**February Meeting Notice: Young Members’ Night**

**Day / Date:** February 15th 2018  
**Location:** University Club  
**Address:** 123 University Place, Pittsburgh, PA 15260  
**Time:** 05:30 PM – 09:00 PM  
**Speaker:** Dr. Chetali Gupta  
**Student Speaker:** TBD  
**Topic:** Life after Grad School: The Early Years  
**RSVP by 2/9/2018 to:** Piyamanee Komolwit: pkomolwit@uss.com

**Abstract**
Transitioning from school to work can be a challenge as young professionals are trying their best to show their capabilities, but it is important for this to be done smoothly, as to maintain a good work-life balance. This presentation will focus on life after grad school and adjusting to industry in the early years.

**Bio**
Chetali Gupta is currently a Research Chemist at PPG in the automotive division at the Coatings Innovation Center in Pittsburgh. She is responsible for developing new formulations for various OEM manufacturers in the adhesives, sealants and NVH (noise vibration harshness) group. She is also a part of the rheology support team for different products within PPG. Chetali earned her B.S in Chemical Engineering from the University of Maryland in 2013. She received her masters and PhD in Materials Science and Engineering at Carnegie Mellon University in 2017 under Prof. Newell Washburn. Chetali worked on enhancing the interfacial activity of lignin using different grafting agents primarily in high solids systems such as cement. During her time at CMU she was the author of 13 publications and one provisional patent application. Chetali was also involved in a NSF I-Corps program during her time at CMU, aimed at helping university research build startups, where she also received an award for Top Entrepreneurial Lead. She was actively involved in the Graduate Student Association of CMU where she held a leadership position of VP of Internal Affairs.

**About Young Members’ Night**
Young Members’ Night (YMN) exposes undergraduate and graduate students from the University of Pittsburgh, Carnegie Mellon University, and Robert Morris University to ASM International and fosters the development of relationships between students and professionals in local industries. A **poster contest** prior to dinner adds competition and camaraderie, and provides further opportunities for networking between students and industry leaders. We also take this opportunity to recognize the contributions made by undergraduate students majoring in materials science and engineering by awarding the **Past Chairpersons Educational Assistance Scholarship (PCEAS)**. We also recognize students nominated by the faculty at their respective institutions with the **Outstanding Senior Award**. The program is being organized by a team of students from these institutions and is led by Mr. Anil Chikkam, YMN Committee Chair.

**YMN Sponsorship**
Young Members’ Night is one of our most important meetings and also one of the most expensive. We welcome contributions in the form of a sponsorship, which help us to provide dinner to the students at no cost to them.

- Table Sponsorship, $300. Your company will receive their name on a table and printed in the event booklet, and dinner for (1) representative.
- Food platter Sponsorship, $200. Your company’s name will be printed in the event booklet, and dinner for (1) representative is included.
- Donation of door prizes—always a hit with the students!

For donations, please contact Anil Chikkam at Anil.Chikkam@exova.com. Thank you!
Letter from the Chair!

It is hard to believe that we have already reached the New Year! I hope that everyone had a healthy and relaxing holiday, and I wish everyone a prosperous new year. What an exciting fall the Chapter had with a great slate of well attended talks and tours arranged by Vice Chair Nee Komolwit, 16 high schools (and nearly 400 students) participating in the Minicamp during MS&T 2017, and the publication of our (every 5 year) Yearbook with deepest appreciation to George Shannon.

This new year, your chapter has several exciting events and meaningful volunteer opportunities. As shown in the upcoming meetings listed throughout the newsletter, we are excited to have a great failure analysis talk in January and our annual Young Member Night in February with over 100 attendees expected at the University Club at Pitt, as well as a diverse set of talks each third Thursday through May.

Also in February, our chapter will be participating in National Engineers week at the Carnegie Science Center. This is an excellent opportunity to teach younger children the basics of materials science. We are in the process of updating our demonstrations, so if you have any ideas for materials demonstrations (that are fairly safe), please let us know! We also have the opportunity to judge at the regional science fair and award a small prize to a deserving student. Please watch your email for these announcements!

