



# MSE Annual Report

Materials Science and Engineering • Michigan Technological University



Fall 2014





## Greetings from the Copper Country, Michigan Tech, and the MSE Department!

It is my pleasure to again share with you a summary of the past year's highlights in MSE. We have had another good year, and I continue to be proud of the accomplishments of our students, faculty, staff, and alumni.

Last year, I reported a significant one-year increase in our undergraduate enrollment, up approximately 33 percent over 2012 numbers and resulting in an eighteen-year high in total enrollment in the department. I am pleased to report that the upward trend in our enrollment continued into 2013–14. Like last year, I attribute the increase to an enhanced awareness of the opportunities offered by a career in MSE. On campus, I am impressed by the efforts of our Materials United student society in coordinating and implementing recruiting-oriented open houses that showcase the department to prospective student peers. I also believe that Michigan Tech continues to benefit from the

positive effects of the ASM Materials Camp and its role in increasing awareness of MSE among science-oriented high school-aged students and their teachers. We were pleased to again host an ASM Materials Camp for Teachers this past summer, our sixth since 2008.

It is with mixed emotions that I report the retirement of three very influential and admired members of the MSE family. We will miss the solid contributions and invaluable wisdom provided by Professors Mark Plichta and Calvin White, who retired after thirty years and twenty-eight years of service to the department, respectively. Staff member and academic advisor extraordinaire Ruth Kramer also retired after nineteen years with MSE. All have had a huge impact on the lives and careers of students and alumni. With the retirements come new faces and new legacies: the department is pleased to welcome several new faculty and staff for the 2014–15 academic year. Walter Milligan returns to the department on a full-time basis following the completion of an eight-year appointment as chief information officer for the University. Jean Kampe joins the department following the completion of two terms as chair of the Engineering Fundamentals Department. Daniel Seguin joins the department in January 2014 as undergraduate advisor and staff scientist/



engineer. We are especially pleased that Erik Herbert, currently with the University of Tennessee, has accepted an assistant professor position with the department and will begin in June of 2015.

As always, I appreciate all of the support we receive from alumni and friends of the department. Your partnerships are very important to us and have become a critical means by which we pursue our goals to ensure a top quality educational experience for our students.

Until next time, and with sincere regards,



Stephen L. Kampe  
Franklin St. John Professor and Chair



### On the cover:

Clockwise, from top left: Michigan Tech's University seal (28 pounds and eighteen inches in diameter), cast in brass by the Advanced Metalworks Enterprise; the Houghton-Hancock Lift Bridge; a 3D graphene in honeycomb morphology (see pg. 6); and the Minerals and Materials Building as viewed at lake level from the Great Lakes Research Center.



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Michigan Tech salutes three retiring

# MSE Department Legends

**M**ichigan Tech's Department of Materials Science and Engineering bids a bittersweet farewell to three much-admired colleagues this year as they begin a new chapter in their lives. The faculty, administration, and especially the students of Michigan Tech's MSE department extend congratulations and deep appreciation for the outstanding contributions of retiring professors Mark Plichta and Calvin White, and Academic Advisor Ruth Kramer. Collectively, they dedicated more than 80 years of service to the MSE department.

Their passion and brainpower helped keep the department on the forefront of innovation and education. Each has played a part in advancing Michigan Tech's trailblazing academics and broadening the focus of the MSE department's curriculum. Equally as important, each has had a profound impact on the lives of countless students, their colleagues, and on the field as a whole. Their absence will be keenly felt.



## **Mark Plichta:** Thirty Years of Leadership and Innovation

Mark Plichta, former materials science and engineering chair and professor, is a leader in every sense of the word. He's a motivator, innovator, influencer, and collaborator. Gary Shiflet, a graduate school classmate and now a professor of materials

science at the University of Virginia, sums up the feelings of the department as a whole: "Michigan Tech has been privileged to have the gift of Mark's inventive mind, teacher's heart, and strength of character and conviction."

Plichta served as associate dean of academic programs in Michigan Tech's College of Engineering and

*"Michigan Tech has been privileged to have the gift of Mark's inventive mind, teacher's heart, and strength of character and conviction."*

transformed the way Michigan Tech engineering students learn. As the principal investigator on a significant National Science Foundation Action Agenda grant for Systemic Engineering Education Reformation, Plichta helped launch Michigan Tech's groundbreaking Enterprise Program in 2000. Enterprise is comprised of student-driven, multidisciplinary teams that function as companies working on real-world projects for clients

such as ArcelorMittal, Waupaca Foundry, and GE Aviation. The experiential learning it provides students remains an invaluable part of the University's engineering education.

Plichta is also known for his ability to bring faculty and students together, doing an outstanding job as MSE department chair starting in 2002. His teaching skills were rewarded in 1990 when he earned both the State of Michigan Teaching Excellence Award and the Michigan Technological University Distinguished Teaching Award.

