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ME-EM 2010 Annual Report

Department of Mechanical Engineering-Engineering Mechanics, Michigan Technological University

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MEE-EM

MECHANICAL ENGINEERING — ENGINEERING MECHANICS


MichiganTech

10

HUSKIES

2010 ANNUAL REPORT
First Year to First Career

MichiganTech



Welcome

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On the Cover

Seth Taylor and Colleen Sharpe display their projects for EcoCAR Enterprise and Senior Capstone Design. The Hybrid MTU EcoCAR and LenMed Thermal Cycling Medical Device were engineered by student teams with oversight by faculty, staff, and industry sponsors.



Welcome to the 2010 Annual Report of the Department of Mechanical Engineering-Engineering Mechanics at Michigan Technological University. In this year's report we highlight the unique aspects of our undergraduate program that differentiate it from other nationally-ranked programs: our state-of-the-art laboratories, Enterprise program, and industry-sponsored Senior Capstone Design projects, funded at an average of \$15,000 each. We highlight these attributes through the undergraduate journeys of Colleen Sharpe and Seth Taylor, two recent graduates. Both secured excellent positions

in industry, highlighting the fact that our graduates remain in high demand, with placement of 92 percent, averaged over the past four years.

It is my privilege to serve the dedicated faculty and staff who foster the leadership and engineering accomplishments of students like Seth and Colleen. Their commitment to guide our students through these experiences has elevated our program to a ranking of twenty-two by *U.S. News & World Report*.

As the global economy continues to evolve and respond to the dynamics of energy and fuel costs, our graduates in industry and academia continue to demonstrate leadership, for example, in heading up GM's hybrid Volt program (see page 21). We are grateful that our alumni support remains strong, including this year's endowment of three faculty (see pages 18-19).

I am pleased to report that our graduate programs are likewise setting high standards and growing steadily with our increasing research expenditures. As demand increases for our MS and PhD programs, we have begun a very gradual expansion of our highly selective graduate distance learning program (see page 34.) The overall growth of our graduate programs has been driven by our faculty, who have secured very substantial research projects in advanced hybrid propulsion, wind energy (see page 20), biomechanics, fuel cells, microfluidics, and multiscale modeling and sensors.

This year we have also expanded our use of video to augment the comments here and the stories of our students. I invite you to visit www.me.mtu.edu/video to hear firsthand how our students meet the challenges of our program with the outstanding support of our faculty and staff.

William W. Predebon

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Professor and Department Chair
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ME-EM Research Involves All Levels of Our Educational Mission

The National Science Foundation ranked the ME-EM department 18th in research expenditures among all mechanical engineering departments in the US for fiscal year 2008, the most recent year available. Research in the ME-EM department is carried out by faculty, staff, and students of both undergraduate and graduate levels.

ADVANCING WITH RESEARCH GROUPS

Having completed our transition to formalized research groups in the fall of 2010, we are pleased to report that this approach has led to continued growth in research expenditures. By providing this matrix structure, our faculty have continued to secure grants and extensive industry research projects.

We are pleased to add two new faculty this year: Dr. Seung Hyun Kim will continue his research in combustion and other energy-related phenomena with the Advanced Power Systems group. Dr. Kazuya Tajiri joins us from Argonne National Laboratory and focuses his research on multi-phase, multi-scale systems including fuel cells (see page 22).

As our faculty begin to optimize their collaboration under this new structure, we anticipate continued growth in the quantity of our grant proposal submissions and overall research expenditures.

