

Materials Advantage Student Chapter of Excellence Report



Michigan
Technological
University

Chapter Description:

The student chapter of materials advantage at Michigan Tech focuses on materials engineering outreach and industry engagement opportunities. The chapter works on developing relationships between industry recruiters and students through events throughout the year. Also the chapter works to provide students with information on various career paths. The chapter's mission is "To build experiences in materials science and engineering through hands-on involvement and professional development."

During the 2018-2019 school year the chapter had 18 active members consisting entirely of materials science and engineering majors. During the year there was approximately 45 non-active members that participated in events, these non-active members consist of materials science, mechanical engineers, and mechanical engineering technology majors. The number of events including conferences, career development, service, social, and recruitment held for the school year at 32, which averages 4-5 events per month during the two semesters.

Michigan Tech's Material Advantage student chapter operates as apart of Materials United. Which is a student organization consisting of the student chapters of Materials Advantage and the American Foundry Society. This allows members of either society the opportunity to take advantage of industry connections, outreach, student competitions, and scholarship opportunities.

Officers



John Falecki- Chair



Katie Amar-Fox- Vice Chair



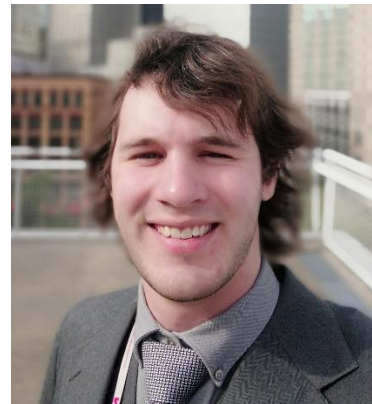
Claudia Smale- Treasurer



Katie Kiser- Secretary



Erin Heidelberg - AFS Chair



Ian Johnson – Social Chair

Programming

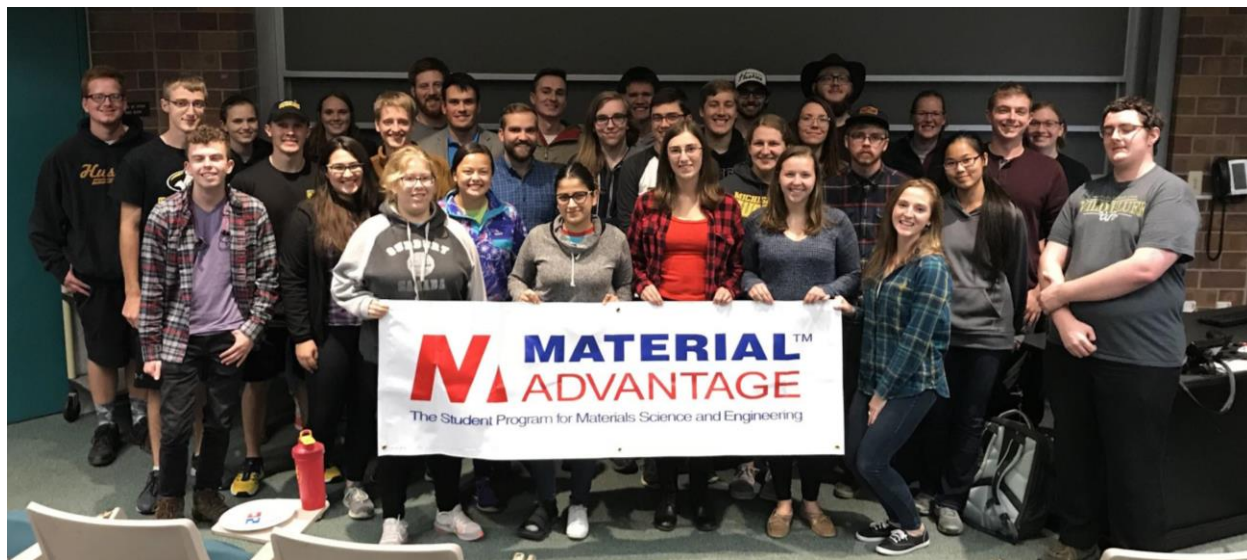
The programs offered by the MTU Materials Advantage in the 2018-2019 school year focused on developing the experience that students had with metal casting design and microstructural analysis. Table 1 details all the chapter activities, attendance of those activities, and a brief description.