The chapter will be supporting a teacher's camp this summer as well where we will be able to educate teachers who can spark interest in materials science amongst high school students so that they can be exposed to materials before they go to college. In my mind, this outreach is probably the most important role our Chapter can fulfill and we will be reaching out for sponsors of this endeavor over the next couple of months.

Again, I speak for the entire executive committee that works hard to deliver the best program possible to you when I say I hope that we are providing value both as a way to stay in touch with each other and relevant topics as well as develop a connection to the materials professionals of tomorrow. We are always happy to have input and are looking for executive committee members to help celebrate the past and shape the future of our chapter. I can always be reached at neisinger@perrymanco.com with any comments or suggestions. Again best wishes for the new year!

Mr. Nathan Eklinger
ASM Pittsburgh Chapter Chair 2017-18
Staff Metallurgist
Perryman Company
213 Vandale Drive
Houston, PA 15342
Phone (office): 724-746-9390
e-mail: neisinger@perrymanco.com

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*Information is tentative. Check the website for the most recent information.
Abstract
This presentation and the related handbook were written by Design Engineers, Materials Professionals, Manufacturers and Construction Professionals who wish to take advantage of all that has been learned over the past 50 years of failure experience in order to avoid similar failures. The presentation also explains how finite element analysis accurately quantifies key issues in litigation.

Speaker Bio
Dr. O’Donnell is the founder and President of O’Donnell Consulting Engineers, Inc. He has extensive experience in the analysis of nuclear components. As an Advisory Engineer at Westinghouse Bettis Atomic Power Laboratory, he performed numerous material selection, design and structural evaluations of reactor and power plant component designs. He has published more than ninety papers in the fields of engineering mechanics, elevated temperature design and structural materials science. His work on fatigue analysis methods, local flexibilities, and effects of cracks on structural integrity is widely used in equipment evaluations.

Dr. O’Donnell is active in the development of international consensus standards for the design, fabrication, and inspection of nuclear equipment, components and structures. He is Chairman of the Subgroup of Fatigue Strength of the ASME Boiler and Pressure Vessel Code, a member of the subcommittee on Design and an expert in the complex failure modes, which occur under cyclic loads at elevated temperatures. He has performed a number of research projects for the Pressure Vessel Research Committee of the Welding Research Council. He has patents on mechanical processes and devices which have been used in 40 nuclear power plants to mitigate crack growth.

Dr. O’Donnell received his B.S. in Mechanical Engineering from CMU and a M.S. and Ph.D. from the University of Pittsburgh. He is a member of TMS, ASTM, and ANC and a Fellow of ASME. He was awarded the National PVP Metal for the Pressure Vessel and Piping division of ASME in 1994.
October Meeting Summary:

On Tuesday, October 17th, ASM Pittsburgh held a well-received joint meeting with AWS with over 50 members in attendance. Mr. Edward Patrick, P.E., FASM gave a talk titled, “Overview of Alternate Aluminum Joining Options” at Roland’s Seafood Grill in the Strip District.

Mr. Patrick discussed aluminum joining methods that are alternative to the most common joining methods of fusion welding. He suggested that aluminum joining community is heavily dependent on arc welding because these processes are low capital intensive, can be employed manually or with automation, and are applicable over a range of metals. In addition to arc welding there are many other fusion welding processes such as tungsten metal arc welding, laser welding, electron beam welding and resistance spot welding that involve melting and fusion of the parent metal. Mr. Patrick explained why aluminum has to be welded “hot and fast” in arc welding. Aluminum has very high thermal and electrical conductivity as compared to steels, so it requires a very high energy density to cause metal melting and fusion. However there are many applications that require a wide variety of alternate joining solutions that do not involve metal melting and fusion. For example heat exchanger tubes, aerospace parts and air-conditioning system parts need alternative methods for joining. Mr. Patrick showed many examples of such parts and then discussed several alternative joining methods including the following:

