ASM Cleveland Chapter Symposium on Heat Treating

Presentations and Speakers

1) Vacuum Heat Treating for Additive Manufacturing:

Heat treatments of additively manufactured parts have been refined and are constantly changing as designs and process controls are being developed with this new metallurgy. After authoring my first article on this subject one year earlier, we continue to learn every day by complimenting the post process heat treatments to achieve full densities and crack free parts. This talk will uncover several of those advances that were mutually discovered alongside the customer while on the path of this exciting and revolutionary manufacturing method.

Robert Hill – President, Solar Atmospheres of Western PA has over 30 years of metallurgical experience involving a wide range of heat treating methodologies. During the past thirteen years, Bob has specialized in the development of large vacuum furnace technology and vacuum heat treating of titanium processing capabilities for Solar Atmospheres.

In 2000, Bob took on the responsibility of starting Solar Atmospheres' second plant located in Hermitage, PA –Solar Atmospheres of Western Pennsylvania. At this location there are fourteen vacuum furnaces, including the world's largest vacuum furnace, which is 36 feet long with a weight capacity of 150,000 lbs. This 60,000 square foot facility primarily services the titanium industries which provide titanium to the aerospace, medical, and power generation arenas throughout the world.

He has published numerous articles on vacuum technologies and vacuum heat treating applications. Bob has publicly presented these papers at National ASM Heat Treating Conferences, SME events, and at various local chapters throughout the country.
Bob has been a long time member of ASM since 1980. In 2000-2001, Bob served as the Chairman of the Philadelphia Liberty Bell Chapter of ASM. Additionally, he co-chaired the 2003 and 2005 ASM Heat Treating Society Conference and Exposition.

In 2009, Bob was bestowed the ITA (International Titanium Association) Titanium Achievement Award on behalf of his company Solar Atmospheres of Western PA.

In 2010, he was appointed to the ASM Board of Trustee's. As an ASM Trustee, Bob visited a variety of ASM Chapters throughout North America.

After serving on the MTI (Metal Treating Institute) Board of Directors for 6 years, Bob became the President of the MTI in October of 2014.

Bob was recently inducted into ASM's prestigious 2014 Class of Fellows in Montreal, Canada.

Bob received a B.S. from Millersville University and a degree in Metallurgy from Spring Garden College.

2) Low Pressure Carburizing and Gas Quenching Processes:

The use of vacuum furnace equipment is becoming increasingly popular for heat treating steel parts. Two major reasons are more efficient carburization and environmental friendliness. Parts remain clean and shiny after hardening, and there is no risk of oil fires. Most interesting to metallurgists is the ability to control the carburization process in terms of case profile and depth. However, there are other important metallurgical considerations. Because gas quenching power differs greatly from quenching power of liquids, alloy hardenability is an issue. Higher hardenability generally means higher alloy content, and carbide formation can be a concern. The consequence is that low pressure carburization consists of a series of boost-diffuse steps, and gas quenching involves both gas pressure and gas velocity control. This presentation will discuss these issues.

Lynn Ferguson, founder and President of DANTE Solutions, is a graduate of Drexel University where he earned a B.S. in Metallurgical Engineering and M.S. and Ph.D. in Materials Engineering. His career has focused on the broad field of mechanical metallurgy, with emphasis on thermal and deformation processing effects on metals. Over the past three decades he has been extensively involved in simulation of mechanical and thermal processes using computer-based tools. Example applications include analysis of forging, extrusion and rolling processes; cold and hot consolidation of metal powders; and heat treatment of steel alloys to investigate phase transformations, distortion, and residual stress. He has been an active member of ASM International, at both the chapter level here in Cleveland and at the national level. He is a Fellow of ASMI, the materials engineering honorary society Alpha Sigma Mu, and the International Federation for Heat Treatment and Surface Engineering (IFHTSE).

3) Fast Quench HIPing:

Hot isostatic pressing or HIP has been used for diffusion bonding, casting densification, and powder consolidation. Continued advances in HIP equipment design have allowed increasingly rapid cooling recently reaching a point where true high-pressure gas quenching is now possible within the HIP unit. This capability allows the integration of a heat treat process within a HIP cycle. Within the heat treat industry, high pressure gas quenching has been an area of significant development. However, where typical high pressure gas quenching equipment offers quench pressures up to 15 or 20 bar, common HIP pressures are 1000 bar or even higher. Thus, the ability to quench from HIP pressures appears to offer heat treat options not previously available. This talk explains the high pressure heat treatment and Uniform Rapid Quenching in Argon gas (from 1000 bar) within the HIP unit. A comparison with other quench techniques, i.e. oil bath and water bath is presented.

