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The Spotlight | Solar Atmospheres' Newsletter
Winter 2015

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the SPOTLIGHT

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What the Medical Industry Can Learn from the Aerospace Industry

contributed by
Robert Hill

Heat treatment standards are stricter in the aerospace industry than in the medical industry where lives are on the line. This doesn't make sense and something is being done about it.

Recently, I was asked to give a vacuum heat treating presentation to a group of design engineers at a large medical device company. The lead engineer asked if I would help educate his team on this subject primarily because they had just experienced a major failure caused by improper heat treatment. After learning more about the failure, it became evident that the medical device engineers in that room could learn a great deal from the aerospace industry, especially regarding knowledge of aerospace materials and secondary aerospace processes. It also became apparent that an industry-managed oversight program addressing the technical competency required in special processing was necessary in order for medical device companies to improve design and manufacturer of future medical devices.

With heat treating being performed at multiple secondary suppliers around the world, problems pop up anywhere. Medical device companies need to understand that simply citing a material specification and hardness measurement on a drawing does not guarantee the product will be free from defects. There are certain stringent parameters that a heat treater must follow in order to provide the end user with a quality product.

Nadcap™ (formerly National Aerospace and Defense Contractors Accreditation Program) is the

organization in the aerospace industry that helps establish stringent industry, prime contractor, and regulatory standards and enforces compliance with those standards. Nadcap's mission is to improve supply chain quality and conformity within the aerospace industry. In today's world of global manufacturing, organizations increasingly find they must rely on effective supply chains or networks of specialized suppliers in order to compete. Supply chains and their management have grown and become increasingly complex over the years. With that growth come many internal challenges of which uniformity among suppliers in their conformance to technical quality standards is one of the most important.

In the aerospace heat treating industry, Nadcap helps regulate the following technical areas. It is this author's opinion that these areas should be just as thoroughly regulated in the medical industry as well.

Pyrometry: This has to do with how temperature measurements are taken and reported. There can be wide variations in temperature readings over time and between varying temperature reading instruments.

Pyrometry standards help everyone know that 1250°F is really 1250°F. In the aerospace industry, pyrometry is governed specifically by AMS2750 Rev.E.

Temperature Uniformity Surveys: Many heat treat processes require uniform heating within a defined volume of a furnace. To ensure that temperatures are consistent in all areas of a furnace hot zone, temperature uniformity surveys must be conducted. Exactly how frequently and where thermocouples are located and how long a furnace must remain at temperature varies widely. Industry standards on how and when to run a temperature uniformity survey help eliminate variability and ensure a more consistent heat treated product. Nadcap standards and AMS2750 Rev.E protocol strictly prescribe how testing is to be done and reported in order to assess proper functioning and any limitations of a specific heat treat furnace.

Procedures: Nadcap requires each supplier to have detailed technical procedures regarding equipment capability, pyrometry, furnace operations and preventive maintenance, contract review, technical instructions to the shop floor, testing and reporting of results, as well as quality assurance for those situations where a non-conformance is found.

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What the Medical Industry Can Learn from the Aerospace Industry

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These procedures help reduce unknowns and ensure consistent and acceptable heat treated product.

Training: Nadcap also details procedures, records and statements of limitations regarding all personnel involved in the processing or quality control of work passing through the supplier facility. Since many errors are human errors, these training procedures aim to reduce this category of error.

Internal Audits: Nadcap requires regular, periodic internal review and recording of results and corrective actions. This includes all areas covered by Nadcap such as competency, equipment, procedures, etc.

Purchasing: Control of critical supplies used by heat treaters are also carefully scrutinized. Heat treat suppliers must include technical information on purchase orders regarding industrial gas quality, heat treat hardware, capital equipment purchase, controls, thermocouples, and

many other supplies critical to the heat treating process.

Flow Down of Requirements: When customers write purchase orders to control the purchase of heat treatment services, the flow down of all pertinent contract and technical requirements from the OEM must be complete and effective. The heat treat supplier must have the critical information necessary and the technical capability to understand all requirements and act on them accordingly.

The aerospace industry enjoys the good fortune of a fairly complete set of vetted and approved industry managed documents. These documents help control the heat treatment of metals in a uniform and well-tested system. This system provides the backdrop for Nadcap auditing and determination of compliance to technical requirements.

When an aerospace engineer designs flight-critical parts, he is thinking ultimately of passenger safety. In an even more important way, the medical device engineer also designs for safety. Heat treated parts such as knee and hip joint, needles, surgical tools and other life-critical medical parts should be as safe to use and insert as aerospace parts are to fly. To assist the medical

device industry and assure quality products compliant with the highest standards, it is critical that the medical industry adopt an industry-managed supply chain oversight program like Nadcap.

To that end, we are glad to hear of the establishment of MedAccred by the same organization that manages Nadcap, the Performance Review Institute, out of Pittsburgh, Pennsylvania. My company has been involved from the very early stages and any reputable heat treater desiring to process medical parts should sit up and take notice. We believe this type of certification is healthy for the industry and we wholeheartedly support the effort.

