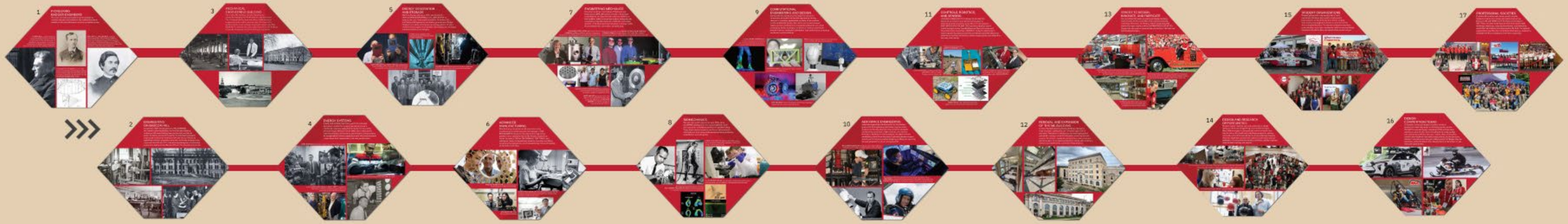
150+ YEARS | Department of Mechanical Engineering
UNIVERSITY OF WISCONSIN-MADISON



A detailed look at the ME150 History Wall installed in November 2025.

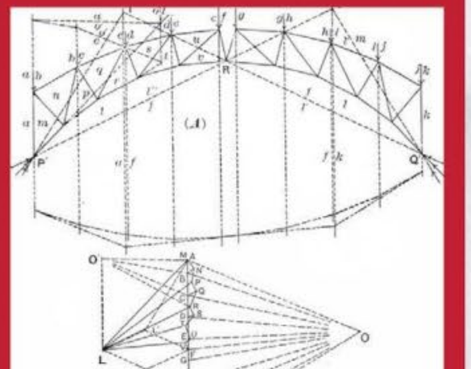
1

PIONEERING BADGER ENGINEERS

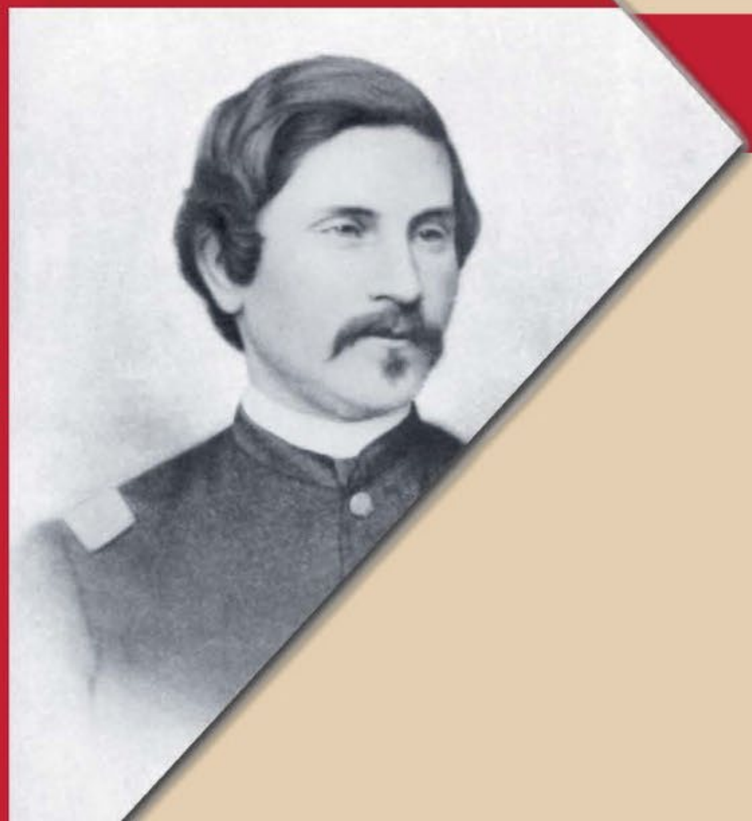
The roots of mechanical engineering were shaped by visionary educators and engineers who combined academic excellence with a broad range of interests and public service.

