October Meeting Notice: Joint Meeting—AWS

Day / Date: TUESDAY, October 17th, 2017
Location: Roland’s Seafood Grill
Address: 1904 Penn Ave, Pittsburgh, PA 15222
Time: 06:00 PM – 08:30 PM
Speaker: Edward Patrick, P.E., FASM
Topic: Overview of Alternate Aluminum Joining Options
RSVP by 10/14/2017 to: Piyamanee Komolwit: pkomolwit@uss.com

Abstract

One need only peruse journal articles, advertiser indices, and online forum discussions to conclude the joining community is arc welding centric, but with good reason. These processes are low capital intense, can be employed manually or with automation, and are applicable over a wide range of metals. There remain, however, many applications that require a wide variety of alternate joining solutions. To provide context, a comprehensive array of joining processes will be categorized and reviewed. Attributes and unique characteristics will be discussed and many “touch and feel” samples provided. Due to the relatively short time available, this will be a whirlwind tour of the “alternatives” with a promise of more specific process detail in future presentations based on member interest.

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November Meeting: GE CATA Plant Tour

Day / Date: Thursday, Nov. 16th, 2017
Location: GE CATA
Address: 101 N Campus Dr, Imperial, PA 15216
Time: 02:45 PM – 07:30 PM
Host: Kirk Rogers, PhD
RSVP by 11/14/2017

Abstract

G.E. Center for Additive Technology Advancement (CATA) is now a G.E. Additive Customer Experience Center, focused on developing and implementing additive manufacturing industrial applications for external customers as well as all G.E. businesses. The facility has several direct metal laser melting machines and sand binder jetting machines for rapid additive-enabled castings. The DMLM machine breaks down a CAD design file layer by layer and uses the laser to fuse one fine layer on metal powder after another in the right design pattern. Each layer is between 20 to 80 microns thick and there are as many as 1,250 layers per inch — each less than the thickness of a human hair. The sand binder jet machine uses a chemical binder to print casting molds from layers of fine sand, each 280 microns thick, infused with an activator. When the two chemicals mix, they start an exothermic reaction that hardens the sand into the desired shape.

(Continued on Page 11)
Letter from the Chair!

Welcome to the 2017-2018 ASM Pittsburgh year! I know you thought you were done with me, but I'll be the figurehead attached to this ship for another year (fortunately it's crewed by a talented and enthusiastic executive committee). I hope that everyone had a relaxing summer, and received the ASM Yearbook! Many thanks to George Shannon for his efforts to bring the yearbook together! I’m also excited to announce that our chapter won an innovative programming award from ASM headquarters for the technically interesting and thoughtfully executed meetings in the 2016-17 year. A special thanks to Piyamanee "Nee" Komolwit who organized many of these meetings—we are excited to have her back in this role again this year! I’d also like to offer my hearty congratulations to Dr. Gary Bray, who was selected for FASM.

I hope you are as excited by this year’s agenda, listed on the front page, as I am! We just finished a talk on the Liberty Bridge Fire—relevant to many of us who commute from the south—and of curiosity to all who watched the billowing smoke on the news. We are planning to have a great variety of talks and a plant tour this year of GE's Center for Additive Technology Advancement. Our Young Members' Night in February will be a great opportunity to connect with many of the future materials professionals. Thank you again to Vice Chair "Nee" for your efforts in organizing an exciting agenda!

Our goals for this year, beyond the monthly meeting (the third Thursday of the month), include outreach to the younger generation. We will have several opportunities to educate future engineers at both National Engineering Week and ChemFest under the direction of Parag Bedekar. Additionally, with the final MS&T to visit Pittsburgh for the foreseeable future this October, we are excited to be hosting over 350 high school students at a Materials Minicamp.

On a personal note, I encourage you all to participate in your chapter at any level. We are always looking for ideas on how to better involve you in our decisions so that you get the most from your chapter. We plan to enhance the audio portion of the meetings based upon member feedback. As the father of two young kids, I know how precious time is and certainly hope that our chapter's program and our volunteering opportunities are worth your investment of time. Whether it is the ability to catch up with old colleagues, network with the materials professionals, learn something unexpected from a technical talk, or just to try something new, I speak for the entire executive committee when I invite you to an upcoming meeting or event!

If you are interested in directly shaping the future direction of our chapter, we are looking for new executive committee members for the upcoming year as well.

Please Join Us!