Table. 1 Programming activities for 2018-2019 school year

Event	Attendance/Team Size	Description
General Chapter Meetings (7 over the course of two semesters)	20 - 30 students	Chapter meetings that update members on current chapter activities, professional development opportunities, and scholarship opportunities
Bladesmithing Competition	5 students	Forged a Kukri out of 1040 steel with a walnut wood handle in the MTU Foundry.
Domesday Design Competition	5 students	Investment casted an Al dome to enter in the ASM Domesday student competition at MS&T
Wisconsin Regional Casting Competition	5 students	Redesigned aluminum battery case for GM electric vehicles
Saginaw Valley Casting Competition	5 students	Designed a metal cage casting around a copper ball.
Steel Founders Society Axe Casting Competition	6 students	Students designed and sand cast a steel axe.

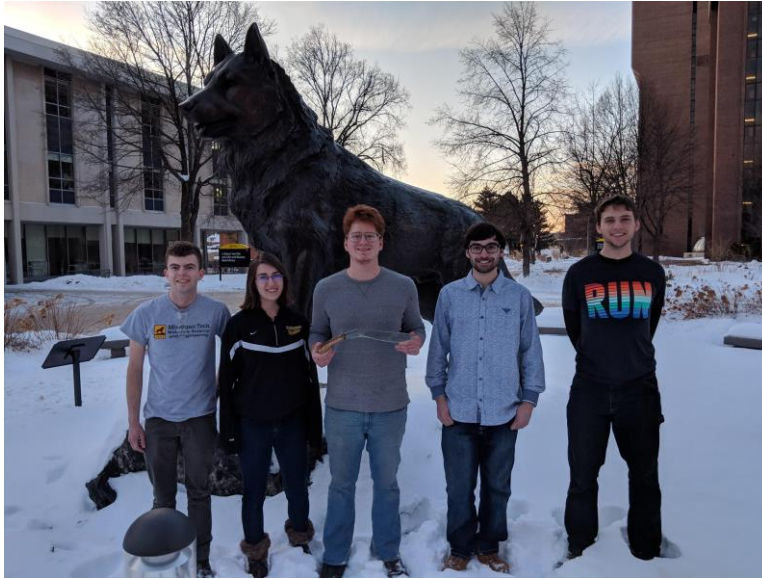
General Chapter Meetings

Chapter meetings were conducted monthly to update chapter members on events, conferences, and scholarship opportunities that are available. Along with updates the meetings are also used as a time for discussion about the future of the chapter and to provide members with a time to socialize with their peers. This year the chapter meetings were also used for an information session from Bemis, a discussion with the Dean of Engineering Janet Callahan, and a platform for executive board elections. Pictured below is the chapter after the first general meeting of the year.



TMS Bladesmithing Competition

This year was the first year that members participated in the TMS Bladesmithing competition. The members chose to forge a kukri out of 1040 steel using equipment in the Michigan Tech foundry. The chapter worked with the blacksmithing guild at Michigan Tech to provide them with a forge on campus while they provided the members with assistance and training to safely start learning to forge. Also, with supervision from foundry staff, the members upgraded the forge to increase the efficiency of future smithing projects. Along with forging the blade, they were tasked with grinding, heat treating, finishing, and wood working the handle. After finishing the dull blade, the member sent the blade along with a video, report, and material characterization data. The picture below is of the team behind the blade with the finished blade in the middle.



Domesday Design Competition

The Michigan Tech MA chapter participated for the second year in the ASM domesday design competition. This year the members attempted to produce an investment cast aluminum A356 dome. The model was created using automated feature analysis, was 3D printed, and was set into a plaster of paris and sand mold. Unfortunately, the team's aluminum dome broke in the finishing process but was able to present a PLA 3D printed dome at MS&T. This project provided a learning experience for the students and granted them the opportunity to work with 3D printing polymers, ceramic molding, and metal casting. Below is pictured some of the team members during the casting of the aluminum dome.



Casting Competitions

Through events ran through AFS, MA student members were involved in three casting design competitions, the Wisconsin Regional Casting Competition, Saginaw Valley Casting Competition, and the Steel Founders Society Axe Casting Competition. For Wisconsin Regional, the objective is to redesign a currently welded part into a casting. The team redesigned an aluminum battery case for a General Motors electric vehicle and cast the part in a green sand mold. For Saginaw Valley the team designed a metal cage casting to encase a copper ball. For the Steel Founders Society, the six student team designed an axe casting and each cast an axe from 5160 steel in chemically bonded sand molds. The best axe of the six was chosen and sent for judging. These projects were opportunities to introduce students to casting and the advantages and challenges that come with the process. Pictured below is the team for the Wisconsin Regional casting competition.