According to Shiflet, Plichta set the stage for a resurgence of the department into the national spotlight. He joined the MSE department in 1984 as an associate professor of metallurgical and materials engineering. Quickly advancing to full professor, Plichta taught undergraduate- and graduate-level courses in the areas of phase transformations, kinetics, materials science, and electron microscopy. He was named Fellow of ASM International in 2010.

At Michigan Tech, he will always be remembered for his legacy of innovative leadership and his vision for making the MSE department a pacesetter in its field.

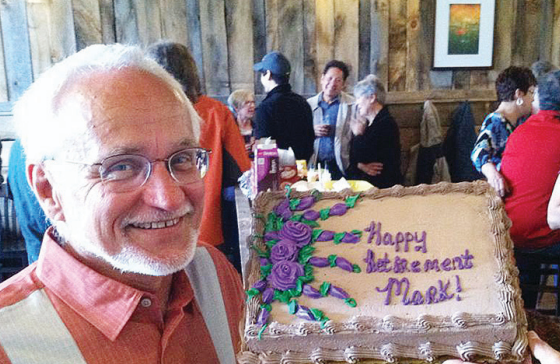


## **Calvin White:** Setting the Pace for Collaborative Education and Research

Calvin White was never content to remain within the four walls of his classroom. His curiosity and drive to address real-world problems through science and technology inspired both students and colleagues alike.

White's substantial expertise and interest in collaboration afforded him opportunities to work as far afield as Norway, Brazil, and India.

Now serving as a research professor in MSE, one of White's many contributions was serving as lead faculty for an international industry/university collaboration with Norwegian aluminum producer Norsk Hydro and the Norwegian University of Science and Technology (NTNU). This pioneering collaboration allowed opportunities for research funding and graduate education, while promoting exchanges and technical interactions among institutions. As a result of this effort, six students from NTNU and Michigan Tech completed MS degrees based on the program's research. Former Michigan Tech President Dale Stein was White's



Since retiring on July 2, Plichta has been enjoying spending time with his grandchildren and family at their log home on Lake Superior.



Although he is officially retired, White has a newly established consulting business, Medora Metallurgical Consulting, LLC, which is named for the location of his family's lakefront summer cottage.



In retirement, Kramer is doing exactly what she envisioned: "pulling weeds in the garden, visiting family, and spending as much time as I can with my husband, Byrd."

PhD advisor while Stein was still a member of the Metallurgical Engineering department faculty. "To my good fortune, Cal decided to join me when I moved to Michigan Tech from the University of Minnesota," Stein says. "We were developing Auger Electron Spectroscopy to study surfaces and grain boundaries, which fit well with Cal's special interest in thermodynamics and kinetics. He developed his reputation as a leading researcher on the properties of interfaces and received wide recognition for his accomplishments."

*"Cal was a leading researcher and received wide recognition for his accomplishments."*

White is indeed widely respected in his field. His work in intermetallics earned him the prestigious recognition of Highly Cited Researcher in Materials Science by the Institute of Scientific Information, and he received the Michigan Technological University Faculty Research Award in 1996. White and his research team were also recognized by the US Department of Energy—Materials Science Research Competition for research having "Significant Implication for Energy Technology."

White joined the faculty of Michigan Tech's MSE department in November 1986. He advised and instructed graduate-level students, taught undergraduate courses—most notable to students was the MY3200 Materials Characterization class—and served as department chair for six years. White continues to collaborate with department colleagues on an active research project: investigating high-temperature alloys for use in power generation.

During his tenure at Michigan Tech, White was an outstanding example for students, personally demonstrating the power of bright minds working together.



### **Ruth Kramer: Guiding Students to Success**

College is a time of transition for young people, a number of who attribute their success to the support and guidance of a special mentor or advisor. For many Michigan Tech undergraduate students, that advisor was Ruth Kramer. She first joined Tech as a research scientist in the Institute

of Materials Processing in 1988, occasionally teaching courses such as Scanning Electron Microscopy and Ore Microscopy. In her MSE position, which began in 1995, Kramer's primary responsibilities were supervising the metallography and optical microscopy laboratories and assisting students with research. However, it was not until 2005 that she discovered her true passion: advising students.

Kramer connected with students in large part because she deeply valued their focus, intelligence, and work ethic. Former student Ben Poquette, who went on to earn a PhD from Virginia Tech and now serves as chief materials scientist at EnerBee in Grenoble, France, says that Kramer's impact was incredible. "The early 2000s was a time of great change for MSE undergraduates at Michigan Tech, but we all made it through thanks to Ruth," Poquette says. "She was the de facto mother of the department and the glue holding our undergraduate lives together."