STORM BULL, a native of Norway, joined UW–Madison in 1879 as Professor of Mechanical and Steam Engineering. He established a rigorous hands-on curriculum, contributed to the design of the campus power plant, and later served as the 33rd Mayor of Madison.

LEANDER M. HOSKINS (C.E., M.S. 1885) became an engineering instructor after completing his M.S. degree in 1885. He wrote influential texts in mechanics, hydraulics, and geophysics, including **The Elements of Graphic Statics** in 1892.



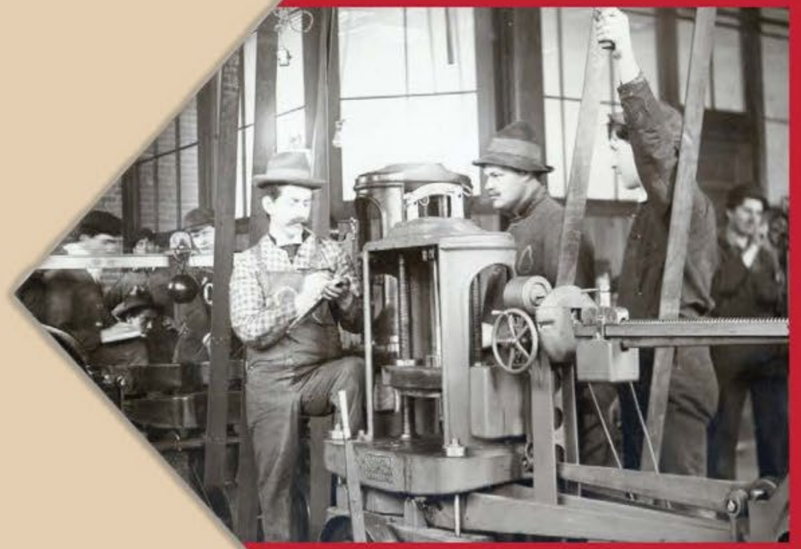
WILLIAM J.L. NICODEMUS, a Civil War veteran, joined UW in 1870 as Professor of Military Science and Civil Engineering, and then became the first Professor of Mechanical Engineering in 1875. He reorganized the engineering curriculum, led military drills, and helped create atlas maps of Wisconsin.

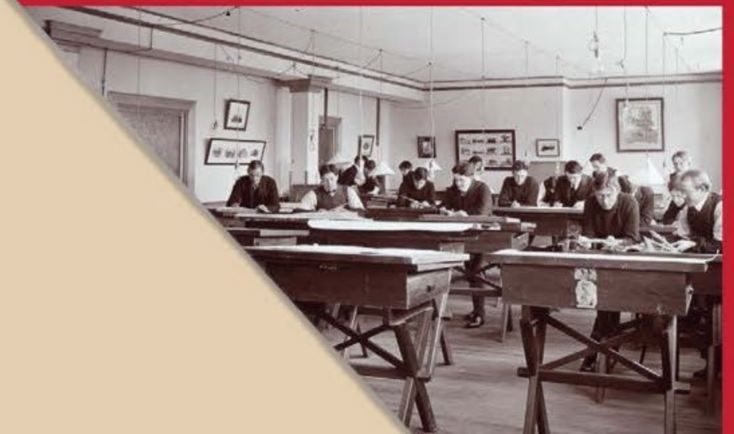


2

ENGINEERING ON BASCOM HILL

Completed in 1900 and designed by J.T.W. JENNINGS, the original Engineering Building (now the Education Building) on Bascom Hill housed drafting rooms, lecture halls, and labs for steam, mechanics, and electrical testing. The educational programs emphasized fundamental training in math and theory, followed by applied specialization, progressive shop work, and foreign language study. It was here that BEN ELLIOTT conducted pioneering work in automotive engineering, leading to his influential 1915 text *The Gasoline Automobile*.

