

COLLEGE OF
ENGINEERING

Department of Mechanical Engineering
Michigan State University
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East Lansing, MI 48824-1226

mechanical
engineering



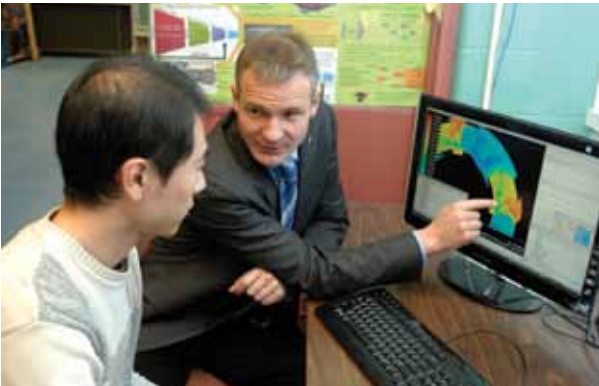
AT A GLANCE
2010

MICHIGAN STATE
UNIVERSITY

MECHANICAL ENGINEERING

The Department of Mechanical Engineering is the oldest department in the College of Engineering. It was established in 1885, prior to the formal establishment of the college. We have the largest undergraduate program in the College of Engineering.

Mechanical engineers have been very successful in the job market, following exciting careers in the automotive, aerospace, manufacturing, design and construction, and paper and plastics industries, as well as medicine, product design, and law.



Norbert Müller, associate professor, collaborates with one of his doctoral students on computer simulations.

Through the design/manufacturing core program, consisting of four required courses, students gain in-depth knowledge of the field of mechanical engineering and what it takes to be an engineer in the real world. This experience within the design/build/test atmosphere culminates in a capstone design course. Students in this course utilize all the skills taught in the mechanical engineering program to address real-world problems posed by industrial representatives, propose possible solutions to a problem, and focus on the best solution to build and test. Industrial sponsors continue to support this program because of its positive impact on their operations.

The design, build, and test approach in the department has been critical in advancing our American Society of Mechanical Engineers student chapter to 6 consecutive wins in regional competition, 1st-place finishes in 12 out of the past 16 regionals, and 1st-place, 4th-place, and 6th-place finishes in world competitions.

UNDERGRADUATE PROGRAM

Undergraduate students are an essential part of a stimulating learning community that enjoys up-to-date equipment and facilities.

The Department of Mechanical Engineering's program provides:

- A math-science base
- An integrated design/manufacturing core
- An integrated communication program
- Global engineering education

The key elements of the program incorporate:

- Multidisciplinary, open-ended design problems
- Real-world experiences and practical problem solving
- Design/build/test experience—teamwork

GRADUATE PROGRAM

Graduate students can expect a high-quality education built on our excellent faculty. Typically, 33 senior-level and 28 graduate-level courses are offered by the department. Our graduate students also benefit from research grants from industry and government as they work with the faculty.

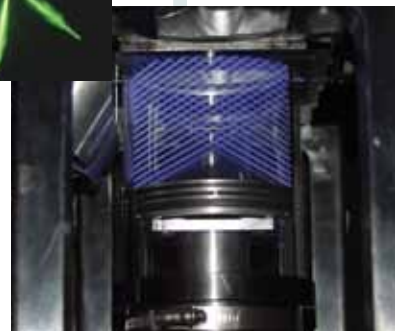
The department in 2009/2010 provided teaching assistantship support totaling over \$465,000; and research assistantship support from external grants totaling almost \$1.2 million.



Ross Weaver, ME senior and captain of the football team.



Left: High-speed, visible images are used to study fuel sprays.
Below: Molecular Tagging Velocimetry (MTV) is used to study in-cylinder gas motion.



FACULTY AND STAFF

The Department of Mechanical Engineering is composed of 37 faculty and 26 academic specialists, research associates, and support staff.

Faculty achievements:

- 20 are fellows of professional societies, including 3 who are fellows of at least 2 societies.
- 4 are high-level officers of international societies.
- 4 are University Distinguished Professors.
- Faculty and staff published over 100 journal articles and over 100 conference papers last year.

RESEARCH

We have seen a strong increase in research activity over the last several years. Accompanying the increase in research expenditures, the department has grown in the number of supported graduate students, the number of publications, and the availability of state-of-the-art laboratory equipment. Our research encompasses the core disciplines of fluid mechanics, heat transfer, engineering mechanics, system dynamics, controls, and vibrations.