For medical device manufacturers, I suggest a more thorough understanding of heat treat standards and the MedAccred program. This type of standardization tends to be helpful to the manufacturer, vendors, and end users.



Robert Hill is the president of Solar Atmospheres' plant in Hermitage, Pennsylvania.

Solar's New Southeast Plant Makes Progress



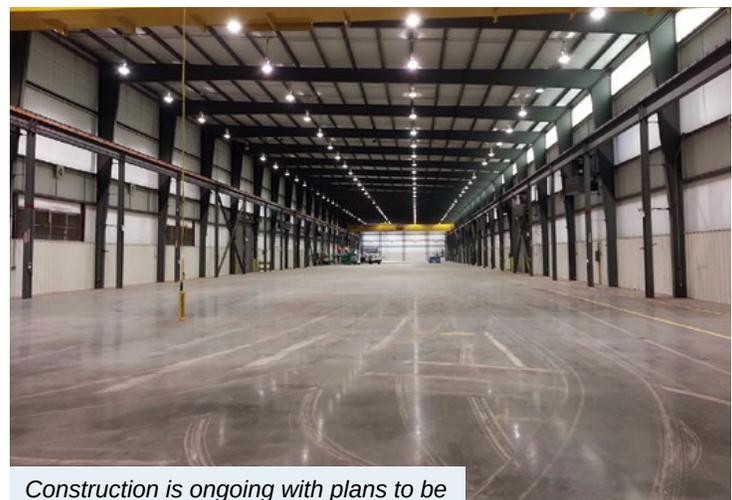
Marc Zeigler

We are pleased to announce that Marc Ziegler and Keith Carpenter have accepted positions at Solar's new plant in Greenville, SC. Keith started in Greenville on October 6th as the maintenance manager. Previously, he worked for Solar's Hermitage, PA plant as a maintenance electrical technician. Marc started with Solar in 1999 as a furnace operator and has worked his way up to his current position in Souderton as an inside sales engineer. He will be starting in early 2015 as Solar Southeast's production manager.



Keith Carpenter

"I am sure that Marc and Keith's contributions in Pennsylvania will be missed, but the Southeast is thankful to have them as a part of the team launching our newest facility. Please join me in congratulating them both!" Steve Prout, President of Solar Atmospheres, Southeast.



Construction is ongoing with plans to be operational in Spring 2015.

Souderton Adds New Climate Controlled Room

In today's modern production environment requirements seldom stay the same. In 2015, a prime example is a new third-party accreditation program called MedAccred in the medical industry. This program is going to be the equivalent of the Nadcap program in the aerospace arena. In addition to MedAccred, medical prime contractors are demanding that environmental conditions are controlled, processes validated, and the risk of exposure to foreign object debris (FOD) reduced. Solar Atmospheres has taken preemptive action to develop and build a new area to meet these upcoming requirements.

In mid-2014, Solar Atmospheres installed a new area within the existing shop at our 1983 Clearview Road address. The area is approximately 1500 square feet and incorporates temperature and humidity controls, as well as a slight positive pressure environment. These features will minimize water vapor and dust/debris in the heat treating area. One unique feature of the space is the addition of a brand new, state-of-the-art, all-metal, hot-zone vacuum furnace with an oversized pumping system, ability to isolate the quench system during the heat cycle, and all stainless steel chamber. The furnace is capable of maintaining a vacuum level of 5×10^{-6} torr or lower and has successfully processed the most sensitive materials unshielded without any

surface contamination. The furnace is positioned outside of the room, and only the door protrudes through the wall into the climate controlled room. This is a very unusual arrangement in the commercial heat treating industry. Early in 2015, an existing furnace will be modified and updated with state-of-the-art controls and added to this new area as well. Currently two laboratory furnaces also reside within the room bringing the total number of furnaces in the area to four.

This new climate controlled room will add significant value to our customers' operations, a core component of Solar's mission statement, by lowering the risk of discoloration and FOD, and by the time-saving elimination of the need to shield parts during heat treating.

If you have an interest in utilizing this specialized area/equipment for your upcoming projects, please contact Mike Moyer, Director of Sales at 215-721-1502 x1207, or mike@solaratm.com

Solar Employees Run Local 5K



On September 21, 2014, 23 employees of Solar Atmospheres in Souderton, PA., and 10 of their family members participated in the 14th Annual Heart to Heart 5K Run and Fitness Walk held at the Lake Lenape Park in Sellersville, PA.

Solar generously paid for half the registration cost for each employee, and provided everyone on the team with a Solar t-shirt. The weather was perfect as the temperature was in the mid 70s with partly cloudy skies making it a perfect day for a walk or run.

The Healthy Hearts Foundation goals are to raise awareness for the prevention and treatment of heart disease, and to promote heart healthy lifestyles in our community, which it does through this annual 5K run and fun walk.

An award ceremony followed the events for 1st, 2nd, and 3rd place to the overall male and female winners in the 5K run, and 1st, 2nd and 3rd place awards were given to the winners in 5-year age groups. From Solar Atmospheres, Nathan Skelton and Tim Steber both came in 2nd place in their respective age groups.