Mission

Prepare engineering students for successful careers

Vision

Be a nationally recognized mechanical engineering department that attracts, rewards, and retains outstanding students, faculty, and staff—be a department of choice nationally

RESEARCH GROUP DIRECTORS

Dr. Craig R. Friedrich

Multiscale Sensors & Systems

Dr. L. Brad King

Space Systems

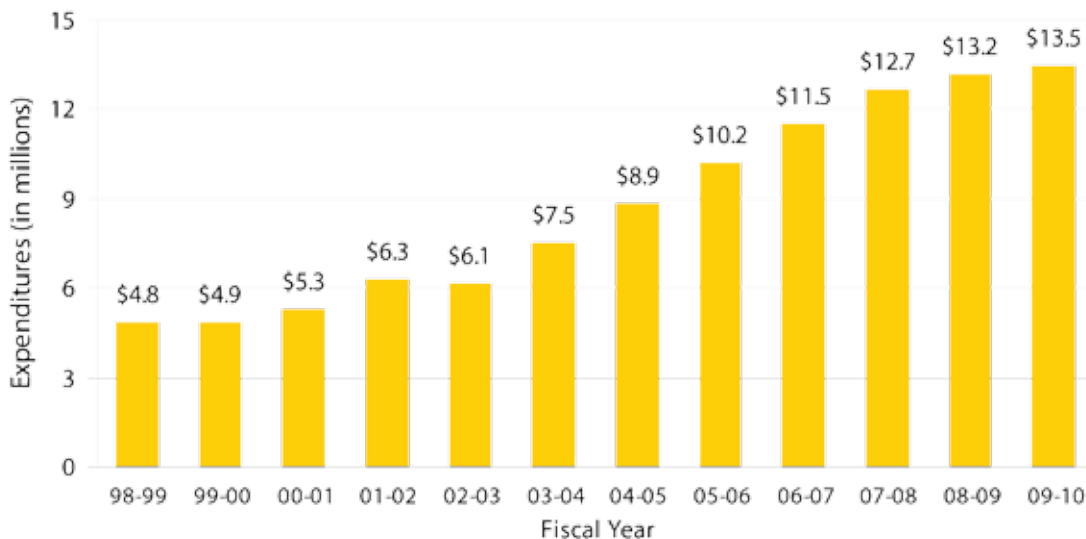
Dr. Jeffrey D. Naber

Advanced Power Systems

Dr. Sheryl A. Sorby

Engineering Education Innovation

Research Expenditures



A balance of single investigator and multidisciplinary research programs with government and industry has fueled the steady growth of our research expenditures.

22

The national ranking of the Michigan Tech ME undergraduate program by *U.S. News & World Report* in 2008



Seth pursuing northern pike near campus on the Portage Waterway.



SETH TAYLOR

The path to engineering for Seth Taylor was rooted in his natural curiosity and nurtured through family traditions. Raised in Lapeer, a rural town in Michigan, he practiced the intense observation and concentration required to become a marksman and angler. Seth's hunting practice honed his visual acuity and fishing, his patience. But his love for learning reached far beyond the outdoors. "Even as a child, I found that everything around me held a secret. It was the secret of how it worked and how it was made," he says. This thirst for understanding led him to pry apart the objects around him, pursuing the knowledge inherent in their design. After dissecting toys and the occasional household

appliance, the garage became his teenage classroom, the repair manual his text, and the car an uncanny instructor: its endless needs defined the syllabus.

Engineering was the natural career direction for Seth, and he characteristically met the question of where to study through direct observation. "We visited many top universities, but none of them seemed to have character. When we drove into Houghton, it was like arriving at a cool ski resort town, and Michigan Tech had the best labs and facilities." Seth would not leave behind his family traditions as he pursued knowledge in these labs: along Tech's waterfront campus he would pursue bass, walleye, and, his favorite quarry, the northern pike.

Firsthand Learning: The ME-EM Undergraduate Experience

Colleen Sharpe and Seth Taylor both completed BSME degrees in December 2010. Their journeys represent the two main paths offered to ME students at Michigan Tech: the standard program culminating in Senior Capstone Design and the Enterprise Program. We follow both students through their undergraduate journeys, with Colleen choosing the Senior Capstone route and Seth following the multi-year Enterprise path. The robust challenges they overcame through teamwork, determination, and support from ME-EM faculty and staff convey what is unique about the Michigan Tech experience. Feedback from industry tells us that our graduates are productive from day one, and they do not fear the front-line challenge. Seth and Colleen show us how these traits are fostered at Michigan Tech.