Research centers in the Department of Mechanical Engineering include:

- Automotive Research Experiment Station and Energy & Automotive Research Laboratories
- Composite Vehicle Research Center
- Collaborative Center of Excellence in Aeronautical Sciences
- Industry/University Cooperative Research Center on Advanced Cutting Tool Technology
- Industry/University Cooperative Research Center on Multiphase Transport Phenomenon

Current research labs include:

- Advanced Manufacturing Research Laboratory
- Automotive Controls Laboratory
- Biomechanical Design Research Laboratory

- Cardiovascular and Tissue Mechanics Research Laboratory
- Combustion Laboratory
- Computational Design and Manufacturing Laboratory
- Computational Fluid Dynamics Laboratory
- Controls Research Laboratory
- Laser Diagnostics for Energy and Environment Laboratory
- Nonlinear Solid Mechanics Group
- Optical Diagnostics Laboratory for Spray and Flow Characteristics
- Optical Measurements Laboratory
- Orthopaedic Biomechanics Laboratory
- Thermal Engineering Laboratory
- Turbomachinery Laboratory
- Turbulent Mixing and Unsteady Aerodynamics Laboratory
- Turbulent Shear Flow Laboratory
- Vibrations Research Laboratory

RESEARCH PARTNERS

The Department of Mechanical Engineering focuses on the importance of engineers in the real world. Collaboration with strategic partners on a wide range of issues such as recruitment, curriculum development, internships, and research provides students with a real-world perspective.

Some of our research partners include:

- Air Force Office of Scientific Research
- Alcoa
- Army Research Office
- Chrysler
- DIFTI
- Ford Motor Company
- General Electric
- General Motors Corporation
- KI-TECH
- NASA
- National Science Foundation
- Office of Naval Research
- USDA
- Valeo

PROGRAM HIGHLIGHTS

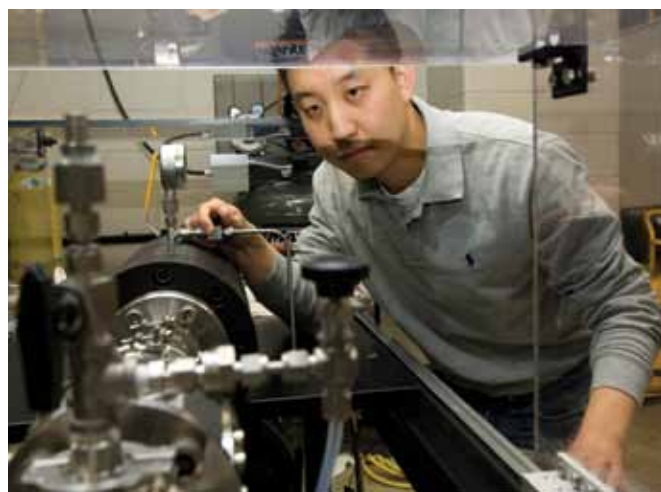
- ABET-accredited instruction is provided in design and manufacturing, dynamics and controls, mechanics and materials, thermo fluids, laboratory, and communication courses, as well as in math, science, and humanities.
- The average starting salary for recent graduates was \$56,500.
- Study abroad programs include Aachen, Germany; Seoul, Korea; Lyon, France; Edinburgh, UK; and Taipei, Taiwan.
- Mechanical engineering majors represent 30% of the College of Engineering's co-op participants.
- The department has a strong communication program that incorporates writing/speaking activities in all required courses.
- The department is a charter member of the PACE program (Partners for the Advancement of CAD/CAM/CAE Education).
- The department continually assesses its educational program through the ME Undergraduate Continuous Quality Improvement Program.
- Faculty provide opportunities for undergraduate involvement in research.
- The department awarded \$120,000 in undergraduate scholarships in 2009.
- Department faculty members are active in a wide range of research.



Baja racing

NUMBERS AT A GLANCE

Faculty	37
Undergraduates	671
Graduate Students	
MS	70
PhD	82
Degrees awarded	
BS	128
MS	31
PhD	17
Grants in force	117
Research expenditures	\$8,311,000
Patents awarded	3



Professor Tonghun Lee works on a rapid compression machine to study combustion of next generation biofuels.

FOR MORE INFORMATION

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