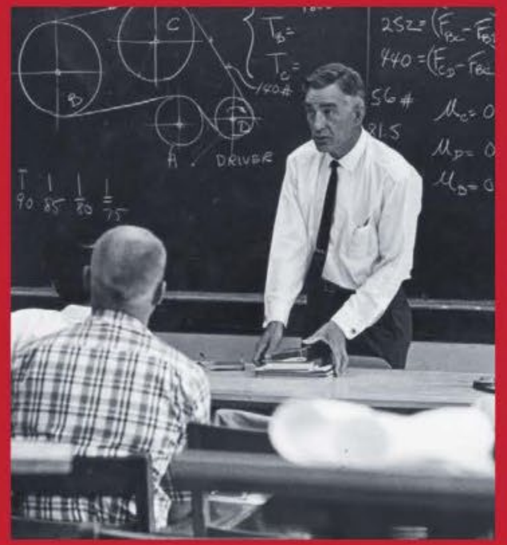




3

MECHANICAL ENGINEERING BUILDING

The original ME Building, an Italian Renaissance architectural design by ARTHUR PEABODY, opened in 1930. The U-shaped building featured sliding chalkboards and wrapped around a central machine shop (the Sawtooth), symbolizing the union of theory and hands-on learning. After World War II, Quonset huts were added west of the ME Building to provide 'temporary' space for the surge in students.



4

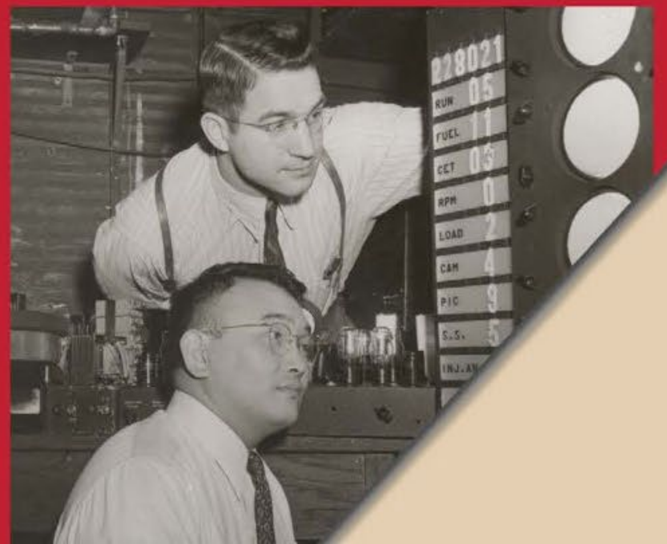
ENERGY SYSTEMS

In 1946, PHIL MYERS (NAE 2017) and OTTO UYEHARA developed a method to measure gas temperatures in combustion cylinders, laying the foundation for the world-renowned Engine Research Center (ERC) that is dedicated to improving efficiency, performance, and emissions. Energy systems for transportation remains a strategic priority with current research in low carbon fuels, hybridization, fuel cells, and batteries.

GARY BORMAN, ERC Director (1986-1994) and NAE (1990) member.

Battery Materials for Energy and Sustainability, ERIC KAZYAK Lab, 2023.

In 2011, SAGE KOKJOHN and ROLF REITZ introduced Reactivity Controlled Compression Ignition (RCCI) to enable cleaner, more efficient combustion.