One of our greatest challenges is to spur interest in the next generation of engineers. We do this through outreach to high school, college, and even elementary school kids. National Chemistry Week is a great opportunity to reach the younger kids. We had a wonderful response to our call for volunteers and all spots are now full, but we hope you will join us anyway for this great event—and bring any young, enthusiastic engineers-to-be along! Our chapter has a booth with neat experiments involving magnetism, thermal expansion, density, and phase changes. We will be demonstrating on Saturday, October 28th from 10:00 am until 4:00 pm.

Thank you Parag Bedekar, for organizing this fun event!
ASM Pittsburgh
Chapter Wins Award

ASM International awards chapters for outstanding accomplishments in several key areas. ASM Pittsburgh won an overall prize of $500 for Category IV chapters (301+ members) for innovative programming in 2016-17.

ASM Pittsburgh’s main focus for the technical monthly meetings is to increase the number of professional and student attendees. To achieve this goal, the chapter designed the meetings based on geography, meeting content, and student engagement activities.

Pittsburgh is a geographically challenging city with industrial diversity in every direction. Traditionally, meetings were held in Oakland, a central location near Pitt and CMU. However, most professional members have to travel at least an hour in traffic to attend the meeting. Therefore, the Chapter continued with alternating meeting locations. Of all eight technical meetings, four were held centrally and four were held in alternative locations north, east, west, and south, attracting 5 – 10 new attendees at each location.

For the 2016-17 meetings, the Chapter evaluated the core industries in the Pittsburgh region and decided to go back to its roots. The meeting topics were focused on metals with an emphasis on process and product metallurgy from an industrial point of view. The speakers were from local companies and were well received, even attracting non-regular attendees. The Chapter still maintains the professional development hours for P.E.s in order to help with annual continuing education requirements. About 10% of attendees take advantage of this perk.

To increase the level of student engagement, we reintroduced the student dessert talk. Typically, the presenting student was more senior and actively looking to advance their career. The presentation showcases their research while allowing them to network. An unintended result was an increase in the number of students at the meetings. For example, 22 students attended the first meeting with a dessert talk. Twenty percent of those students attended subsequent meetings throughout the year.
September Meeting Summary:
The ASM Pittsburgh Chapter’s New Year began under the stewardship of Mr. Nathan (Nate) Eisinger with a well-attended meeting on 21st September at the Grand Concourse for Spouses’ Night. The talk was given by Mr. Roger Eaton, P.E., entitled “Liberty Bridge Fire Emergency”.

On the afternoon of September 2, 2016, clouds of black smoke filled the Monongahela River valley, as the Liberty Bridge in Pittsburgh burned. The 2,600-foot deck truss bridge was in the midst of an $80M rehabilitation project when a fire broke out under a key bottom chord member carrying two million pounds of compression. The deck was being cut into pieces for removal and replacement. Additionally, the bridge was being painted (though not actively at the time) and ventilation for this part of the project unfortunately helped fuel the fire caused by sparks from the cutting process. Before it could be extinguished, the fire severely warped and buckled the compression chord, causing the affected truss to shift and redistribute load throughout the structure.

On seeing warping of the truss, all personnel and equipment were ordered off the bridge. While many Pittsburghers were inconvenienced by closing of traffic over the bridge, river traffic under the bridge was also stopped until the damage could be assessed. HDR worked around the clock to determine how the two million pound load was redistributed throughout the structure. Fortunately, this section of bridge was significantly over designed for loads it saw, and much of the weight was shifted to the neighboring truss. However, some of the load was shifted along the bridge to sections with less of an ability to take on the extra load, which is why traffic was initially restricted to smaller vehicles.

As the designer for the rehabilitation work, HDR worked with PennDOT District 11 and several other consultants and universities to orchestrate an emergency repair of the

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truss. This repair required jacking the bridge structure axially to restore the global geometry, laterally to correct a rotated truss panel joint, and locally to remove the buckles in the member web due to plastic deformation.

Initial repairs enabled normal traffic across the bridge in part due to the large safety factors built in to the original structure. Further repairs were required, however, in order to fully restore the bridge to the design state prior to the fire. Mr. Eaton mentioned that the bridge originally was built for trolley car traffic, which was the main reason it had been designed for such heavy loads.

Mr. Eaton received his BS degree in Civil Engineering from University of Pittsburgh at Johnstown in 1990 and performed his post graduate work at the University of Pittsburgh. He is an Associate Vice President, Professional Associate, Senior Bridge Engineer and Senior Project Manager at HDR where he manages the bridge group. His experience includes the design, management, and construction of major bridge structures. He has managed the design of river bridge projects, interchange projects, and bridge replacement projects. He has worked on major projects throughout the US including: The Mike O’Callaghan –Pat Tillman Memorial Bridge over the Colorado River just downstream of the Hoover Dam; the Knik Arm Crossing in Anchorage Alaska having a bridge length of over 8,200 feet; the Columbia River Crossing in Vancouver, Washington; and the Boston Central Artery Ted Williams Tunnel in Massachusetts.