Kramer also worked tirelessly to forge relationships with area high schools. In 2012, she was rewarded for her efforts with the student-nominated Claire M. Donovan Award. Sponsored by Blue Key Honor Society, the award recognizes significant contributions and outstanding service. It acknowledged Kramer's many outreach efforts that engaged high school teachers and students in Michigan Tech's activities.

Kramer's knowledge and personalized advice earned her the respect and affection of students as they sought

*"Ruth's shoes will be hard to fill."*

out her academic and career advice. Her service was also acknowledged with the receipt of the 2007 Making a Difference award, which recognizes staff for their contributions to the University's educational, research, and public service missions.

Of the many thanks and accolades she receives, the most meaningful to her are the letters from students years after leaving Michigan Tech, thanking her for guiding them along the path to success. Poquette sums up the sentiments of many of those students: "She always kept her door open, providing much of the function of an academic advisor. Her shoes will be hard to fill."

Michigan Tech is at the forefront of solar technology research with new cost-saving

# ‘WONDER MATERIAL’

Solar energy is renewable, clean, and promotes independence from fossil fuels. However, the expense of manufacturing solar cells has been a factor in preventing its widespread adoption in the US. Researchers at Michigan Technological University are paving the way toward a solution to this dilemma, drawing national, industry-wide attention for their groundbreaking work. Yun Hang Hu, the Charles and Carroll McArthur Professor of Materials Science and Engineering, and his research team, have developed a new generation of 3D graphene with the potential to replace expensive platinum in solar cells. Early data suggests that 3D graphene functions as a cheaper, more conductive alternative, which in turn can make solar

cells more affordable without compromising their performance.

Regular graphene is a two-dimensional form of carbon, about a molecule thick. Hu and his team developed a new, simplified approach to synthesize a unique 3D version with a honeycomb structure. The key was to combine lithium oxide with carbon monoxide in a chemical reaction that forms lithium carbonate ( $\text{Li}_2\text{CO}_3$ ) and the honeycomb graphene. The  $\text{Li}_2\text{CO}_3$  helps shape the graphene sheets; its particles are easily removed from the 3D honeycomb graphene by an acid. To test the effectiveness of the cells, Hu and his team created dye-sensitized solar cells, replacing the platinum electrodes with 3D graphene.

The results were impressive. Solar cells with the 3D graphene electrode converted 7.8 percent of the sun's energy into electricity—nearly as much as Pt-based dye-sensitized solar cells.

Although only small amounts of platinum are needed to manufacture each solar cell, at \$1,500 an ounce, the precious metal is very costly, hindering the economic viability of broad manufacturing of solar cells. The cost savings using 3D graphene as an alternative are substantial. “Our approach to synthesizing the 3D graphene is much simpler and it allows us to control the shape,” said Hu. “Not only is the process simple, we can repeat the pattern at a much lesser cost.” Given the technical and market uncertainties, 3D



*Hu and his team developed a new, simplified approach to synthesize a unique 3D graphene with a honeycomb structure.*

graphene is likely several years away from achieving widespread market success; however, the team is working to scale up manufacturing systems and provide larger quantities of the material for prototype testing.

John Diebel, director of Tech's Michigan Translational Research and Commercialization (MTRAC) program, notes that although the technology is at an early development stage, even more potential applications are being considered. "Early data suggests it could have wide-reaching applications for energy storage. We are working to understand how this could help improve the performance of capacitors and dye-sensitized solar cells," Diebel said. "Graphene-based capacitors could enhance battery and energy storage technology in

electric vehicles and other kinetic applications, ranging from cranes to military weapon systems." The initial response from the scientific community has been highly positive. Hu notes, "This is really significant for Michigan Tech because we are one of the leaders in the world. We're at the frontier of this research." Michigan Tech is now working with several advanced materials companies to develop the necessary process improvements, production scale-up, new product applications, and other commercial considerations for a successful product roll-out.

The American Chemical Society Petroleum Research Fund and the National Science Foundation funded the research. Hu, Michigan Tech graduate student

Hui Wang, Franklin Tao of the University of Notre Dame, Dario J. Stacchiola of Brookhaven National Laboratory, and Kai Sun of the University of Michigan coauthored the article describing the research, entitled "3D Honeycomb-Like Structured Graphene and its High Efficiency as a Counter-Electrode Catalyst for Dye-Sensitized Solar Cells." The article was published online July 29, 2013, in the journal *Angewandte Chemie*, International Edition. Hu's research was reported on by numerous media worldwide, highlighted by the Materials Research Society in 2013, and nominated for the Society of Manufacturing Engineers's "List of Innovations That Could Change The Way You Manufacture."

# Student News



## MSE Open House

Each year, the Materials United student group organizes and hosts the MSE Engineering Exploration Open House—a chance for students to learn about professional societies and opportunities in industry. See above for photos from this year's event.