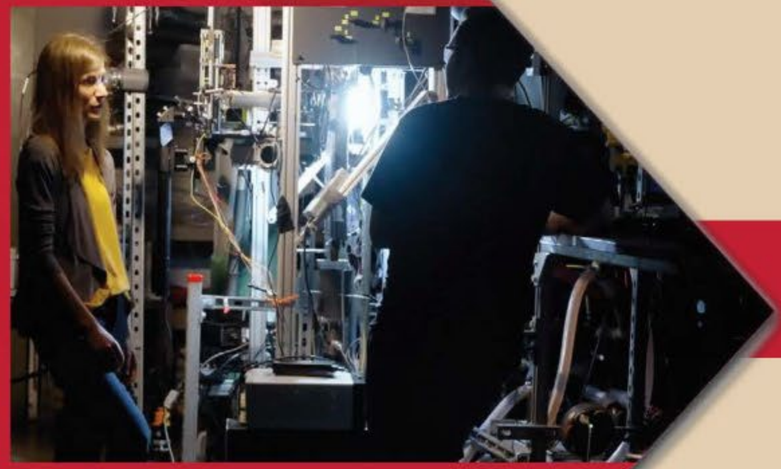
5

ENERGY GENERATION AND STORAGE

The Solar Energy Laboratory (SEL) was founded in 1954 by FARRINGTON DANIELS and JOHN DUFFIE to advance the use of solar power worldwide. Since then, SEL and Mechanical Engineering have trained generations of Badger Engineers to sustain and improve our energy systems. Current research drives progress in renewables, thermohydraulics, hydrogen, and electrochemical technologies.

SANFORD KLEIN and GREG NELLIS introduced Heat Transfer (2008) and Thermodynamics (2011) texts that have been adopted across engineering programs worldwide.

A TRIGA reactor installed in 1960 launched teaching and research activities in nuclear engineering.



ALLISON MAHVI's Lab for Energy Transport and Storage (LET+S) is advancing thermal energy storage technologies.

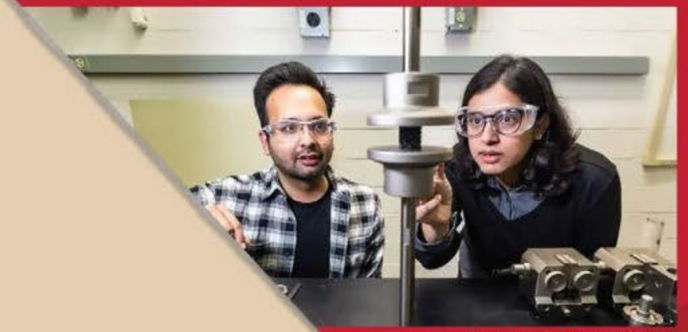
6

ADVANCED MANUFACTURING

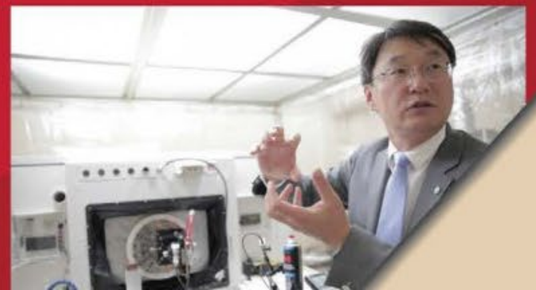
Manufacturing innovation at UW spans from early machine shops to modern precision technologies. In 1946, RON DAGGETT introduced the nation's first engineering plastics course, paving the way for the Polymer Engineering Center, founded in 2001 by TIM OSSWALD, TOM TURNG, and colleagues. Today, the department advances innovation in additive manufacturing, biopolymers, smart manufacturing, friction stir welding, and precision machining.

PAVANA PRABHAKAR, 2024, Mechanics and Manufacturing of Architected Composites.

SHIEN-MING (SAM) WU (PhD ME '62; ME faculty 1962–86) introduced statistical methods that transformed manufacturing automation, quality, and precision.



SANGKEE MIN, 2016, Ultra-precision machining.



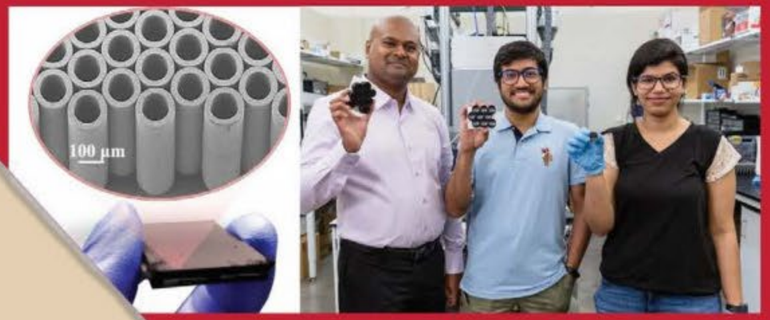
7

ENGINEERING MECHANICS

Since the founding of the College of Mechanics and Engineering in 1896, UW has been a leader in theoretical, computational, and experimental mechanics. Building on this tradition, today's researchers explore metamaterials, composites, molecular dynamics, vibrations, and cellular systems. Their discoveries fuel advances in energy, health, structural resilience, and modern manufacturing.