Colleen on the Tech Trails, Michigan Tech's celebrated multi-use trail network.



COLLEEN SHARPE

As a young person, Colleen called the world her home. Her parents are both Michigan Tech graduates who work in the petroleum industry, so Colleen lived in Brunei and the Netherlands, as well as the US. However, she had

not been to northern Michigan until she visited campus. She admits being influenced by her mountain bike test ride on the Tech Trails, Michigan Tech's multi-use trail network. "It was so amazing that I just kept riding the whole day, and I was pretty sore by the end of it," she says.

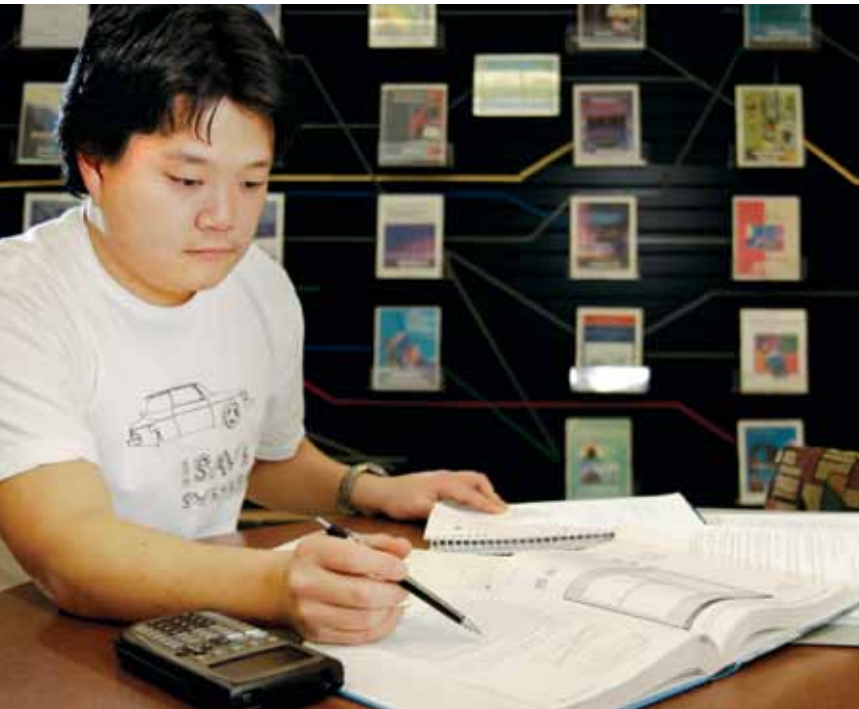
The environment was only one aspect of Colleen's decision to attend Michigan Tech. As a youth, she enjoyed working through complex systems and uncovering hidden relationships. These skills would be honed through her coursework and thoroughly tested in her Senior Capstone Design project.

Grinning through the pain after her test ride on the Tech Trails, she could not imagine the challenge she would meet as a senior on campus: to design and build a medical device that accelerates healing. Through the physical suffering caused by mountain bike crashes, she would discover what engineering can mean—to directly impact the well-being of people. For Colleen, this would mean testing the medical device on her own injuries.



Watch Colleen talk about Michigan Tech in her own words:
www.me.mtu.edu/video

Setting the Foundation for Success



Seth prepares for his classes in the Engineering Learning Center.

FIRST YEAR & FIRST CO-OP

Transitioning to campus from home can be a challenge, and Seth experienced it along several dimensions. “Walking through the labs and facilities like the Product Realization Center, I realized I had three machine shops at my disposal for project work. I was like a kid in a candy shop,” he says. Although he did not struggle academically, at first he found living with three other students in a single dorm room a bit daunting. “It ended up being like any other challenge. You have your moments, you work through it, and you move on, one day at a time.”

Seth’s drive to learn and experience engineering firsthand led him to request early entry to the Enterprise program. “I had seen it on my campus tour and knew it was right for me. Normally it begins in year two, but they recognized my motivation and allowed me to enroll,” he says. His practical knowledge enabled him to contribute immediately to the Mini-Baja Enterprise team.