- Cold Pressure Bonding
- Resistance Butt Welding
- High Frequency Induction Bonding
- Flush Bonding
- Expansion Bonding
- Roll Bonding
- Friction / Inertia Bonding
- Friction Stir Welding
- Magnetic Impulse Welding

All of the above methods includes some level of heating of metal (except cold pressure bonding). However, it does not involve melting of the parent metal. These processes may be used to bond different metals together such as aluminum, copper, and stainless steel. A variety of shapes such as fine tubes, large tubes, rods and plates of similar or dissimilar metals can be bonded together. In addition to the above processes there are other processes that are employed for a variety of applications. These processes include: Adhesive Bonding, Brazing (furnace brazing, salt bath or dip brazing, flame or torch brazing, vacuum brazing, inert gas brazing and Nocolok brazing), Soldering, Mechanical Fastening (threaded fasteners, riveting, clinches), and Plastic Deformation Processes

The talk was a very good survey of aluminum joining methods demonstrated well with actual parts made from these processes. Attributes and unique characteristics of these processes were discussed, and many “touch and feel” samples were provided.

Mr. Patrick is a ’63 Pitt ME graduate. He began his career at Westinghouse Bettis and then spent the next 30 years at Alcoa Technical Center, principally developing manufacturing processes for aerospace and automotive body structures, lightweight automotive wheels, semiconductor 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 trouble shooting 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.
ASM Pittsburgh Exhibits Materials at National Chemistry Week

Wondering what those orange plastic blobs filled with a liquid shown in the photo below do? So did many of the kids who visited the ASM Pittsburgh Chapter’s demonstrations of density, phase changes, and expansion characteristics of materials at Chemistry Week: Chemistry Rocks! at the Carnegie Science Center. On hand were Peter Kozlowski, Bob Wesolowski, Gary Bray, Justin Sickles, Yoosuf Picard, Thomas Wingens, Corleen Chesonis, Andy Jiang, and Parag Bedekar who engaged students of all ages and explained some of these “rocking” aspects of materials science.

Despite construction at the Carnegie Science Center, including the closure of the Omnimax, this event, held October 22-28, 2017 still brought in 2,700 visitors! Parag Bedekar, who organized the ASM Pittsburgh demonstration table, said, “Thank you again to all the volunteers who donated their time on a Saturday and made it such a great success—the kids had a blast!”

If you missed this fun event in October, but are excited to share your knowledge of materials science, there are a few ways to become more involved. Some of the demo materials are degrading, so Parag is open to new ideas for the exhibit—just no fire, sparks, flashes (CSC mandate)—use of steady flame is acceptable. Also be on the lookout for an e-mail for volunteers for the Engineering Week in February!

Thank you again to those who volunteered at Chemistry Week, and a special thanks to Parag Bedekar for all his hard work in organizing this exhibit!

Gary Bray, Peter Kozlowski, and Justin Sickles demonstrating phase changes and density of materials to students.

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The November meeting was at-capacity for this exciting tour of GE’s Center for Additive Technology Advancement (CATA), now a GE Additive Customer Experience Center.

Dr. Kirk Rogers hosted this event and began with a short presentation on additive manufacturing. Although currently part of GE’s aerospace business unit, GE CATA works with all of GE’s business units and with outside customers. The Additive Customer Experience Center helps customers to develop additive manufacturing process to meet their needs in order to enable their customers to best use the machines they purchase. GE plans to grow its additive technologies into its own business unit at GE.

After the overview and a brief safety review, the tour began. There are six different types of additive technology under development at this facility. ASM Pittsburgh had the opportunity to see them all, and each station had a table filled with neat examples of materials made into various shapes using that technology.

Direct Metal Laser Melting (DMLM), a process where a fine layer of powder metal is deposited, and the laser fuses this layer according to the design pattern. The process is then repeated until a final part is made. Each layer is between 20 to 80 microns thick and there are as many as 1,250 layers per inch.

Electron Beam Melting, a process similar to DMLM except that an electron beam is used to melt the powder.