An operator loads a furnace in the climate controlled room

The Fundamentals of Titanium Workshop

The International Titanium Association (ITA) held a day long workshop titled "The Fundamentals of Titanium" on October 16, 2014 in West Middlesex, PA, which included a plant tour of Solar Atmospheres of Western PA. The workshop included a complete overview of titanium and a thorough grounding in its metallurgy, characteristics, properties and



uses, and was designed to prepare attendees to work effectively with job related functions involving titanium.

Representing the ITA as the workshop instructor was Mr. Stanley Seagle. In his career spanning 40 years, Mr. Seagle was involved in all aspects of titanium technology including metal reduction, titanium metallurgy, and titanium processing and marketing. In his early career, Mr. Seagle centered around research in titanium physical metallurgy and alloy development. Today, numerous titanium alloys developed by Mr. Seagle are still in use in aerospace and corrosion resistant applications. Mr. Seagle is currently retired from his role as

Vice President of Technology at RMI Titanium Co., a leading producer of Titanium mill products.

Mr. Bob Hill, president of Solar Atmospheres of Western PA conducted an extended plant tour through the 60,000+ sq.ft. state-of-the-art facility that houses 16 vacuum furnaces and 2 cryogenic treatment units. The tour included Solar's newest and smallest furnace, The Mentor that is constructed inside an environmentally controlled room, their largest vacuum furnace at 36 ft. long and capable of processing loads up to 150,000 lbs., and a walk-by of one of the fluorescent liquid penetrant inspection lines dedicated for titanium work. After concluding the plant tour the students were treated to lunch and shuttled back to the workshop to continue the lecture.

Solar Atmospheres of CA Adds Additional Large Furnace Capacity

In response to increasing large furnace capacity demand, Solar Atmospheres of CA (SCA) has set into motion the procurement, installation and certification of additional large capacity vacuum equipment to complement SCA's current facility equipment arrangement. The first step in this expansion initiative takes place early 2015 with the delivery of Solar Manufacturing's (SMI) Model HFL-84144-2EQ. Uniquely designed for SCA, Solar's new furnace offers newly designed features and characteristics that will enhance SCA's ability to process a multitude of diverse processing parameters that

currently exist in the vacuum heat treating industry. It will also allow SCA to prepare for future material advancements and specification modifications that require strict adherence to process control to include Heating/Cooling Rates, Process Vacuum Levels, Temperature Uniformity and Mistake-Proof Processing.

President Derek Dennis states, "Solar CA is very excited to add this versatile piece of equipment to our consistently growing vacuum furnace inventory. SCA has worked very closely with our sister company Solar Manufacturing to design this furnace in order to best meet the needs of our expansive customer base on the west coast. We feel that this furnace will add a competitive advantage by allowing Solar to expand our vacuum processing capabilities in the large parts market. We're excited to get the furnace on the floor and put her to work."



The new furnace under construction in the Solar Manufacturing shop

SCA's Model HFL-84144-2EQ Key Performance Characteristics include:

- 84" diameter x 144" long hot zone
- Maximum operating temperature of 2650°F
- Hearth to support in excess of 30,000 lbs.
- Energy efficient all graphite hot zone
- Solar Manufacturing's state-of-the-art Furnace Control Package – SolarVac™ 5000

Solar Atmospheres of Western PA Extends Boeing Dreamliner Contract with RTI Claro in Canada

Solar Atmospheres of Western PA, announced today that it has signed a Memorandum of Agreement (MOA) with RTI Claro, a business unit of RTI International Metals, Inc. located in Laval, Quebec, Canada, to extend its contract for the Vacuum Stress Relieving and Fluorescent Liquid Penetrant Inspection of the Boeing 787 Dreamliner Titanium seat track system until December 2021. Solar Atmospheres anticipates the agreement will include work on more than 1000 of the Boeing 787 aircraft.

“RTI Claro’s decision to continue our relationship for another seven years can be attributed to the extraordinary past performance of our employees plus our overall corporate commitment to supply RTI Claro and Boeing with the straightest, cleanest, and most defect-free seat tracks in the industry. We look forward to successfully executing on expected increasing monthly build rates over the term of this agreement as we explore additional opportunities to expand our partnering relationship,” Robert Hill, President of Solar Atmospheres of Western PA, said.



Boeing 787

New Employee



Keith Reim
Corporate Marketing Manager

Keith comes to us with over 19 years of experience in business-to-business marketing. He previously worked as the Marketing Manager of an industrial automation business in Souderton, and possesses extensive experience in all aspects of marketing. Keith is focused on providing strategic direction for all of Solar’s marketing activities such as corporate branding and communications; advertising; website development; trade shows; public relations and social media.

Upcoming Trade Shows



Design2Part Grapevine
February 25-26, 2015
Grapevine, TX



Design2Part Atlanta
March 25-26, 2015
Atlanta, GA



IBSC
April 19-22, 2015
Long Beach, CA



Design2Part Oaks
April 22-23, 2015
Oaks, PA

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