The involvement in Enterprise made him a standout for co-op interviews, and Seth secured a six-month manufacturing position with Delphi-Saginaw Steering Gear. His experiences at Delphi were the perfect backdrop for year two in the curriculum, where his next challenge was the foundational ME Lab.

Outstanding Support

Earning an ME undergraduate degree can challenge every aspect of a student’s intelligence, from honing organizational skills to writing to Laplace transforms.

While the curriculum is demanding, the ME-EM department balances those demands with help from an outstanding network. Two full-time academic advisors, based in the Lagina Student Success Center, assist with planning and ensure all degree requirements are met. The Engineering Learning Center, managed by Dr. Charles Margraves, (see page 20) provides tutoring, group problem-solving, and guidance on test-taking skills. ME students also receive expert training on how to safely use equipment in the Rivard Product Realization Center.



Watch Seth talk about Michigan Tech in his own words:
www.me.mtu.edu/video

Colleen working through dynamics in a student conference room in the Van Pelt and Opie Library.



27

Consecutive years the ME-EM has ranked in the top ten in the nation for number of BSME degrees granted

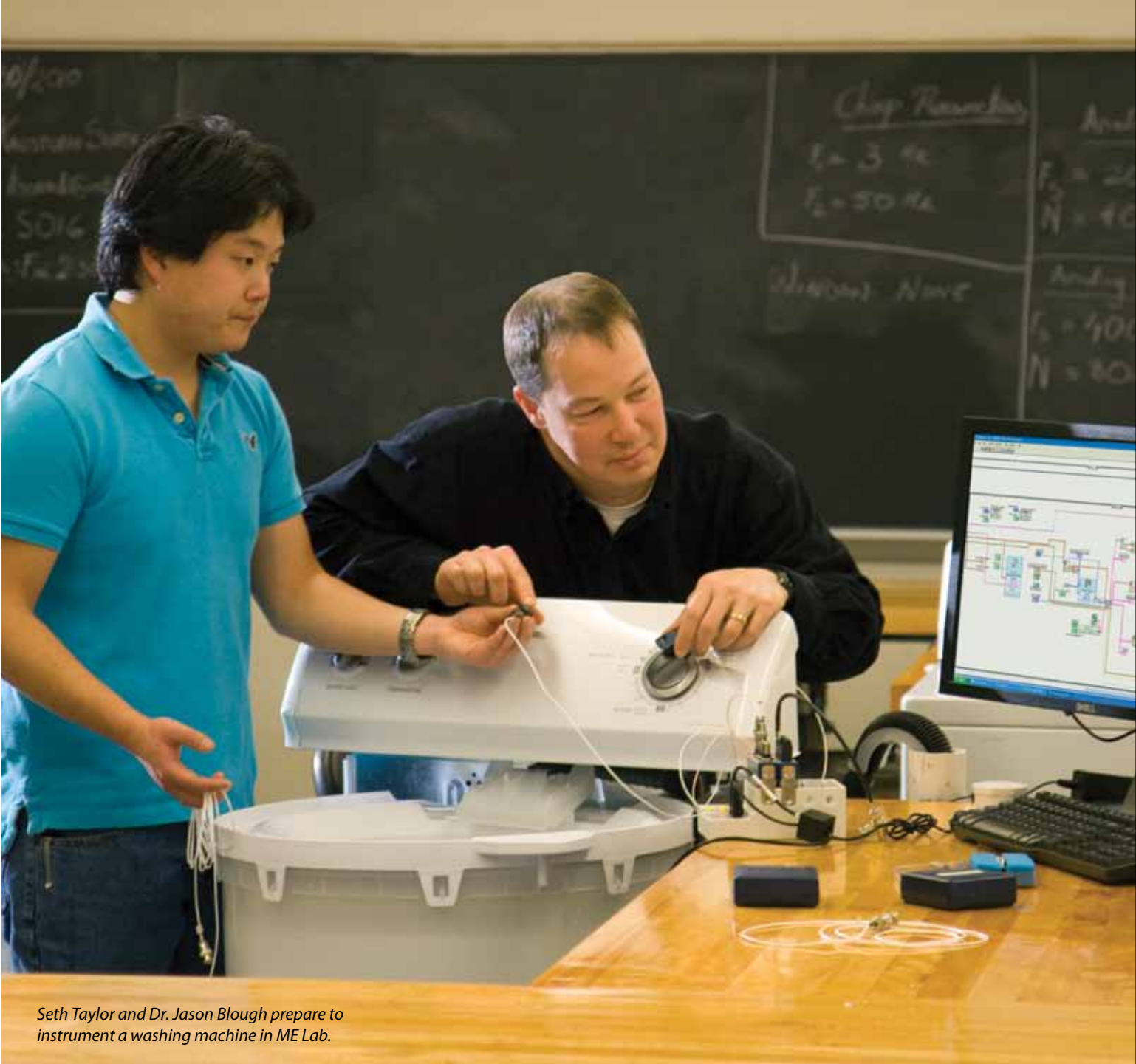
THE ORGANIC & THE SYNTHETIC

Upon her arrival at Michigan Tech, Colleen was unsure of which field to enter. She was certain of one thing only: she would not follow her parents' path into the petroleum industry. After exploring the various science and engineering options, the flexibility of the mechanical engineering program and wide range of career paths after graduation were persuasive.

"I spoke with students in group sessions and one of the supplemental instructors helped me understand the wide range of paths that can begin with an ME degree," says Colleen. As a self-starter, Colleen's independent streak kept her goals in focus, but worked against her in one way. "I wish I had visited my academic advisors earlier," she says,

"because I might have gained a biology degree, as well as a BSME, with a few changes in my early coursework. I waited a little bit too long for that."