## 2014 Departmental Scholar Named

**Calvin Nitz** was named the MSE Departmental Scholar for his academic accomplishments, participation in undergraduate research, and leadership. Nitz is a leader in Michigan Tech's Advanced Metalworks Enterprise (AME) and is a member of the cross country team.

## Two MSE Students Win AFS Scholarship

Senior **Melissa Wright** and grad students **Helen Rau** and **Karl Warsinski** were awarded scholarships by the Detroit Windsor Chapter of the American Foundry Society at a February 2014 event.

## First Richard W. Heckel Memorial Scholarship Awarded

**Matthew Tianen** was presented with the inaugural award at the 2013 Materials Science and Technology conference in Montreal, Canada.

## Student Receives Honorable Mention for Prestigious Award

**Alexandra Glover** received an honorable mention for the Barry Goldwater Scholarship and Excellence in Education Program—established to honor Barry Goldwater, who served as a soldier and statesman for fifty-six years.

## Student Spends Summer Working Abroad

**Jacob Braycovich** was awarded a Research Internship in Science and Engineering (RISE) by the German Academic Exchange Service for summer 2014. He worked at Leibniz University in Germany on a project titled "Optimizing AWIJ (Abrasive Water Injection Jetting) Cutting Techniques for Magnesium-based Myocardial Graft Materials." Braycovich says, "My experience traveling to Germany was amazing; both educationally fulfilling and culturally eye opening."

## SURF Award Goes to MSE Student

**Zachary Morgan** received a Summer Undergraduate Research Fellowship (SURF) award through Tech's Vice President for Research and Honors Institute. He worked with Professor Yongmei Jin on a project to optimize damping capabilities of metal matrix composites with ferroelectric barium titanate inclusions through modeling and computer simulations.





## FEF News

The Foundry Educational Foundation (FEF) provided scholarship funding in the amount of \$11,300 for sixteen AME students during the 2013–14 academic year (see photo, below left).



Back row (left to right): Danielle Williamson, Troy Podges, Collin Tether, Alex McQuarter, Adam Jacobson, Alex Thiel, Andrew Lewis, Matt Dazell, Max Rebottaro, Adam Pringle  
Front row (left to right): Dan Freiberg, Henry Brewer, Melissa Wright, Jordan Pontoni, Zach Boyden, Ben Holtz

The FEF sponsored two students to represent Michigan Tech at the College Industry Conference (CIC) held in Chicago, Illinois, in November 2013 (see photo below). The CIC gives students the opportunity to network with metalcasting companies in a “job fair” atmosphere.



Shown are (left to right): FEF Key Professor Paul Sanders, students Kyle Myszka and Travis Hefpner



## A Word From . . . Advanced Metalworks Enterprise (AME)

Hello! I am Melissa Galant, vice president of the Advanced Metalworks Enterprise (AME). The 2013–14 school year was a busy and successful time for the AME. The enterprise experienced yet another growth in student enrollment, up to forty-six students, from thirty-five students the previous year. With the abundance of students in its ranks, AME successfully took on eleven different projects sponsored by ArcelorMittal, Meritor, Magliner, Linamar, GE Aviation, Eck Industries, Forging Industry Association, Alcoa Howmet, and Waupaca Foundry. Projects included super-finishing of cutting tools for increased tool life, induction mixing of nanoparticle aluminum metal matrix composites, developing single crystal crystallography software, and developing a tap bit for tapping a blast furnace with improved efficiency.

Another exciting project has come to a close for the enterprise. It started several years ago when representatives of Michigan Tech’s Undergraduate Student Government asked AME to cast the University seal in brass. Without a drawing, CAD model, or existing 3D pattern, the project quickly became quite the challenge. Matt Monte, of Houghton-based Monte Consulting, stepped up to develop the initial CAD design. Nick Hendrickson, Facility Supervisor of the Michigan Tech School of Technology Machine Shop, used this CAD design to create CAD code to machine an aluminum pattern from which sand molds were made. Four seals were cast by AME members, using 300 pounds of red brass, generously donated by MSE alumnus Louis Iannettoni (BS '49), president of Meloon Foundries in Syracuse, New York. The seals were polished, and three have been mounted on the kiosk in front of the Memorial Union Building, and the fourth on the Alumni House. The project was a huge success that required support from many different sources, all of which help promote AME’s presence on and off campus.



## Graduate Student News

MSE master’s candidate and Nordic Skier **Matt Wong** was named to the Central Collegiate Ski Association (CCSA) second team. Wong placed twelfth in the 20K freestyle race at the CCSA Championship held in Ishpeming in February 2014. Wong’s advisor is Associate Professor Paul Sanders.

**Amberlee Haselhuhn**, PhD candidate, was elected President of Michigan Tech’s Graduate Student Council for the 2013–14 academic year. Haselhuhn is advised by Associate Professor Paul Sanders.