ROXANNE ENGELSTAD (ME Chair '07-13) and EDWARD LOVELL (EM Chair '92-95) investigated the mechanics of X-ray lithography for semiconductor fabrication, 2003.

Engineering mechanics faculty WENDY CRONE, ROB CARPICK and ROD LAKES in the optics section of the Lakes lab (c. 2000s), where seminal research in viscoelasticity and metamaterials was conducted.



RAMATHASAN THEVAMARAN's group developed carbon nanotube foams with exceptional energy absorption, suitable for helmet liners, 2022.

KURT WENDT (ME faculty '36–53, CoE Dean '53–71) contributed to a decades- long concrete durability study with GEORGE WASHA, the first PhD graduate of Engineering Mechanics (1938).

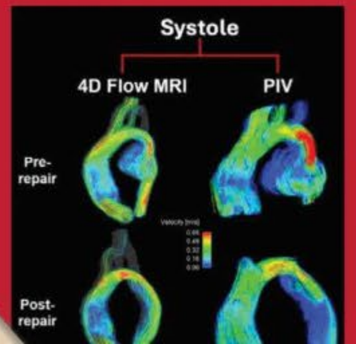
BIOMECHANICS

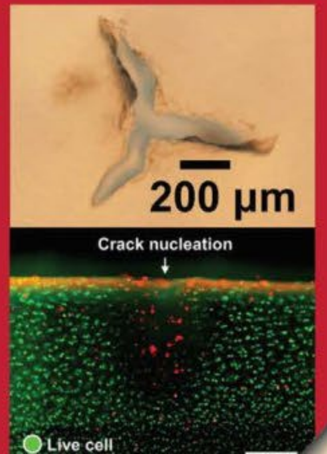
Biomechanics in ME began in the early 1970s, when ALI SEIREG developed the first musculoskeletal model and a computer-controlled exoskeleton for assisted walking. Today, biomechanics remains a core focus, with research in cell mechanics, brain injury, cardiovascular systems, prosthetics, rehabilitation, and orthopedics.

CHRISTIAN FRANCK leads the PANTHER program, which uses cellular experiments, mechanics, sensors, and models to prevent brain injuries.

The CORINNE HENAK Lab translates orthopedic biomechanics and mechanobiology into new insights for cartilage regeneration and repair.

The Cardiovascular Fluid Dynamics Lab led by ALEJANDRO ROLDÁN-ALZATE uses imaging and CFD to investigate cardiovascular diseases and treatments.