Entering her second year, Colleen's vision of her future became increasingly clear. "Discussions with faculty like Dr. Tammy Donahue showed me that an ME can focus on biomechanics. It ignited a passion in me for engineering that went beyond the industrial aspects," she says. Her career path would thus span the realms of machines and living beings, at the nexus of the organic and the synthetic. Before this aspiration could be realized, Colleen would need to confront the core ME coursework and labs. Fortunately, she was not afraid of getting her hands dirty.



Seth Taylor and Dr. Jason Blough prepare to instrument a washing machine in ME Lab.

FOUNDATION OF INSTRUMENTATION

Much of what the engineer needs to view cannot be seen. Through the experiments conducted in the Integrated ME Lab, students learn to focus the instrumental “eyes” that perceive strain, acceleration, temperature, and pressure. They then train those eyes on real-world applications to comprehend how the sensors deliver a novel portal to reality. As Seth puts it, “We learned how to install accelerometers, calibrate them, and interpret the results of an actual test. I had performed similar tasks during my co-op with Delphi, so I appreciated how important it was to get it right, and to communicate the results clearly.”

For example, the teams open up actual, operational washing machines and fill them with off-balance loads.

They instrument the system with accelerometers to capture and quantify the violent shaking, something they can also perceive tactilely. “ME Lab really supplemented what I learned in class and reinforced the concepts with concrete results. There was also heavy emphasis on technical communications—we normally delivered 20-25 pages per week,” says Seth. Dr. Jason Blough revised this lab in 2010 and developed several new experiments. “We continually revise the labs to keep in sync with the broader curriculum and changes in measurement technology,” notes Blough. ME Lab’s challenges would prove beneficial to Seth as he moved into a leadership position with Enterprise, exercising communications to all involved.



Colleen installs a die on a plastic extrusion machine in the IDM Lab.

INTEGRATED DESIGN & MANUFACTURING

“This was my first lab that was not a repeat of high school chemistry or physics—my first lab with actual engineering,” says Colleen, with visible enthusiasm. The gritty front line of engineering is exactly what Integrated Design and Manufacturing (IDM) Lab offers to second year ME students. Covering a wide range of engineering applications, the challenges range from operating plastic extrusion machinery to programming CNC mills. Design considerations are related directly to the choice of suitable materials and manufacturing methods.