He is the recipient of the 2016 Diamonds Awards for Engineering Excellence from ASCE/PA. He is one of the authors on the Steel Bridge Design Handbook, Design for Constructability, issued by U.S. D.o.T, Federal Highway Administration and the Steel Bridge Fabrication Guide Specification, issued by the American Association of State Highway and Transportation Officials and National Steel Bridge Alliance.

October Meeting Notice

Day / Date: Tuesday, Oct 19, 2016
Speaker: Edward Patrick, P.E., FASM
Topic: Overview of Alternate Aluminum Joining Options

Speaker Bio

A ’63 Pitt ME grad, Ed started his career at Westinghouse Bettis, followed by 30 years at Alcoa Technical Center, principally developing manufacturing processes for aerospace and automotive body structures, lightweight automotive wheels, semi conductor equipment, and aluminum heat exchangers. He was responsible for development and implementation of advanced product manufacturing technology, focusing on automotive related joining methods, rapid prototyping, and net shape part fabrication. Currently, he is president of E.P. Patrick & Associates, Inc., a consulting firm, specializing in manufacturing process troubleshooting and failure analysis. With 50+ years experience in product and manufacturing development, Ed is the author of numerous technical papers and 19 US Patents. He remains an AWS and ASM life member.

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May Meeting Summary:
Awards Night, Past Chairs Night

ASM Pittsburgh Chapter held their final meeting of the 2016-2017 year on May 18, 2017 at Penn Brewery. As this meeting was the ASM Pittsburgh Chapter’s Awards Night and Past Chairs Night, the brewery was at capacity!

A moment of silence was held for Mr. F. Robert Dax, FASME, who many knew as Bob, who died Friday, May 5, 2017. Bob, a past chair of ASM Pittsburgh Chapter, also had many years of service as our Chapter’s secretary. He was a good friend and colleague who will be missed.

Mr. Paul Allen, a past chair of the Pittsburgh Chapter himself, returned to Pittsburgh to give a talk titled, “Reflections on Business and Technology Trends in the Titanium Industry.” Mr. Allen discussed how the relatively young titanium industry has grown from primarily military aerospace applications to commercial applications. Paul touched on how several problems including grain refinement and porosity have been addressed by the industry and then focused on how Pittsburgh is really the nation’s center for America’s titanium production.

Prior to the main speaker, Pitt graduate student Amir Mostafaei gave a short talk on his PhD project titled, “Microstructure and Mechanical Behavior of Binder Jet Additive Manufactured Alloy 625.” Mr. Mostafaei discussed the influence of water- and gas-atomized alloy 625 powder (WA and GA, respectively), as well as thermal process parameters on density, microstructure and mechanical properties of printed parts. GA printed samples achieved higher sintering density (99.2%) than WA samples (95.0%) due to differences in powder morphology and chemistry. He showed that microstructural evolution (densification, and carbide, oxide and intermetallic phase formation) is very different for GA and WA binder jet printed and heat-treated samples.

The Owen Katz Scholarship for the 2016-17 year was awarded to William Hasley. The Owen Katz Scholarship, formerly the Gilbert Solder Scholarship, is given in honor of Dr. Katz to an outstanding high school senior in the Pittsburgh region who intends to pursue a college education in metallurgy or materials science and engineering. Mr. Halsey, from Mount Lebanon High School, developed an interest in Materials Science with his work as a research assistant at CMU on magnetic materials. In addition to his academic achieve-
May’s meeting was also the Past Chairs’ Night where all the past Chairs of the ASM Pittsburgh Chapter were recognized and thanked for their service to the chapter. This year had a great turnout, with over 10 past chairs in attendance! Thank you again for your time and commitment, and we look forward to continuing to have an active and vibrant chapter!

The ASM Pittsburgh Chapter selected Dr. Piyamanee “Nee” Komolwit to receive the Chairman’s Award. Dr. Komolwit was selected for her excellent service to the chapter in her role as Vice Chair. She organized a thoughtful, exciting and dynamic agenda for the 2016-17 year, for which the Chapter won an award from ASM International—read more about her work on Page 3 of this newsletter!