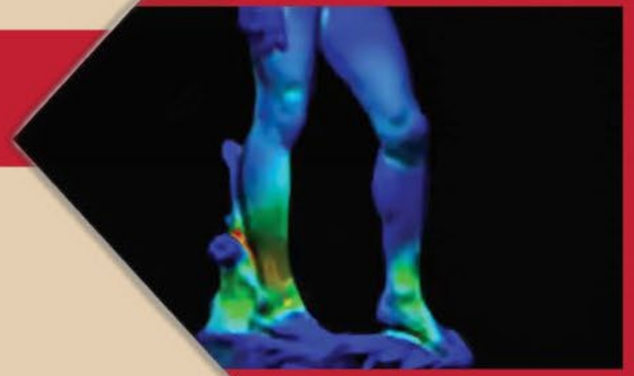


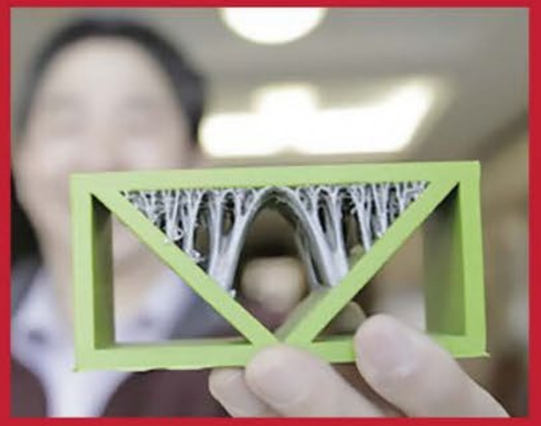
9

COMPUTATIONAL ENGINEERING AND DESIGN

Computational engineering and design has become a cornerstone of modern mechanical engineering, driving advances in simulation, optimization, and data-driven methods. JOHN UICKER (ME faculty 1967–2007) was an early pioneer, making seminal contributions to computational dynamics and virtual prototyping. Today, that legacy continues in research spanning AI, machine learning, topological optimization, high-performance computing, and human-centered design.

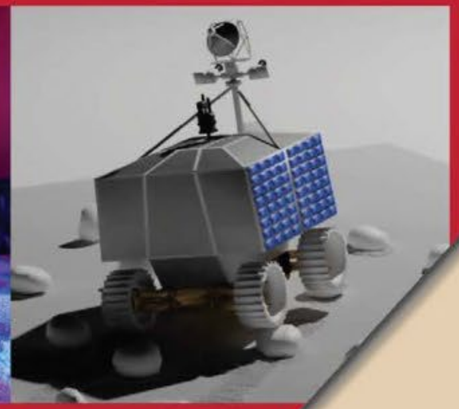
In 2008, VADIM SHAPIRO and his teams introduced a scan and solve approach that could identify weak spots in structures such as Michelangelo's David statue.





XIAOPING QIAN uses topology optimization to improve structural support in 3D printing.

YING LI applies molecular dynamics and data-driven models to design high-performance polymers.



DAN NEGRUT'S lab harnesses high-performance computing to

AEROSPACE ENGINEERING

Aerospace engineering and astronautics at UW–Madison grew out of the Engineering Mechanics program, where students and faculty advanced core mechanics alongside aerodynamics, propulsion, flight controls, and celestial mechanics. Building on this foundation, the department is establishing a stand-alone Aerospace Engineering degree program as the home for future innovators designing, building, and operating the next generation of aircraft and spacecraft.

RICCARDO BONAZZA developed a shock tube facility that enables research on high-speed gas dynamics and combustion.

The Engineering Mechanics program launched aerospace leaders such as JIM LOVELL (student '46–48; honorary degree '95), Apollo 13 commander, and BREWSTER SHAW (BS '68, MS '69), veteran of three space-shuttle missions.

11

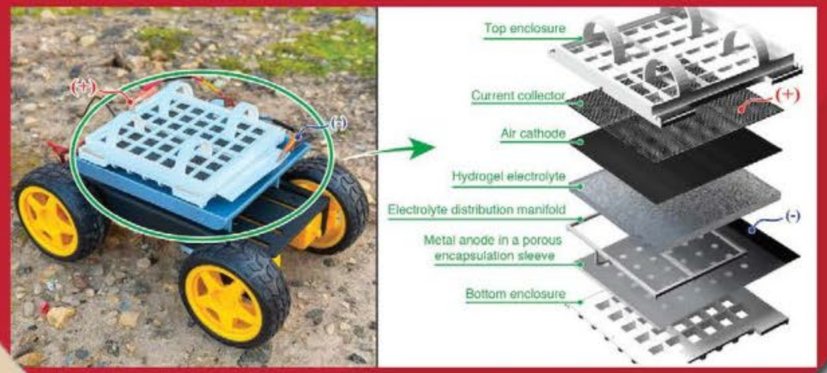
CONTROLS, ROBOTICS, AND SENSING

JOHN BOLLINGER (PhD '61, CoE Dean '81–99, NAE '83) advanced automation and manufacturing systems that transformed companies across Wisconsin and beyond. BOB LORENZ (PhD '84, NAE 2019) pioneered physics-based control strategies and co-founded Wisconsin Electric Machines and Power Electronics Consortium (WEMPEC). Today, the department's research pushes boundaries in precision mechatronics, printable electronics, autonomous systems, microbotics, robotic energy sources, and robots that can swim, walk, and fly.