“This was my first lab where I knew that people out in industry were doing this very work,” she says. “Conducting tensile tests, hardness tests—and here we are in only the second year—you don’t have to wait long to get to the exciting stuff. It was my first true taste of engineering.”

IDM Lab lays the observational foundation for several third-year and senior level courses. For Colleen, these thrilling firsthand experiences with the machinery that turned her CAD designs into prototype parts galvanized her career choice. She was no longer seeking a degree—she sought to master the field of knowledge.



Watch Colleen talk about Michigan Tech in her own words:
www.me.mtu.edu/video

20 The number of labs available to ME-EM undergrad students

Over 75,000 Square Feet of Laboratories & Product Development Space

The ME-EM department has continued to attract top students nationally and globally by investing in laboratory space with support from corporate sponsors and alumni donations.

For example, the Rivard Product Realization Center, made possible by the generous gift of Dan and Carol Rivard, provides complete machining, fabricating, and wood prototyping equipment. ME-EM staff train and certify all students in safe use of equipment and materials before they can begin using required equipment like CNC machine tools, welders, and woodworking equipment.

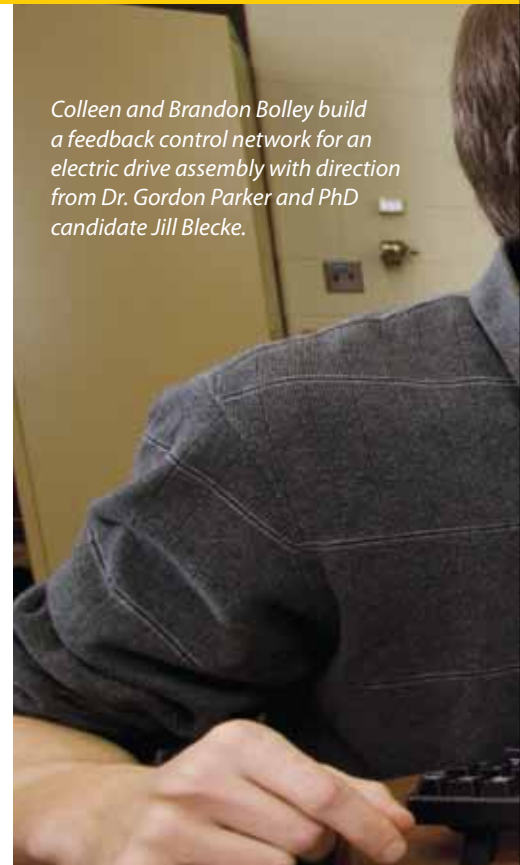
Advanced Labs: Energy & Controls

Research & Alumni Fund Laboratories

The Calder Systems and Controls Lab is a state-of-the-art facility for controls measurement and programming, made possible by a generous grant from John and Joan Calder. “Controls are growing in importance with “smart” products. The Calder Lab lets students experience controls firsthand,” says Dr. Gordon Parker, Controls Lab Coordinator.

The GM Energy Lab was updated through a donation by General Motors that purchased new equipment for thermo-fluid experiments. “Our research relationships and educational mission are tightly coupled. Sponsors like GM recognize the social value of investments in education through research,” says Dr. Jeff Allen, GM Energy Lab Co-Coordinator.

Colleen and Brandon Bolley build a feedback control network for an electric drive assembly with direction from Dr. Gordon Parker and PhD candidate Jill Blecke.