Dr. David Sapiro received the Young Member Award from ASM Pittsburgh. Dr. Sapiro, who recently earned his PhD from CMU, was selected for chairing the website. He also contributed to Young Members’ Night and helped organize a career panel for undergraduate students. Dr. Sapiro’s enthusiasm for metallurgy is not just a career but a passion—check out this YouTube video on his blacksmithing here: https://www.youtube.com/watch?v=AzGrng2CZsc.
**December Meeting Notice:**

**Day / Date:** Thursday, December 21st, 2017  
**Location:** Lombardozzi’s Restaurant  
**Address:** 4786 Liberty Ave, Pittsburgh, PA, 15224  
**Time:** 6:00 PM – 8:30 PM  
**Speaker:** Konstantin Redkin, PhD and Christopher Hrizo  
**Topic:** State-of-the-Art Rolls’ Design, Manufacturing and Applications and the Key-Factors Driving Breakthrough Technologies and Innovation  
**RSVP by 12/19/2017 to:** Piyamanee Komolwit: pkomolwit@uss.com

**Abstract**

The talk is about modern roll applications including work and backup rolls used in cold/hot rolling mills. General modern mill requirements will be covered with the emphasis on enhanced roll performance. The design, manufacturing and application aspects of the roll products will be discussed regarding state-of-the-art advanced materials characterization, CFD/FEM technologies, in-field measurements and testing, and verification/validation of the roll performance. The roll life cycle will be demonstrated using examples from hot strip mill. The provided information is applicable to ingot producers, foundries, heat treatment facilities and rolling mill audiences.

**Speaker Bios**

**Konstantin V. Redkin, PhD**  
Research Metallurgist, Mechanical Engineer, WHEMCO Inc.  
Dr. Redkin is an acclaimed professional in the ferrous physical metallurgy. His interdisciplinary specialty combines materials science and mechanical engineering at the structural and microscopic levels. His applied research has been primarily oriented toward processing of new commercial steel grades, as well as the development of special iron-based alloys for heavy machinery and rolling mill equipment. As a visiting researcher at the University of Pittsburgh and a corporate metallurgist at Pittsburgh-based WHEMCO Group, Dr. Redkin’s work has resulted in breakthrough analytical technologies and applied manufacturing solutions, supporting both local industry and academia. His research and development is well recognized by Association for Iron and Steel Technology (AIST) and the international scientific community.

**Christopher Hrizo**  
Director of Product Development, WHEMCO Inc.  
Christopher Hrizo is the Director of Product Development for the WHEMCO group producers of special large castings and roll products for the steel industry. At present, he serves as the President of the Ingot Metallurgy Forum (IMF) and the Chair of the Rolls Technology Committee for AIST. His research group has authored numerous scientific papers and technical presentations that were presented locally in the United States and abroad. Extensive research and developmental work focuses on new product design, improvement, quality and structural integrity of large scale industrial products and modern computational analytical modeling.
Dr. Gary H. Bray Awarded FASM

Dr. Gary H. Bray was named a Fellow of ASM “for prolific and sustained contributions to the development and commercial application of new aerospace aluminum alloys, enabling improved aircraft performance, and to the understanding and characterization of fatigue and fracture properties.” AM&P Sept 2017.

Dr. Bray is a senior technical specialist in the alloy technology division at Arconic Technical Center (formerly Alcoa Technical Center). Dr. Bray has a deep knowledge of the relationships between microstructure, thermomechanical processing and mechanical properties in aerospace aluminum products. With this expertise, he has invented and developed novel and innovative aluminum alloy products and processes and is the lead or co-inventor on 19 U.S. patents. Twelve of these new aluminum alloy products are now in commercial production. In 2007, he was on the team that was awarded the R&D 100 Award for Alloy 2099 as one of the 100 most technologically significant products introduced commercially. Dr. Bray has also conducted extensive research on understanding and improving the fatigue and fracture resistance of aluminum alloys, publishing over 30 technical articles from this work.

Dr. Bray has further served the greater scientific community by taking leadership roles in ASM International, Metallic Materials Properties Development and Standardization Committee, and ASTM International. He has also served as an industry advisor and committee member for nine MS/PhD thesis committees. Locally, Dr. Bray has judged the student poster competition at ASM Pittsburgh Chapter Young Members’ Night and volunteered at the ASM Pittsburgh booths at the Carnegie Science Center.

Dr. Bray received his B.S. degree in Materials Engineering from Virginia Tech and his M.S. at California State University, Long Beach. He earned his Ph.D. in Materials Science and Engineering at the University of Virginia.

