The Program

The “vision” of Western Michigan University’s College of Engineering and Applied Sciences is “to be the college of choice for tomorrow’s engineers through excellence in education, discovery, and service.”

The college strives toward this vision by providing an education that develops career-ready engineering and applied science graduates; students are also exposed to advanced knowledge and innovation through high-quality research and teaching.

Western Michigan offers a superlative student-centered metalcasting experience – the goal is to see students applying practical concepts that will prepare them for a future in the manufacturing industry. In order to apply the concepts that they learn, the program is very hands-on and lab oriented. Students also have many opportunities to participate in research-oriented metalcasting projects.

Students can earn a BS in Manufacturing Engineering, Mechanical Engineering or Industrial Engineering.

The Curriculum

The courses offered at Western Michigan are wide-ranging; they start with the basics and end with the completion of senior projects.

Some of the required courses in the engineering track include: Introduction to Manufacturing; Introduction to Computer-Aided Design; Machining Processes; Properties of Materials; Materials Science for Engineers; Metal Casting Metrology; Fabrication, Assembly and Finishing; and Manufacturing Systems Integration.

Several of the electives that are available to choose from are Die Casting; Mold Design and Construction; Casting Simulation and Solidification; and Manufacturing Productivity Techniques.

Students who graduate from the Western Michigan program find jobs as process engineers, mechanical engineers, manufacturing engineers in the foundry, and melt and mold supervisors – positions that tap into the management responsibilities these students learn about in some of the courses offered.

The Facilities

The lab at WMU is equipped with machinery, tooling, hardware, and software to help students design, produce, and test a wide range of cast metals and cast metal matrix composites. Not only does the lab have equipment for green sand mulling, a continuous mixer for chemically bonded sands, and all major sand testing and analysis machines, students also have access to software for gating design, risering systems, and solidification analysis.

Other equipment that is available to the students includes: shell molding, no-bake core making, evaporative pattern casting, optical pyrometer, and gas/crucible melting. They can produce low pressure die castings, high pressure die castings, and investment castings as well.

This fully-equipped, integrated system allows for the design and manufacture of castings all within a university setting.
The Professor

Sam Ramrattan received his BS in Manufacturing Engineering and his MS in Management Technology from the University of Wisconsin. He then earned his PhD in Industrial Technology and his Post Doc in Plastic and Composite Engineering from Iowa State University. Sam has received several awards including the Ray H. Witt Management Award in 2000, the Outstanding Teaching Award College of Engineering WMU in 2007, and the AFS Scientific Merit Award in 2009. Sam was also awarded the FEF/AFS Distinguished Professor Award in 2004.

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The Students

Processes and experiences that are available to the students are:

- **Molding:** Green Sand, Chemically Bonded, Permanent Mold, Investment Casting, Die Casting, Lost Foam, and 3D Light Cured Sand
- **Metals:** Aluminum, Iron, Steel, Copper Base, and Zinc
- **Core Making, Pattern Making, Casting Simulation, and Rapid Casting Technology**
- **Processes:** Machining, Heat Treating, Metallography, Mechanical Testing, Metrology, and Fabrication

Western Michigan students spend many hours participating in outside-the-classroom activities. Foundry tours are scheduled throughout the school year and are a part of the metalcasting courses. These tours provide students the opportunity to network with industry people and see the concepts that they are learning being used in the real world. Local AFS Chapter meetings also provide networking opportunities – there are five chapters within driving distance of the school. Senior projects (which are typically industry-sponsored), casting competitions, and Passport Day (middle school through high school students visiting campus) are other opportunities that allow WMU students to sharpen their casting skills. One of the outreach highlights at Western Michigan is hosting the annual Summer Short Course. This is an opportunity for high school students to spend five days on campus learning about and doing casting. In all of these activities, the engineering students at Western Michigan are able to help others learn about casting as well as deepening their knowledge and experiences in the industry.

Over the past four years, 26 FEF registered students have taken a job in metalcasting or related industry, and 8 students have participated in internships and/or co-ops in metalcasting or related industry in the past two years.