Two types of polymer printing, one where a spool of polymer was melted and deposited by a x-y-z head and one which used light to cure a polymer solution.

Binder jetting, where binder is deposited onto a layer of powder to build up the structure. This process is useful for making sand castings, for example—readers may remember this technology from ExOne’s talk in previous years.

Weld cladding, although not often thought of as 3-D printing, is an additive technique that is very useful for repairs of turbine blades, for example. The facility had robots to perform this process.

In addition to the cornucopia of additive technologies, the facility also had a well-equipped lab for metallurgical analysis—an SEM, optical microscopes, CT, and mechanical test equipment. Thank you again to GE for hosting this great tour!
University of Pittsburgh Students Win Scholarships from ASM International

Katerina Klimes, winner of the George A. Roberts Scholarship and past winner of the William Park Woodside Founder’s Scholarship, is a senior at the University of Pittsburgh, majoring in materials science and engineering. Katerina has had intern experiences in both industry and academia in materials science and engineering. She currently studies characterization methods for Ni-based magnetocaloric and Ni-based shape memory alloys in Professor Chmielus’ laboratory, for which she won 3rd prize in last year’s ASM Pittsburgh Young Members’ Night poster competition! Her passion for learning has led her to decide to pursue her doctorate in MSE, after which she hopes to work in research and development to advance additive manufacturing technologies.

Samantha Schlorer, winner of the Lucille and Charles A. Wert Scholarship, is a sophomore at the University of Pittsburgh, studying material science and engineering. She was inspired to pursue a degree in the field of engineering by her mother, a University of Pittsburgh graduate in Chemical Engineering, who was the first one to introduce her to the world of mathematics and science. Samantha was chosen to participate in the Governor School for Engineering and Technology at Lehigh University. During her time there, she gained a passion for engineering, but it wasn’t until her internship at Product Assurance Service Inc. that she became interested in working with different materials. Undergraduate research only solidified Samantha’s notion that material science and engineering was the right choice for her.

Both students are actively involved in Material Advantage. Katerina serves as the president of the Pitt Chapter and was on last year’s YMN committee. Samantha currently serves on this year’s YMN committee. A hearty congratulations to both Katerina and Samantha, and best of luck on your future endeavors!

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March Meeting Notice:

Day / Date: Thursday, March 15th, 2018
Location: Pugliano’s Italian Grill
Address: 1808 Golden Mile Hwy, Pittsburgh, PA 15239
Time: 06:00 PM – 08:30 PM
Speaker: Brian M. Pinto, PhD. Research & Development Manager, FOSECO, Division of Vesuvius
Topic: Foundry Iron Casting Turbulence: Practical Model and Simulation Analysis
RSVP by 3/13/2018 to: Piyamanee Komolwit: pkomolwit@uss.com
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Abstract

Relationships between iron casting stream quality and pouring systems are empirically known. Using optical sensing equipment and a custom algorithm developed to analyze and quantify stream turbulence, iron pouring scenarios were simulated in a controlled laboratory setting using a water model designed to emulate a bottom-pour box and stopper-nozzle system. Experiments conducted while varying use conditions and geometry allowed critical testing of several variables that influence stream turbulence. Results were validated using computer simulations and by evaluating open-stream pouring turbulence at iron foundries. The ability to reliably emulate customer applications in a laboratory setting leads to a significantly accelerated learning curve when testing concepts capable of addressing well-known issues present in the field or assessing potential process improvement opportunities.

Speaker Bio

Dr. Pinto is Research and Development manager at the FOSECO, the leading manufacturer and provider of propriety consumable products and solutions to the global foundry industry. Dr. Pinto leads his teams in the research area of metal flow engineering, focused on the ferrous and non-ferrous foundry industries. His current research focuses on the stopper rods/nozzle, iron filtration, and crucibles for the foundry application and consumable in aluminum die casting. His research utilizes computer simulations, water modeling, pilot plant testing, flow and dip coating, high temperature thermo-physical and mechanical testing of refractories.