Continuing WEMPEC's tradition of innovation, LEI ZHOU leads the Precision Mechatronics and Controls Lab.

Printing the future of soil sensing, JOSEPH ANDREWS' Lab, 2024.

Thanks to the generous support of ME alumni, the Bollinger Chair was established in 2019, with inaugural holder JAAL GHANDHI.



JAMES PIKUL's lab is developing new battery systems to enable robots to work longer and do more.

RENEWAL AND EXPANSION OF THE ME BUILDING

In 2007, the Mechanical Engineering Building underwent a major expansion, adding more than 270,000 square feet of new space. The historic U-shaped structure was largely gutted and rebuilt, creating a modern facility while preserving its iconic exterior. At its heart, a spacious central atrium now serves as a gathering place to recognize graduations, scholarship recipients, research accomplishments, and senior design projects.

SPACES TO DESIGN, INNOVATE, AND FABRICATE

Our commitment to hands-on learning and design continues today in state-of-the-art facilities that enable prototyping, machining, fabrication, and testing. These include dedicated labs for first-year students and the BJORN BORGEN (BS ME '62) Design Lab, where senior capstone teams brainstorm, fabricate, and test design prototypes.

The Phil Myers Automotive Center supports student teams building vehicles for Formula, Baja, autonomous, and clean snowmobile competitions. It also houses the Bucky Wagon, restored and electrified by GLENN BOWER in 2009.

The Grainger Design and Innovation Lab features a full machine shop with mills, lathes, CNC, and welding stations, equipping students to manufacture precision prototypes using industry-grade tools.

The Makerspace in Wendt Commons serves as a student-led hub for 3D printing, rapid prototyping and interdisciplinary design.

DESIGN AND RESEARCH OPPORTUNITIES

Students explore creativity, teamwork, and hands-on design during an introductory engineering course in their first year. Many will then engage in undergraduate research in world-class labs. As seniors, they tackle real-world design projects for industry, community, and entrepreneurial clients. An annual design showcase allows the students to present their solutions and creative physical prototypes. These experiences develop confident, capable engineers ready to lead in industry and beyond.

First year projects in Intro to Aerospace Engineering and Intro to Mechanical Engineering.

A team demos their design to test Medtronic's neurosurgical tracker accuracy.

An automated pendulum will demo vibration modes in the Physics Dept.

STUDENT ORGANIZATIONS

Student groups turn a big campus into a close community. Members plan events, mentor peers, lead outreach, and build things that matter, ranging from makerspace projects to demos at outreach events such as Engineering Expo. The experience sharpens teamwork, communication, and project management while connecting Badger Engineers with alumni, labs, and opportunities across campus.

DESIGN COMPETITION TEAMS

Competition teams give Badger Engineers hands-on experience in leadership, design, and building complex systems. The SAE Formula team began competing in 1998, and have been joined by an array of other teams including those designing Baja cars, autonomous vehicles, solar cars, rockets, clean snowmobiles, remote control airplanes, renewable energy systems, and human power vehicles. These teams have become a defining part of the Badger Engineer experience, with participation often opening doors to internships, co-ops, and career opportunities.

PROFESSIONAL SOCIETIES

Professional societies make career growth tangible. Students chapters of professional societies have a long history at UW, with ASME and Pi Tau Sigma started back in 1915. These and other student groups host industry talks, skills workshops, plant tours, research presentations, and networking events that link students to professionals in the field. The national organizations also often host competitions that allow our students to compete with their counterparts from other universities.

View the ME150 History Wall in-person near the South Entrance of the Mechanical Engineering Building at 1513 University Ave. Madison, WI.

View the digital Prezi tour here.

Find everything on the ME150 website.