

Five Questions with Mike Johnson on Stress Relieving



Mike Johnson,
Sales Manager,
Solar Atmospheres
of Western PA

1. Can stress relieving help minimize distortion on my parts?

Yes! As a matter of fact, if you take a cursory read of the machinist's handbook you will see stress relieving is recommended as a best practice. We commonly see requests for stress relieving on weldments, fabrications, and machined components; but increasingly on additive and printed parts as this technology advances. Stress relieving

removes machining stresses, cold working, or in case of AM parts, the unbalanced heat affected areas that can contribute to distortion.

2. Is stress relieving allowed when working to MIL or AMS heat treat specifications?

Yes, in some cases it is mandatory. We work to many MIL, AMS, and BAC specifications on a daily basis. AMS2759, AMS2801, and BAC-5613 represent a large portion of our stress relieving business. Did you know PH grade materials, in the aged condition, can be stress relieved? Per table 1 of AMS2759 / 11 stress relieving must be done 100°F below the aging temperature. Using this method has become popular and necessary to stabilize parts in use or during machining.

3. Are material properties affected during stress relieving?

Trick question! You really must know the scope of work, processes, and needs of your customer. Stress relieving consists of heating

the steel to a temperature below the critical range to relieve stress from cold working, shearing, mill / cutting, etc. It is not intended to alter the microstructure or mechanical properties. You would not want to stress relieve a 17-4 stainless steel part at 1250°F if it is going to be aged (H-900) at the final process. However, if you knew it was going to be solution treated and then aged you would be fine. If desired, the material properties of some alloys can be altered by stress relieving; but then, restored with an annealing process or hardening process. Again, consult with your heat treater.



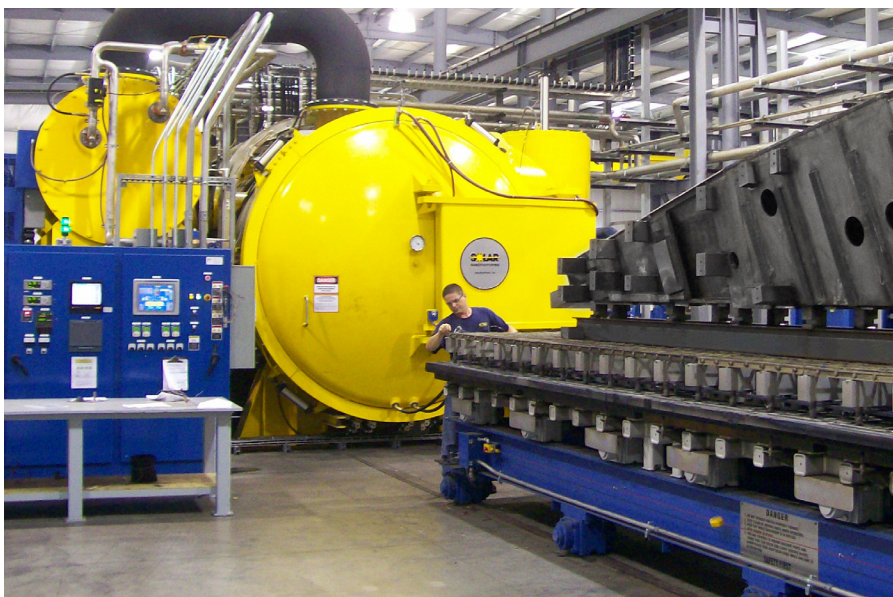
4. What are the negative impacts of stress relieving?

Unintended results or ones that fall short of the goal. Heat treating complex geometries or configurations may require post heat treat straightening or flattening. These post processes must be built-in ahead of time. Predicting results to leave stock on conditions, for instance, can prove challenging. In many cases a trial run, in a smaller furnace, will yield the knowledge needed to ensure the usefulness of stress relieving. If stress relieving does not work, then we will work on plan B, there is always a plan B.

5. Can finished machined parts be stress relieved?

Absolutely, vacuum stress relieving proves most advantageous! Vacuum stress relieving produces bright, clean finishes in a near net shape. Additionally, stress relieving can, in some cases, correct (straighten or flatten) a warped part post machining or grinding. Influencing the materials at temperature by exercising techniques such as static weight to flatten or utilizing coefficients of thermal expansion (CTE) of dissimilar metals may improve such conditions. Again, it is always best to describe the conditions you are seeing during machining or after a thermal process to see if stress relieving can benefit your production flow. You might walk away saying you wish would have done it sooner.

Visit <https://solaratm.com/vacuum-heat-treating/stress-relieving/> for more information



Solar Atmospheres of California and Kittyhawk Form Strategic Partnership

Solar Atmospheres of California and Kittyhawk are pleased to announce a strategic partnership for heat treating and hot isostatic pressing services. Kittyhawk, has been providing excellent, timely and economical hot isostatic pressing (HIP) services since 1981 for companies in the aerospace, commercial, military, medical, automotive, firearms and oil and gas industries. Solar Atmospheres provides quality vacuum heat treating services with bright, clean results and minimal distortion.