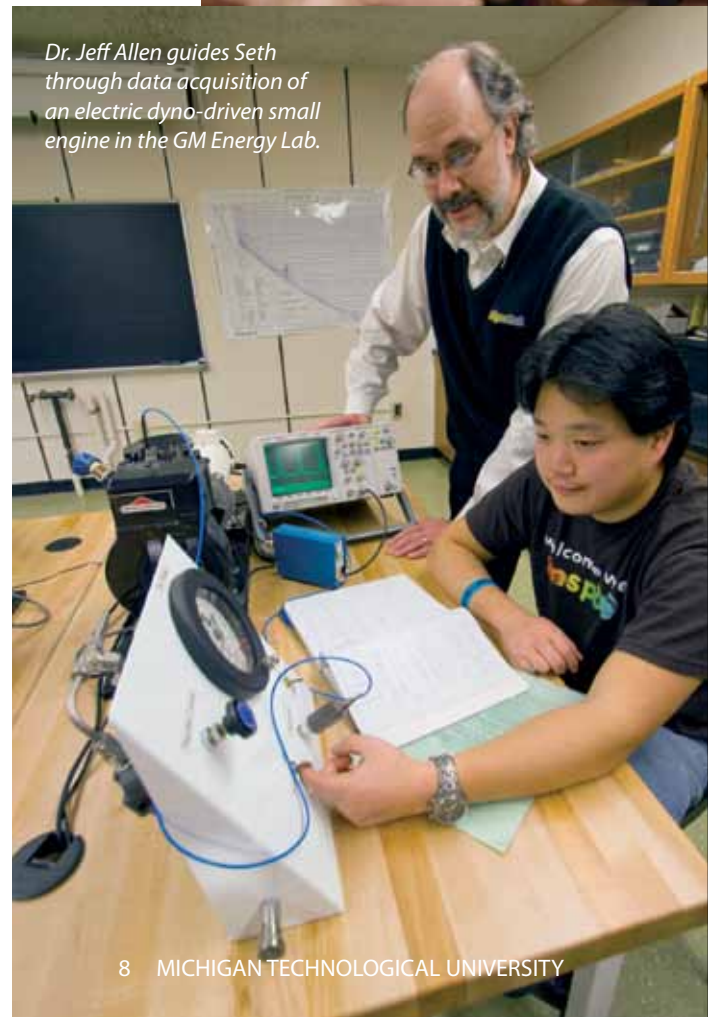
GENERAL MOTORS ENERGY LAB

For students like Seth whose primary learning channel is visual, the less visible world of energy and fluid flow can be a challenge. “I really struggled because you can’t see heat,” he says. “Energy Lab helped me learn the material because I had difficulty following the text book representations of the phenomena, such as vector field plots. To analyze a wind tunnel and see the vortices being generated made those plots meaningful.” In addition to heat transfer and fluid experiments, students become familiar with industry-standard transducers and hardware.