Career Development

The MTU MA chapter continues to have a strong relationship with industry recruiters, and a focus on professional development. These have been reflected in the variety of professional events held in the 2018-2019 school year. Between industry mixers during career fair weeks, resume help sessions, and industry/faculty info sessions, this past year the chapter worked diligently to provide the members with an array of career development opportunities. Table 2 details the career development events held this year.

Table. 2 Career development activities for 2018-2019 school year

Event	Attendance	Description
Bemis Information Session	25 students	Professionals from Bemis were invited to discuss career opportunities for MSE students in polymer packaging
Fall Industry Meet and Greet	13 companies, 40 students	Provided MSE students access to industry recruiting representatives in a mixer format
Spring Industry Meet and Greet	6 companies, 25 students	Provided MSE students access to industry recruiting representatives in a mixer format
Gerdau Resume Help Session Fall	30 students	Resume help session hosted by Gerdau to prepare students for career fair
Gerdau Resume Help Session Spring	6 students	Resume help session hosted by Gerdau to prepare students for career fair
MS&T 2018 Conference Trip	8 students	Organization of student trip to MS&T 2018 and e-board member attendance at annual MA e-board meeting
AISTech 2019 Conference Trip	2 students	Organization of student trip to AISTech 2019
Congressional Visit Day	4 students	Students traveled to Washington DC to meet with congressional staff and discuss the importance of materials science and engineering

Faculty Talk - Dr. Janet Callahan	15 students	Dean of Engineering at MTU Dr. Janet Callahan spoke to the members about her career path after obtaining a PHD in Materials Science and Engineering
-----------------------------------	-------------	--

MSE Meet and Greet (Fall and Spring)

The MSE meet and greet events provide students a relaxed atmosphere with which to engage with recruiters before the university career fair. These events allow students the opportunity to develop a relationship with company recruiters prior to the high stress environment of career fair. With a wide variety of companies attending, this event draws from the polymers, automotive, specialty casting, and foundry industries. The lists of attending companies in the 2018-2019 year are below:

Fall:	Spring:
Surface Combustion	Ford
Ford	Belmark
General Motors	Neenah Enterprises, Inc.
Neenah Enterprises, Inc.	Arconic
Oshkosh	Nucor
Arconic	Philips
Meritor	
Caterpillar	
Nucor	
Norfolk Naval Shipyard	
DTE Energy	
EJ	

Materials Science and Technology 2018

One of the main services the MTU MA chapter leadership provides its members with an annual trip to the MS&T conference. Preparation for this event included communication of expectations, transportation, and housing. Leadership also provided members with the location and time of all MTU graduate student talks to provided support for the fellow students. After the conference the attending member were expected to provide a one slide talk on a topic of their interest at the prior chapter meeting. The executive board also attends the annual MA leadership workshop. Below is a picture of students and with some faculty members that attended.



Congressional Visit Day

Each year the chapter provides the opportunity for the members to attend congressional visit day. This event provides members the opportunity to advocate for STEM funding at the congressional level and learn about how the science and engineering communities are affected by public policy. The chapter provides the attending members with resources for transportation and housing along with the contact information to the lobbyist for Michigan Tech. This year the members were able to meet with both Senator Stabenow, Senator Peters, and Representative Bergman personally along with staffers from Representative Moolenaar's, Representative Mitchell's, and Representative Grothman's office. Pictured below is the members and Representative Bergman after their meeting.



Service

Materials science and engineering outreach to K-12 age-groups, the wider community, and engineering students at MTU is a focus of the MTU MA chapter. These outreach events teach observers about materials engineering principles and processing methods, implementing both the Karl B. Rudman Foundry in a Box (FiaB) and MSE department facilities. The FiaB demonstrates the metal casting process by using the low melting temperature metal tin to cast simple shapes and figures.