## 2014 Graduate Degrees in MSE

The following students completed graduate degrees in 2013–14: Benjamin Jensen MS (advisor: Gregory Odegard), Joseph Licavoli PhD (advisor: Paul Sanders), Daniel Seguin PhD (advisor: Calvin White), Ben Wang MS (advisor: Stephen Hackney), Hui Wang PhD (advisor: Yun Hang Hu). Congratulations!

# Materials United



Hi, I'm George Castle, president of Materials United (MU). Materials United is a student organization designed to expose students to all aspects of Materials Science and Engineering. We accomplish this by providing opportunities to meet with fellow students, learn about

industry, and introduce students to the major materials societies: AFS, ACerS, ASM, TMS, and AIST.

Last year, Materials United students attended the Materials Science & Technology (MS&T '13) Conference and Exhibition in Montreal, Canada. At the conference, we went to receptions, lectures, and enjoyed the gorgeous city in a foreign country. Also during that year, MU hosted MSE alumnus David Gelwicks '82, president and chief operating officer of Hickman, Williams & Company, who provided a lecture on ferrous metallurgy. MU also hosted a panel to raise student awareness of higher education opportunities and organized the departmental Engineering Explorations Open House by providing

laboratory demonstrations for first-year engineering majors to introduce the materials science discipline. During the Michigan Tech Career Fair, we held a "Mix-n-Mingle" with attending company representatives to provide them with a chance to interact with our students outside the Career Fair setting.

This year, we are excited to travel back to Pittsburgh for the MS&T '14 Conference and Exhibition, and to once again coordinate the departmental Open House and assist with high school outreach programs. Along with continuing our past successes, we plan to make MU more accessible to students, alumni, and those in industry through our easy-to-navigate student-run website. The site will feature articles describing current projects, an events calendar, and even a scholarship database. MU is always looking for support from alumni and industry to help with funding the events that we attend or host. To get involved, please feel free to contact me, George Castle, at [gycastle@mtu.edu](mailto:gycastle@mtu.edu). You can also go to our web link to support MU: [www.mtu.edu/musg](http://www.mtu.edu/musg). Thank you from all of us in MU for your continued support as we grow and improve our organization!

## Materials United Students Attend MS&T '13 in Montreal, Canada



Michigan Tech MSE students pose outside the Montreal Science Centre and enjoy an end-of-conference dinner celebration at the Les 3 Brasseurs Brewpub in Old Montreal.

# Senior Projects Teams/Sponsors



## Design, Manufacture, and Testing of a New Blast Furnace Tap Bit

Team: Alisha Clark, Matt Dazell, Dan Freiberg, Max Rebottaro  
Advisor: Tom Wood (AME)  
Sponsor: ArcelorMittal (Joe Brunner, liaison)



## Battery Electrode Formulation for Lithium Battery

Team: Kellan Martin, Taylor Michels, Emily Wolbeck, Michael Warhus  
Advisor: Peter Moran  
Sponsor: Boston Scientific (Todd Bofinger, liaison)



## Ductile Iron Alloy Development

Team: Collin Tether, Alex Thiel, Danielle Williamson, Melissa Wright  
Advisor: Daniel Seguin  
Sponsor: Meritor (Steve Thelen and Stephen Doyle, liaisons)



## Bainitic Steel Alloy and Heat Treatment Optimization

Team: Travis Hepfner, Cody Terrez, Matthew Tianen, Kelsey Whalen  
Advisor: Douglas Swenson  
Sponsor: ME Global (Ed Vesely, liaison)



## Friction Stir Welding of Aluminum Die Castings

Team: Anthony Konieczny, Alex Seidl, Chris Shaw, Stephanie Tankersley  
Advisor: Daniel Seguin  
Sponsor: American Axle (Cory Padfield and Steve Cook, liaisons)



## Improved Brake Design for Brake Truck Applications

Team: Adam Jacobson, Michel Knudsen, Alex McQuarter, Troy Podges  
Advisor: Jerry Anzalone (AME)  
Sponsor: Magline (Greg Ecker, liaison)



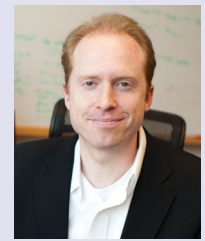
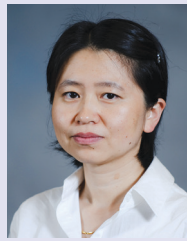
## Local Material Properties in Die-Cast Aluminum Driveline Housings

Team: Zachary Dvorak, Ben Holtz, Greg Holl, Andrew Lewis  
Advisor: Dale Dewald (AME)  
Sponsor: Linamar (Ben Cottrill, liaison)

# Faculty and Staff News



Professor **Larry Sutter** was selected as a recipient of the newly implemented Faculty Fellow Program for the 2014–15 academic year. The Faculty Fellow Program is sponsored by the Office of the Vice President for Research. Sutter's charge is to improve sponsored programs administration and strategic planning through faculty input.