Dr. Anders Eklund is the Senior Sales Manager - Americas for Quintus Technologies, LLC, Lewis Center (Columbus), Ohio. He has a M.Sc. and a Ph.D.

in Chemical Engineering from the Royal Institute of Technology in Sweden, from where. After a Post-doc at Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland, he moved into Industry as a Project Manager for zinc production in Norway at Norzink Technology A/S. He then worked at Outokumpu Stainless Oyj Ab as group leader at R&D-Process Chemistry, Project Manager for revamping projects, Process Technology Manager for Technical Development, Production Manager for Hot and Cold Rolled Sheet and Plate, before moving into Sales and Marketing in September-2001. Later he moved to work for Carpenter Powder Products in Sweden, as a Business Development Manager, developing new markets and new products. The last six years he has worked in the area of High Pressure technology, mainly Hot and Cold Isostatic Pressing sales and marketing, but also Sheet Metal Forming for the Aerospace and Automotive industry.

Dr. Eklund has authored and co-authored 30+ publications in the areas of Electrochemistry, Stainless Steel, Powder Metallurgy and Isostatic Pressing Technology. He holds 8 patents and has, as an industrial supervisor, guided 3 Ph.D. students.

4) Applications of Induction Heat Treating:

The current presentation will be focused on applications of induction heat treating. It will include a brief overview of how induction heating works, advantages of induction heating compared to other methods and common applications of induction heat treating in industry. Some specific examples for induction heat treating of steel components will be included with computer modeling results and videos of real processes.

Robert Goldstein has been working at Fluxtrol where he is currently the Director of Engineering, since he graduated from the University of Michigan in 1998. He has been a co-author of over 75 papers and presentations on the induction heating technique, co-authored a chapter in the "Handbook of Metallurgical Process Design", and two articles in the recently released ASM Handbook Volume 4C. He is a member of the Society of Manufacturing Engineers (SME) and the American Society of Metals (ASM), currently serving as Co-Chair of the 2017 ASM Heat Treating Society (HTS) Conference. His current research is in the areas of computer simulation, methods for magnetic flux control, development of new induction heating processes and optimization of current induction heat treating applications.

5) Salt Bath Processing:

Stephen G. Kowalski is President of Kowalski Heat Treating Co, a second generation family business since 1997. (KHT), a world-class distortion sensitive thermal processing company, servicing the automotive, truck, aerospace, military, power transmission, wind/solar/new energy and specialty manufacturing industries, focused on customer PIA (Pain in the #%$) jobs. Steve leads the strategic business, vision and overall direction of the company. He has a B.S. in Business Administration from Miami University 1984. He was the chairman of the National membership committee ASM 2012-2013 and

chairman of the membership committee for the HTS affiliate Society of ASM 2006-2013. He is currently the president of the Heat Treating Society (HTS, 2015-current) and an executive board member since 2003. He is a founding member of the Heat Treating Society and a member of the Metal Treating Institute. Steve has served on multiple non-profit boards in various leadership capacities, working to enhance private and public partnerships. He has worked with local, state and national employment organizations to develop and implement training programs to enhance worker retention rates. Steve has published numerous papers relating to furnace systems controls, high pressure gas quenching, and government financing of business development. He has been married for 33 years with 4 daughters – ages 20-28. He lives in Bay Village, Ohio since 1984 and has been an active member of the St. Raphael Parish since 1984.

6) Three Dimensional Heat Treating for Lean Part Design + Manufacture:

For a heat treating process to produce the optimal "bundle of part properties" at the total lowest cost, and in the shortest amount of time, the heat treater must become a "full partner" in the Lean part manufacturing value stream. Before the raw material and the heat treating processes are established from the end-user specifications, the new part designer needs to collaborate with all the other parties in the part manufacturing chain, including their heat treater. The 3-Dimensional Heat Treater™ should strive to use the optimal heat treating processes and equipment that eliminate waste "upstream and downstream" from the heat treat process, and that provide the most added-value possible for a given heat treatable material, at the total lowest cost of manufacture.

Joseph A. Powell is President and Owner of Akron Steel Treating Company (AST) and President and Part Owner of IQ Technologies Inc of Akron, Ohio USA. He has over 33 years of experience in commercial heat-treating operations. AST performs Nadcap® commercial heat treating services in vacuum, controlled atmosphere and molten salt furnaces for over 1,200 metal working companies.