Dr. Pinto attended Alfred University in New York for his undergraduate and graduate degree. His research at Alfred focused on the characterization, evaluation and developing a technique to control the strength of ceramics.
Owen M. Katz High School Scholarship Now Accepting Applications

The ASM Pittsburgh Chapter established the Owen M. Katz High School Scholarship in 2009. The scholarship is awarded to an outstanding high school senior who wishes to pursue a career in the metals or materials field and enrolls in a related college program. The scholarship is $1500. The Katz family kindly donated the money to ASM to help make this scholarship possible.

Owen M. Katz, PhD, FASM, was an active member of ASM since the 1950’s. He served as chairman and secretary of ASM. Dr. Katz was a recipient of the Edger C. Bain award in 2004. Dr. Katz began his career at Westinghouse Research and Development in 1956 after graduating from the University of Pittsburgh. He received his Ph.D. in 1963. Owen then transferred to Westinghouse, Bettis as a senior engineer where he instituted state-of-the-art metallographic technology and worked on failure analysis until retirement in 1998. Dr. Katz then began a second career as an adjunct professor at the University of Pittsburgh supporting students and faculty. Owen died on September 1, 2007 and will be remembered for his many contributions by his friends, family and community.

In 2011, a generous donation to the Chapter was also received from the Rich Foundation, to be invested along with original funds donated by the Katz family, to ensure the continuation of this award.

The application can be found on the ASM Pittsburgh website at:

http://www.asminternational.org/web/pittsburgh-chapter/scholarship-opportunities

Completed applications should be sent to Parag Bedekar by February 9, 2018. For questions, Parag can be reached by email at parag_bedekar@comcast.net or by phone at 412-327-4091.

Call for Volunteers: Judge YMN Posters

The Young Members’ Night Committee is looking for enthusiastic professionals to judge the graduate and undergraduate poster competition at YMN on Thursday, February 15, 2018. Judges are asked to arrive by 5:15pm at the University Club in Oakland. The poster competition officially runs from 5:30-6:30pm. However, this allows the judges an opportunity to review the guidelines. Posters are judged based on technical content, clarity and conciseness of presentation, quality of illustrations, and quality of the layout/presentation.

This is a fun opportunity to engage students and learn about the exciting research going on at Pitt, CMU, and RMU!

If you are interested in volunteering, please contact Ms. Anna Weiss at acwelss@andrew.cmu.edu.

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April Meeting Notice

Day / Date: Thursday, April 19th, 2018
Location: Lombardozzi’s Restaurant
Address: 4786 Liberty Ave, Pittsburgh, PA 15224
Time: 06:00 PM – 08:30 PM
Speaker: Dr. Frederick Schmidt, Jr., P.E., FASM, Director of Technology, Principal Engineer, Advanced Applied Services, Inc.

Topic: Design, Selection and Failure Analyses of Tool Steels; Metallographic Case Investigations

RSVP by 4/17/2018 to: Piyamanee Komolwit: pkomalwit@uss.com

Speaker Bio

Dr. Frederick E. Schmidt, Jr., P.E., FASM retired in 2015 after 17 years as a senior managing consultant at Engineering Systems, Inc. He served as Technical Director of Materials Engineering at ESI for many years. He was responsible for a very broad professional engineering practice which used interdisciplinary teamwork with clients and other experts while working to solve complex "mission impossible" problems. Prior to ESI, he served as Chief Metallurgist for Remington Arms, a subsidiary of E.I. DuPont De Nemours. He designed and specified all materials, coatings and processes for advanced weapons, i.e., Navy SEALs, sniper firearms, commercial products, and ammunition optimization for the U.S. Army.

Dr. Schmidt’s career with E.I. du Pont de Nemours and Remington Arms Company spanned 24 years in affiliation with the Engineering Research and Development Division. His progression from research, to production control/master scheduler, to marketing electronic connections systems, and to project management of polymer processing materials culminated in his appointment to Research Fellow in 1989.