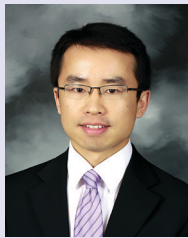
Congratulations to Assistant Professors **Yongmei Jin** and **Paul Sanders**, who were promoted to Associate Professors with tenure, and Associate Professor **Joshua Pearce**, who was granted tenure, effective August 18, 2014.



Department Chair **Stephen Kampe** was the recipient of the Michigan Tech Exceptional Graduate Student Mentor Award presented by the Graduate Student Government at their awards ceremony in April 2014. Kampe was nominated by MSE PhD student Andrew Baker, who cited his mentoring and advocacy, and his guidance in creativity and modeling.



The Applied Chemical and Morphological Laboratory (ACMAL) was named a Core Facility by Michigan Tech's Vice President for Research, in recognition of its role in supporting interdisciplinary research by providing communal space for tools, equipment, and support expertise. ACMAL is managed by the MSE Department for the benefit of the university research community and includes electron optics and X-ray diffraction capabilities. ACMAL is directed by **Owen Mills**, MSE senior engineer/scientist, above left, and staffed by **Edward Laitila**, MSE engineer/scientist, above right.



Research Assistant Professor **Zhiwei Peng** received a 2014 TMS Young Leader Professional Development Award from the Minerals, Metals & Materials Society. The award recognizes early-career individuals under the age of 40 for their potential as future leaders within TMS and the materials and engineering community.



MSE Research Professor **Stephen Mashl** chaired the International Hot Isostatic Pressing (HIP) Committee and helped organize the 11th International Conference on HIP held in Stockholm, Sweden, in June 2014.



**Jean Kampe** has joined MSE as associate professor. Kampe was recently Chair of Michigan Tech's Engineering Fundamentals Department. She received her PhD in Metallurgical

Engineering from Michigan Tech in 1987 working under the guidance of late Professor Tom Courtney. Kampe will continue her efforts and research in the areas of engineering education and curricular enhancements.



**Daniel J. Seguin** joins MSE as research engineer/academic advisor. Seguin received his PhD in Materials Science and Engineering from Michigan Tech in

2013. His research interests include corrosion, mechanical behavior of materials, deformation processing, and aluminum extrusion process design and optimization. Seguin's duties will focus mainly on academic advising of undergraduates, but will also include maintaining undergraduate laboratories and assisting with Enterprise projects.



**Walter Milligan** rejoins the MSE faculty after serving as Michigan Tech's chief information officer since 2006. Milligan received his PhD in Materials Engineering from Georgia Tech in 1988.

His research and teaching interests include composite materials, mechanical behavior, and structure-property-processing relationships of advanced structural materials. "I learned a lot in administration," Milligan says, "but I'm very glad to be back home."

# Outreach

## MSE and Summer Youth Programs



MSE actively takes part in Tech's Summer Youth Programs (SYP), participating in Women in Engineering, Engineering Scholars, and Explorations

in Engineering Programs. Students are involved in projects such as blacksmithing, casting, and making patterns with 3D printers.



## ASM Materials Camp for Teachers

Shown are regional high school teachers who participated in the ASM Materials Camp held on campus in summer 2014. The twenty-two high school teachers built their own 3D printers to take back to their home schools.



## External Advisory Board

Members of the MSE External Advisory Board met on campus in April 2014. The Board meets annually with students, faculty, and staff to provide vision and guidance on the department's curriculum and policies. Pictured from left to right are: Mike Agin, EAB chair and president, Pioneer Technologies Corp.; Kathy Hayrynen, technical director, Applied Process Inc.; Boyd Mueller, vice president technology & research, Alcoa Howmet; Sally Klaasen, formerly with IBM Microelectronics; Evelyn Jackson, quality manager, ArcelorMittal; Steve Kampe, MSE department chair.

## ALMMII | Advanced Materials Manufacturing at Michigan Tech

The MSE Department at Michigan Tech will be a partner in the newly formed \$148 million American Lightweight Materials Manufacturing Innovation Institute (ALMMII). ALMMII is a public-private partnership incorporated in the state of Michigan, with headquarters to be located in Detroit. The ALMMII proposal team was led by the University of Michigan and EWI (Columbus, Ohio), and was selected for funding by the US Department of Defense. ALMMII is one of four founding institutes in the National Network for Manufacturing Innovation. For more information, see <http://almmii.org>.