AST also provides metallurgical and heat treating consulting services. AST Consulting works with all the parties in the lean manufacturing value stream to find the optimal raw materials and proper sequence of manufacturing operations, including heat treating, for parts with better mechanical properties at a lower net cost with shorter lead times.

Mr. Powell is one of the developers of "Three Dimensional Heat Treating," including the IntensiQuench® processes and IQ equipment for optimizing the part "stress state" during the hardening process for steels and ductile irons (IQDI®), as well as the Direct from the Forge IntensiQuench Process (DFIQ).

Mr. Powell has a Bachelor of Science in Industrial Management degree and a Juris Doctorate degree in Law (both from The University of Akron, Ohio). He is an active member of the Metal Treating Institute, on the Board of the ASM International's Heat Treating Society and on the Forging Industry Association (FIA) Technical Committee.

7) The State of Process Controls:

It is hard to find a market segment that has not benefited from technology advancements. Heat Treating Process control is no different. Of course there are variations between the heat treating processes but there is commonality of the process with the goal of altering the metallurgical properties of a part using time, temperature and in some cases the atmosphere.

Control and process related documentation and technology are riddled with industry buzzwords that you can hear or read in any technical publication or interview. Optimization, IoT (internet of things), KPI (key performance indicators), smart technology and predictive planning to name a few. With that said, these are all real when it comes to where process control is today and where it will be tomorrow. Technology weaves its path into platforms that are used in a very sophisticated operation and some simplest of operations. Today's heat treater benefits from technology to help reduce errors on the shop floor, make better decisions and provide a quality product.

This discussion will cover what heat treaters are doing today and looking at in the future. We will identify existing technology being used with current equipment and look at some of the new equipment and the capabilities being provided.

Jim Oakes is Vice President of Business development for Super Systems Inc (SSi). He is a graduate of the University of Buffalo with a Bachelor of Science in Electrical Engineering. Since joining SSi in 2005, Jim has overseen marketing and growth of the company, helped develop product innovation strategies in conjunction with customer feedback, and driven SSi's commitment to quality and continuous improvement in the products that SSi offers.

Prior to joining SSi, Jim worked with the Oracle Corporation, where he helped organizations leverage technology to become more competitive and improve processes with enterprise software solutions.

Jim holds a board position with the Metal Treating Institute and contributes to a number of the committees focused on bringing value back to the members. He has also been involved with ASM for many years at the local chapter level and contributed to the recent ASM Handbook rewrite. He has served as a board member with the ASM affiliate – the Heat Treating Society and is currently the Vice President.

Super Systems Inc. specializes in carbon and oxygen probes, control system integration, software development, and gas analysis equipment for the metal heat treating industry. With an experienced team of engineers, SSi is always looking for ways to innovate and enhance the use of technology for heat treaters.

8) Vacuum Furnace Preventative Maintenance:

Nick Suchoski is the Vice president of Business Development at Pregl Services, Inc. (Janesville, WI), with a Sales Office recently opening in the Cleveland Area. Pregl is an after-market parts and service company specializing in vacuum furnaces.

After a career in the military Nick joined Pregl Services in their old Rock City location. He quickly grasped the concepts and theories of vacuum science focusing primarily on the materials used within the systems. He has been involved in all facets of the company from purchasing to upper management. He is a member of ASM Milwaukee and the Society of Vacuum Coaters. He also volunteers his time on the Board of Directors for his local VFW.

9) Quench-Polish-Quench and Nitriding:

The Quench/Polished/Quench (QPQ) process is an advanced Black Nitriding process. Enhancing corrosion resistance involves a secondary polishing operation, followed by re-oxidation to produce a lustrous black finish. Lustrous black finishes increase the consumer product applications, cosmetic appeal, making products appear modern and attractive.

Shade McMillen is President of H&M Metal Processing, located in Akron, Ohio. H&M has the capabilities to fill orders of any shape and size, accommodating loads from as light as an ounce to 2,500 lbs. Utilizing the process known as Black Nitriding, or Ferritic Nitrocarburizing, H&M can improve the operational capabilities of your components and help solve the problems of wear, lubricity and corrosion resistance. From performance racing to aerospace, firearm components to locomotive parts, H&M's stringent quality testing process before, during and after treatment ensures the integrity of the product according to the requirements and specifications of its customers. This facility is equipped with comprehensive metallurgical laboratories, providing all related research and development for all operations and is ISO certified. The consolidation of facilities into one location enables us to process up to 40,000 lbs. of steel per day.