Table. 3 Service activities for 2018-2019 school year

Event	Attendance	Description
Materials Science and Engineering Open House	200 MTU engineering students	Organization and demonstration staffing of MSE department open house demos for audience of a variety of engineering backgrounds
STEM Fest	200 children and family members	Demonstration of the metal casting process with FiaB to elementary and middle-school students at university-sponsored STEM night
Materials Day	100 students and community members	Demonstration of the metal casting process with FiaB alongside Waupaca Foundry cupola furnace demonstration
Foundry Fun Day	50 MTU engineering students	Demonstration of the metal casting process in the MTU foundry with green sand aluminum casting

Materials Science and Engineering Open House

The MSE open house remains the MSE major's largest recruitment tool at MTU. This event is organized in coordination with the Engineering Fundamentals department to provide first year engineering students with information about the MSE department. Demonstrations of iron casting university foundry, scanning electron microscopy, 3D printing, bismuth crystallization, and a tour the department facilities was carried out. A liquid nitrogen ice-cream demonstration and tasting session (relating ice-cream to microstructures) tops the event off. The MA chapter at MTU facilitates the event by generating advertising media, organizing volunteers to run demonstrations and direct attendees, as well as coordinating with facility managers for laboratory space use. Pictured below is the liquid nitrogen ice-cream demo and the iron casting demo during the MSE open house.



STEM Fest

STEM Fest draws a wide audience of elementary and middle school students from the western upper peninsula of Michigan. Organized by the university, the MTU MA chapter participated for the third year running, demonstrating the metal casting process with the Karl B. Rudman Foundry in a Box. The young students were able to pack their own sand molds and take home casted tin figures. MA chapter volunteers staffed the FiaB demonstration and discussed materials engineering principles with students during the casting process. A few of the volunteers are featured below with some of the young scientist in training.



Social Activities

Every month the chapter provides at least one social event for the members to be able to develop relationships with their peers and relax. These events include things like board game nights, study breaks, snack shares, and a hike. The highlight of this year's social events was the hockey suite that was a combined event with the Advanced Metalworks Enterprise and the MSE department.

Hockey Suite

The chapter came together with the Advanced Metalworks Enterprise and the MSE department to provide the combined members and faculty with a hockey suite for one of the Michigan Tech hockey games. Hockey is a large part of Michigan Tech student culture and was a great event to bring together students from both organizations and the faculty of the department. The event allowed us to boost school spirit and interact with others that we may not typically see daily. Featured below is our school mascot blizzard in the suite between the period breaks.



Pumpkin Carving

The annual Michigan Tech Materials Advantage pumpkin carving is a must have around Halloween. It is a fun event to celebrate Halloween, be a little creative, and utilize some engineering skills all at the same time. Members are encouraged to make the a creative MSE design and the pumpkins are displayed in the department building for everyone to see. Roughly 10 members attended or stopped by the event. Pictured below is some of the members that came to carve pumpkins with the chapter.



Chapter Management

The MTU MA chapter consistently operates as an independent group, securing funding for events and coordinating with stakeholders in chapter events to ensure facility access, travel arrangements, and volunteer participation. Below is a bulleted list describing the general procedures by which the chapter operates.

Chapter operation:

- General Meetings: Occurred this past year on the second Wednesday of every month and consistently informed members of upcoming events, ongoing events and any upcoming project or scholarship deadlines.
- Elections: Secret ballot elections take place during a general meeting, there must be a quorum of voting members for elections to take place.
- Finances: Treasurer position and keeping ledger
- Recruiting: Social chair responsibilities. Organize and plan the events listed in the recruitment section
- Chapter website: Social chair responsibilities to continually develop and maintain.
- Documentation: Google drive documentation of agendas/meeting notes, event organization documents, design competition documentation, etc.
- Committees: Formed to help keep organization in chapter and accomplish different tasks such as Domesday and Casting competitions

Chapter Transition:

To aid the transition from year to year of a new e-board the following procedures were developed.

- Officer handbooks: Each position on the e-board has its own book detailing responsibilities
- One-on-one meetings between incoming/outgoing officers to answer questions and clarify confusion

Recruitment:

- MSE departmental welcome to freshman: Welcoming first-years to the university and MSE department encouraging them to become MA members. This has become a bigger event in the past year
- K-Day: Student activities fair that happens the first Friday of school. This is the largest recruitment event our chapter participates in.
- Departmental Open House: Put on by MA this is our largest out-reach group and is a open house that all engineering students can attend. This event has been seen to generate new members and make other students decide on majoring in materials science and engineering.