# Alumni News

**Mark Goldberg Ascher**, BS MY '89, was recognized in *Who's Who in Mineral Names* in the September/October 2014 issue of *Rocks and Minerals* magazine, as discoverer of a mineral which was named after him—Markascherite. Ascher is a mineral collector and engineer for Raytheon Company in Tucson, Arizona.

**Gregg M. Janowski**, who graduated with BS, MS, and PhD degrees in Metallurgical Engineering from Michigan Tech, in 1983, 1985, and 1988, respectively, won the 2013 Ellen Gregg Ingalls/UAB National Alumni Society Award for Lifetime Achievement in Teaching at the University of Alabama at Birmingham.

**Robert Washnock**, BS MY '75, was the 2013 recipient of the SME (Society for Mining, Metallurgy & Exploration Inc.) President's Citation Award, presented at the annual SME meeting February 23–26, 2014, in Salt Lake City, Utah.

**Iver Anderson**, BS MY '75, was the recipient of the 2014 TMS Application to Practice Award, sponsored by the Minerals, Metals, and Materials Society and presented at their annual meeting in San Diego in February 2014. The award was given in recognition of Anderson's development of lead-free solders now used in many electronic applications, as well as his creative contributions in the area of powder metallurgy and rapid solidification processing.



**MSE alum Susan Kiehl**, MY '83, vice president of integrated fighter group product development for Lockheed Martin Aeronautical (front, second from left), hosted the spring meeting of the College of Engineering External Advisory Board at the company's Fort Worth manufacturing facility. Shown with an F-35 Lightning II Joint Strike Fighter are the attending COE EAB members and faculty, including MSE Chair Steve Kampe (front, second from right).

## Alumni Reunion 2014

The MSE graduate students hosted a departmental reception for the MY/MME/MSE alumni attending the Alumni week festivities at Michigan Tech, August 7–9, 2014. Pictured are three "Golden MY Alumni"—Kenneth Kulju, Joesph Rosebery, and Victor Storhok—celebrating their 50th year reunions.



## MSE—Class of 2014

**Back row, left to right:** Kelsey Whalen, Alex McQuarter, Daniel Freiberg, Alexander Thiel, Danielle Williamson, Matthew Tianen, Peter Tropper, Christopher Heiting, Travis Hepfner, Anthony Konieczny, Alex Seidl, Taylor Michels

**Front row, left to right:** Michel Knudsen, Emily Wolbeck, Melissa Wright, Cody Torrez, Stephanie Tankersley, Alisha Clark

**Missing from photo:** Kellan Martin, Collin Tether, Michael Warhus. Also missing are two fall 2014 graduates, Gregory Holl and Christopher Shaw.

MSE now includes job postings on its website. Prospective employers can post positions by emailing [beth@mtu.edu](mailto:beth@mtu.edu). The site also gives alumni a resource for changing jobs. Visit [www.mtu.edu/materials/department/employment](http://www.mtu.edu/materials/department/employment) to view current postings.



# Materials Science and Engineering

## 2014 Graduates

BS Graduates—21  
 PhD Graduates—3  
 MS Graduates—2

## 2013–14 Enrollment

Undergraduates 121  
 Graduate Students 32 (26 PhD/6 MS)

## 2013–14 Student Awards

2 The Minerals, Metals and Materials Society (TMS) scholarship winners  
 1 Goldwater honorable mention

# Facilities

39,500+ square feet of state-of-the-art laboratory space—with pilot-scale capabilities in all forms of material processing (foundry, deformation, particulate, electronic), and in material structure and property characterization

## Faculty

16 Tenure/tenure track faculty

8 Research faculty

# Faculty Honors/Awards

7 Professional society fellows  
 2 Endowed professorships  
 1 AIST Kent Peaslee Junior Faculty Award  
 1 Faculty (emeritus), National Academy of Engineering  
 1 Outstanding Graduate Mentor Award