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Prof. David Laughlin to Give Keynote at MS&T

Professor David Laughlin, the ALCOA Professor of Physical Metallurgy at Carnegie Mellon University will give the Annual ASM Edward DeMille Campbell Memorial Lecture at MS&T in Pittsburgh. The title of his talk is *Magnetic Transformations and Phase Diagrams*. This is an annual lecture that was inaugurated in 1926 in memory and recognition of the distinguished educator, Edward DeMille Campbell, and his outstanding scientific contributions to the metallurgical profession. Campbell had a very successful academic career, even though he was blinded at age 28 as the result of a laboratory explosion. Past Campbell Lecturers include Edgar Bain, Cyril Stanley Smith, Robert F. Mehl, Clarence Zener, John P. Hirth, Harold W. Paxton, Thaddeus B. Massalski, Paul G. Shewmon, and Subra Suresh. Professor Laughlin is a Fellow of both ASM and TMS and the recipient of the 2014 Edgar Bain award of the Pittsburgh Chapter of ASM.

ASM Pittsburgh Hosts Materials Minicamp at MS&T

The ASM Pittsburgh Chapter is hosting a Materials Minicamp for high school students on October 10th and 11th at the MS&T show at the David Lawrence Convention center. The chapter is looking for volunteers for the following tasks:

1. Assisting students from the buses to the minicamp on the floor of the exhibition - (Tuesday and Wednesday from 8:30-9:00 and from 11:00-11:30.)
2. Checking students in and handing out shirts (8:45-9:00 and 11:15-11:30 on both days)
3. Timing and helping with flow through the camp (9-11 and 11:30-1:30 both days)
4. Donation/Lending of hand-on materials for a station at the camp. Looking for materials or parts (Steel/Aluminum/Ceramics/Polymer/Titanium/Nickel Alloy/refractories/etc) that have been produced either in the Pittsburgh Region or from material from the Pittsburgh Region. Materials can be returned afterwards, but this will be a hands-on display.
5. Explaining the materials from #4 above - Looking people to discuss these materials with students at each session.

Please contact Nate Eisinger at neisinger@perrymanco.com if you are able to help with this!
The June Social was a truly interesting tour of a unique relic of the Pittsburgh area. As the only non-operating blast furnaces remaining in the Pittsburgh region, the Carrie Furnaces in the Rivers of Steel National Heritage Area were toured by about 25 members and their families. The tour guide was a veteran of the steel industry and had many insights into the now deserted facility and the decline of the domestic steel industry as a whole. The tour wound through the entire remaining facility. Highlights included a torpedo car, a view of the ore pit where iron ore could still be found on the ground, the skip car, the safety features (or lack thereof) of the plant, and of course the furnace itself. The site is also home to a gigantic deer sculpture made from debris found at the site. Following the tour, the group met at Schenley Park for a wonderful picnic. Even the weather cooperated, making this outing a resounding success!

November Meeting Notice

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Day / Date: Thursday, Nov. 16th 2017
Location: GE CATA
Address: 101 N Campus Dr, Imperial, PA 15216
Tour: 02:45 PM – 05:30 PM
Dinner Location: Walnut Grill Robinson
Dinner Address: 1210 Settlers Ridge Center Dr., Robinson Township, PA 15136
Dinner Time: 06:00 PM – 07:30 PM
Meal choice: Wild mushroom chicken, Walnut salmon, Vegetarian dish
Host: Kirk Rogers, PhD
RSVP by 11/14/2017
ONLY 35 SPOTS AVAILABLE
CONFIRMATION REQUIRED
NO PICTURES

Speaker Bio

Kirk is the Technology Leader in Additive Manufacturing at the GE Center for Additive Technology Advancement (CATA), in Pittsburgh, PA. He has used additive technology to solve manufacturing and supply chain problems since 2010. Prior to CATA, Kirk spent a short time outside of GE, proceeded by over 15 years at GE Healthcare, Refractory Process Innovations. His responsibilities there included designing manufacturing processes for and launching new products; analyzing new business opportunities; identifying, investigating and applying new process methodologies and inspection techniques; and developing patent and technology strategy.

Dr. Rogers has 25 years of experience in materials processing, primarily powder metallurgy, more than 15 of which have been focused on P/M of refractory metals. He has also done research on novel joining methods, novel molybdenum and tungsten alloys, recycling and sustainable manufacturing.

Kirk obtained his B.S. in Materials Engineering from Case Western Reserve University, and his MS and Ph.D. in Materials Science and Engineering from Purdue University. He completed postdoctoral work at Ohio State University, and is a certified Six Sigma Blackbelt.
Visit our ASM International hosted website. Register for chapter meetings, view our newsletter, and more.
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http://www.asminternational.org/web/pittsburgh-chapter/home

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