The partnership comes at a perfect time as customers have been searching for value added propositions. As many parts require heat treating and HIP, the relationship allows the customer to work with two companies that have extensive experience and a strong reputation within the industry. Solar Atmospheres and Kittyhawk are both Nadcap, ISO9001, and AS9100 certified, and maintain source approvals for a full line of major aerospace primes.



“The partnership between Solar Atmospheres and Kittyhawk is a natural fit as both companies are market leaders in their respective industries. This partnership allows the customer to take advantage of hot isostatic pressing and heat treat without having to look further. I am very excited about the future and more importantly providing our customers with two of the best options in the service industry,” states Brandon Creason, President of Kittyhawk.

Derek Dennis, President, Solar Atmospheres of California adds, “In response to the needs and requirements of our valued customers, Solar Atmospheres is delighted to partner with a high caliber organization like Kittyhawk to provide hot isostatic pressing services. Both companies share a strong focus on quality and bringing a valued service to our customers, coupled with a best in the industry level of customer service and responsiveness, and you have a winning partnership for success.”

Solar Atmospheres Commissions Scanning Electron Microscope

To meet the challenges of the metal treating industry, Solar Atmospheres recently purchased and commissioned a Hitachi smart Scanning Electron Microscope (SEM). The FlexSEM1000 II will allow Solar to meet customer needs, such as strict requirements for low level contamination from carbon, oxygen, and/or nitrogen, post heat treating. Additionally, the SEM will enable Solar to fulfill materials characterization and microstructural determination requests beyond the basic metallography and hardness testing. This investment is a response to the changing needs of Solar’s customers, and is in keeping with the company’s mission of looking forward in the area of technical capabilities while demonstrating a willingness to accept a challenge.

“The purchase of an SEM fits naturally in Solar Atmospheres’ commitment as a leader in the vacuum heat treating industry, and its addition is a natural progression in the improvement of our metallurgical laboratory,” states Solar’s Corporate Chemist, Virginia Osterman, PhD. The SEM unit includes an energy dispersive X-ray Spectroscopy (EDS) option in order to characterize the elemental composition of the sample under investigation. Osterman continues, “Today’s SEM technology has evolved over the years to a system with a more user-friendly interface resulting in quick, high-level metallurgical imaging and elemental analysis of a variety of materials.”



“SEM analysis is yet another value-added service available to our customer base” states Mike Moyer, Director of Sales. “Many of our customers have needs over-and-above what commercial heat treat companies offer. Now, not only can we help our customers develop a complex heat treatment process, but we can provide them with the analytical results to validate that process. It’s a one stop shop for them, adding value and reducing the time necessary to bring a process to production.”



Gas Nitriding Furnace Installed at Solar Atmospheres, Souderton, Pa

To support an increasing demand for high-value gas nitriding, Solar Atmospheres, Souderton Pa, has installed a new, state-of-the-art vacuum gas nitriding furnace, built by sister company, Solar Manufacturing.

The front-loading furnace incorporates the latest nitriding and recipe system from Solar Manufacturing. The automated controls meet AMS2759/10, Automated Gaseous Nitriding Controlled by Nitrogen Potential, in addition to the standard AMS2759/6, Gaseous Nitriding of Low-Alloy Steel Parts. The automated control system is useful for single stage, as well as two-stage (Floer)

processing. All hot zone components are made completely of graphitic materials inert to the anhydrous ammonia used during the nitriding process.

In addition to a forced gas cooling system, the furnace also incorporates Solar Manufacturing's unique convection heating system. This design has significant advantages over conventional retort-type systems in the reduction of cycle time, by as much as 50% - resulting in increased efficiency, saving customers time and money.



Sharing Our Knowledge

Mike Johnson, Sales Manager at Solar WPA gave a talk about vacuum brazing on February 20 at the ASM Warren Chapter meeting. Solar Atmospheres presented a gift for service to Rich Polenick who has been ASM Warren Ohio chapter secretary for more than 25 years.

This newsletter is published by Solar Atmospheres, a leader in world-class vacuum heat treating services.

Keith Reim, Corporate Marketing Manager | Kim Long, Graphic Designer

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Solar Atmospheres Holiday Closures

Solar Atmospheres will observe the following schedule during the Holidays:

Thanksgiving - Closed Nov. 26-27

Christmas - Closed Dec. 24-25

New Year's Day - Closed Jan. 1

If you have an upcoming order with a tight deadline during those time frames, please contact your sales or customer services representative for your Holiday scheduling at 855-934-3284.

Wishing you a wonderful Holiday Season and a prosperous 2021!



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THE Spotlight

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