Dr. Schmidt was commissioned in the U.S. Army in 1968. He served for 12 years in various command positions, as a combat qualified reserve officer, retiring as Captain in the Corps of Engineers, 1980

Dr. Schmidt is a Fellow of ASM International, and Alpha Sigma Mu where he currently serves as President and Chairman of the Board of Trustees since 2010. He served on the ASM Board of Trustees from 2004-2007 as well as serving on the ASM Materials Education Foundation Board as Trustee from 2007-2010. Dr. Schmidt received the ASM International Allan Ray Putnam Service Award in 1991 and the William Hunt Eisenman Award in 2015. He has a Ph.D. and M.S. in Materials Science and Engineering from Drexel University, and a B.S. in Metallurgical Engineering from Drexel Institute of Technology. He became a Professional Engineer in the State of Pennsylvania in 1981 and currently holds P.E. licenses in eight states. Dr. Schmidt has earned the National Council of Examiners for Engineering and Surveying (NCEES) designation as a Model Law Engineer.

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**December Meeting Summary**

ASM Pittsburgh wrapped up 2017 with a talk from Mr. Christopher Hrizo and Dr. Konstantin Redkin at Lombardozzi’s Restaurant on Thursday, December 21. Both speakers work at WHEMCO, Inc. and gave a talk titled, “State-of-the-Art Rolls” Design, Manufacturing and Applications and the Key-Factors Driving Breakthrough Technologies and Innovation.”

Mr. Christopher Hrizo began the talk by describing how WHEMCO Inc. is a group of foundries and forging operations located in Lehigh PA, Midland, PA and several locations in Ohio. All operations are supported by corporate research and technology. He emphasized a methodology that requires a strong commitment to understanding customer needs and mill observations with WHEMCO operating capabilities and their use of finite element modeling (FEM) to minimize failures and extend the working life of mill rolls. WHEMCO has extensive experience including instances where rolls made in the same shop to the same process standards have vastly different lives due to process variations not previously considered in the manufacturing process.

Mr. Hrizo said that four basic attributes must be defined to define mill roll design:

- Mechanical Force
- Wear Resistance
- Thermal Stress Response and Thermal Fatigue Cycling Damage
- Damage Tolerance

Once these are defined, the research and development staff determines how chemistry and microstructure affect the roll properties, and how these properties define roll performance under the specified service conditions.

Numerous failure mechanisms can lead to reduced mill roll life including:

- Rolling fatigue and the material fatigue endurance limit
- Mill induced damage from foreign objects or workpieces of large dimensions are input

Wear and roll slippage often increased by intentional roll shifting used to roll thinner gauges
- Oxidation and attendant pitting
- Thermal fatigue

Mill rolls provided by WHEMCO are often bimetallic and available alloys might be as high as 3% (weight percent) carbon.

Dr. Konstantin Redkin then spoke, and described that with this baseline understanding, the available manufacturing methods are surveyed for the optimal approach. This selection process includes the use of DANTE® Software to optimize the desired alloy matrix properties and minimize residual stresses. Microstructures are examined on a very fine scale via scanning electron microscopy (SEM) and wave dispersion spectroscopy (WDS). The roll alloy and thermal process are selected based upon the combination of properties in the alloy matrix as well as the properties of the carbides and other hardening phases appearing in the alloy. The DANTE® software will integrate material properties from JMatPro® Computational Thermodynamic Software database. Other solidification software and academic information is used to understand portioning of the desired phases and the predicted volumes. The WHEMCO staff utilizes its experience and familiarity with available academic data, material data bases, computer simulation of steel heat treating, and customer observations to optimize a solution best suited for the required end use and roll performance.

Dr. Redkin is a visiting researcher at the University of Pittsburgh and a corporate metallurgist at Pittsburgh-based WHEMCO Group. 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. His research and development is well recognized by Association for Iron and Steel Technology (AIST) and the international scientific community.

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. His work focuses on new product design, improvement, quality and structural integrity of large scale industrial products and modern computational analytical modeling.
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http://www.asminternational.org/web/pittsburgh-chapter/home

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