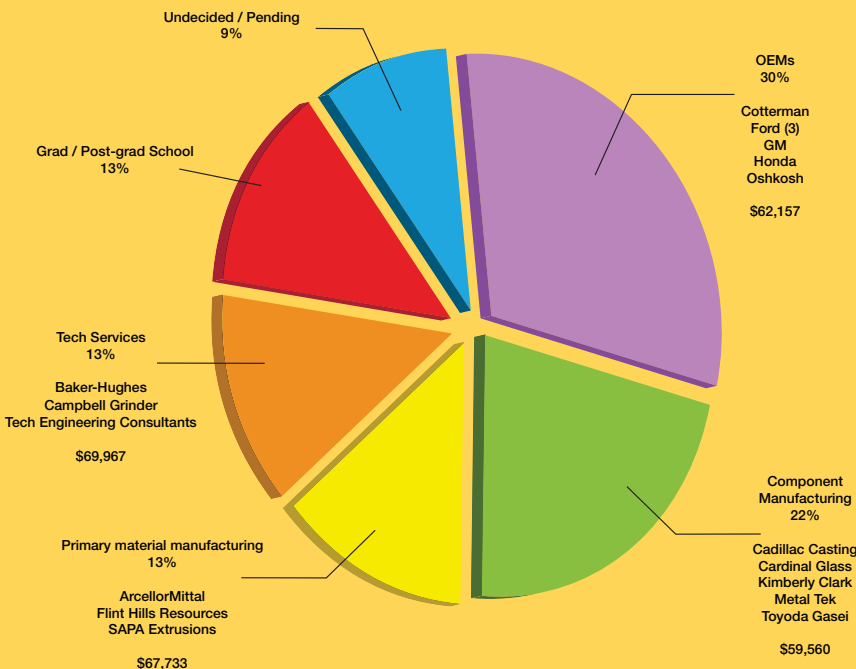


## 2013–14 Placement Stats

260+ companies attended the 2013 Michigan Tech Fall Career Fair

90+ of those companies were looking specifically for MSE students

# Class of 2014 Employment



**90%** of MSE students are employed by commencement day

## General

*U.S. News & World Report* ranked Michigan Tech's PhD in Materials Science and Engineering program as 51st in the nation in March of 2014



**\$2.6M** external research expenditures FY14

## MSE Endowed Scholarships

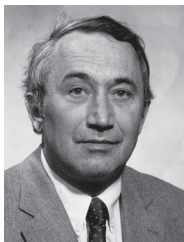
Endowed scholarships are a meaningful way to acknowledge lifetime achievements and the role Michigan Tech has had on one's career, by passing along assistance for the benefit of future students and generations. Endowments can be established to honor alumni, or as a way to remember individuals who helped make the journey possible. Examples of the latter include these five scholarships created for MSE students that celebrate the impact of influential faculty.



### Richard W. Heckel Memorial Scholarship

Initiated in 2013 by a group of MSE alumni, the scholarship honors Professor Richard Heckel, a popular faculty member from the 1970s through his retirement in 1996. Professor Heckel was a teacher of materials science and a dedicated friend and mentor to many students. He taught at Drexel

University and Carnegie Mellon prior to joining Michigan Tech. As a testament to his influence on students, Alpha Sigma Mu (the national honor fraternity for the materials profession) provides a matching contribution to the Michigan Tech recipient of this award.



### Thomas H. Courtney Memorial Scholarship

This endowed scholarship was created by MSE alumni to honor Professor Tom Courtney, an influential faculty member during the late 1970s through the 1990s. The scholarship recognizes students who have demonstrated notable department citizenship, service, and promise as future leaders in the MSE

profession. Courtney was a dedicated educator and scholar, a generous mentor, and a tenacious advocate for students, faculty, the department, and for the materials discipline and engineering profession as a whole. He had a very strong impact, both professionally and personally, on his students and his many colleagues.



### Gary Shannette Endowed Scholarship

Professor Gary Shannette was a member of the Metallurgical Engineering faculty at Michigan Tech from 1968 until his untimely death in 1984. Shannette received his BS in Metallurgical Engineering at Michigan Tech and his MS and PhD degrees from Iowa State University. During his tenure at Tech,

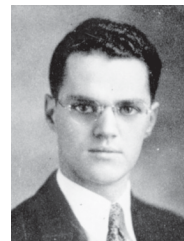
Shannette impacted many students, both by way of his excellent teaching and the sincere and personalized assistance he provided in his role as academic advisor. The Gary W. Shannette Undergraduate Library in the Minerals and Materials Engineering Building was dedicated to Shannette in 1993.



### Gilbert W. Boyd Endowed Scholarship

Gilbert W. Boyd graduated with BS and MS degrees in metallurgy from the University of Detroit in 1929 and 1930, respectively. After working in the automotive industry for several years, he joined the Michigan Tech faculty in 1937, where he remained until his retirement. During his thirty years of teaching

at Tech, he received the Distinguished Teachers Award, was a member and president of the Faculty Association, and served as secretary of the Faculty Senate.



### Corbin T. Eddy Endowed Scholarship

Corbin T. Eddy was department head of the Metallurgy Department from 1940 until his retirement in 1967. He earned his BS, EM, MS, and PhD in metallurgy from the Michigan College of Mining and Technology (presently Michigan Tech). In 1927, Eddy was one of the first two students at Michigan Tech to earn a

Master of Science Degree. In 1934, he was the recipient of one of the first two PhD degrees awarded at Michigan Tech.

For more information about giving to MSE and Michigan Tech, contact MSE Chair Steve Kampe at [kampe@mtu.edu](mailto:kampe@mtu.edu) or Connie Scott in the Office of Development at [cscott@mtu.edu](mailto:cscott@mtu.edu).