING

Solar's mission is "to add significant value to our customer's operations by thermally treating parts, primarily in a vacuum." This is a limiting mission, but characterizes Solar as specialists who continually advance vacuum technology and processing, a key element of the *Metal Processing Advantage*.

In the past six months, a focus of Solar's Technical Center has been the development of vacuum gas nitriding. Because of the vacuum chamber environment, there is a greater degree of process control, which gives several advantages. Temperature processing controls in a vacuum environment enable minimized distortion. Controlled gas quenching greatly improves turnaround. No special load spacing is needed and the horizontal furnace load truck facilitates the loading procedures.

Yet, the Solar Advantage is best summarized by Solar people. That is, unique capabilities are more than furnaces. It is the people who design, operate and oversee the furnaces in the plant. In the development of new processes such as vacuum nitriding, the Technical Center is a unique team of knowledgeable professionals dedicated to the success of your project. Consistent quality flows from a quality system that is developed, overseen and implemented by Solar people. Responsive service begins with saying hello and continues to give you the best possible results. All these people are key to the *Solar Advantage*.

Vacuum nitriding is on its way as a process at Solar. New metals and applications require new processes and new furnaces and Solar people are eager to meet the challenges of the day. ☀

The Solar Spotlight is a quarterly publication of Solar Atmospheres

Chief Executive Officer  
William R. Jones

President, Western PA  
Robert Hill, Jr.

Corporate President  
Roger A. Jones

Spotlight Editor  
Robert D. Lacock

President, Hatfield Facility  
A. Bruce Craven

### Contact Information

Eastern PA  
1969 Clearview Road  
Souderton, PA 18964  
800 347-3236  
Fax: 215 723-6460  
info@solaratm.com

Western PA  
30 Industrial Road  
Hermitage, PA 16148  
866 982-0660  
Fax: 724 982-0593  
wpa@solaratm.com

Web Site: [www.solaratm.com](http://www.solaratm.com)



1969 Clearview Road  
Souderton, PA 18964

Return Service Requested

PRST STD  
U.S. POSTAGE  
PAID  
SOUDERTON, PA  
PERMIT NO. 64050

1969 Clearview Road  
Souderton, PA 18964  
800 347-3236  
215 721-1502  
Fax: 215 723-6460  
info@solaratm.com

30 Industrial Road  
Hermitage, PA 16148  
866 982-0660  
724 982-0660  
Fax: 724 982-0593  
wpa@solaratm.com

*Beyond Valentines*

*Love means to love that which is  
unlovable; or it is no virtue at all. --  
G. K. Chesterton*

## Upcoming Seminar & Trade Shows



**Carburizing Seminar  
Hermitage, PA**

April 18th Solar of Western PA. RSVP by  
April 11th. Contact Solar at 866.982.0660.



Eastern States Exposition Center  
May 20-22, Springfield, MA  
Booth # 2100



Valley Forge, PA  
April 23,24, Valley Forge, PA  
Booth # D14

**For a 2008 show listing  
go to [www.solaratm.com](http://www.solaratm.com).  
and visit *Upcoming Events***