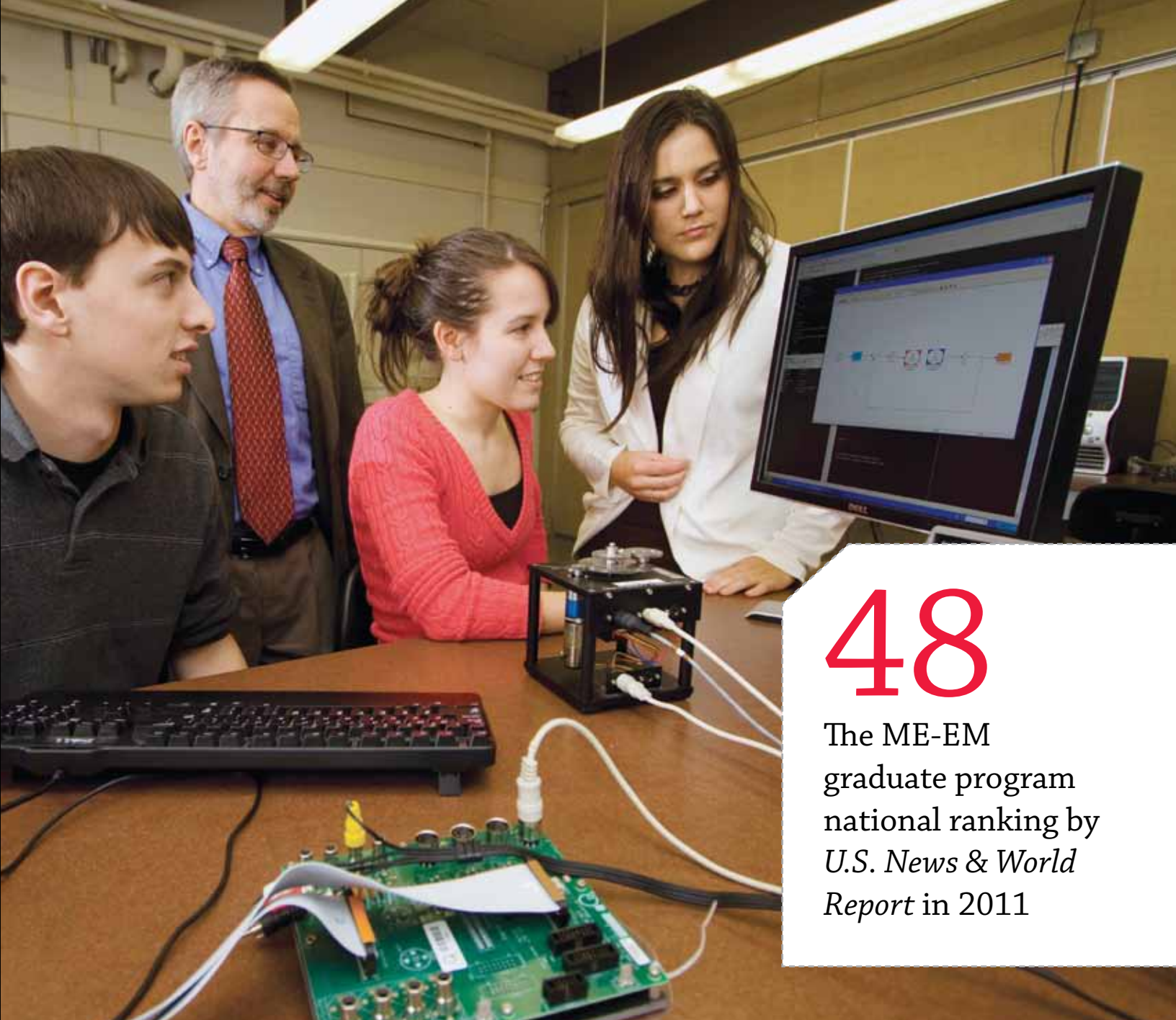
The topics and experiments covered in Energy Lab are updated every few years, most recently by Dr. Jeff Allen and Dr. Chuck Margraves. Allen says, “This year we’ve updated a few of the experiments that were almost too consistent. We like to see noise in the data at levels similar to what we find in industrial settings.”

The GM Energy Lab is a large facility with modern equipment and experiments, providing ample room for fluid flow ducts, heat pipes, and work benches for scopes and pressure vessels. “We’re lucky to have a facility like this,” Seth adds. “One week we followed the flow of energy as it changed forms from electrical draw to mechanical power, ending in heat generation. At each conversion we could track the losses and compute efficiencies.” Mastering conversion efficiencies would be crucial for Seth: one of his technical electives would focus on fuel cell design.

Dr. Jeff Allen guides Seth through data acquisition of an electric dyno-driven small engine in the GM Energy Lab.



Watch Seth talk about Michigan Tech in his own words:
www.me.mtu.edu/video



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The ME-EM
graduate program
national ranking by
*U.S. News & World
Report* in 2011

GAINING A SENSE OF CONTROL

As products and systems become ever more integrated, engineers need to effectively design across traditional academic boundaries. The ME-EM department emphasizes problem solving at these boundaries, and through the Controls Lab, ME students face the interaction of electronic sensors, motors, and software. "In Controls Lab we built the control schemes covered in lecture using Simulink software," says Colleen. "Managing the response of the hardware to the inputs is absolutely fascinating, and we even built a system to balance a free standing pole on a carriage. That was *so cool*."

The challenges posed in Controls Lab coincide closely with the content of the lecture, such that lab content immediately reinforces the abstractions presented in

lecture. "Because Controls is a senior level course, we can build on the myriad experiences acquired in previous years and integrate them into the lecture and lab," says lab coordinator and PhD candidate Jill Blecke. She continues, "The educational challenge for me was to find examples with the right level of complexity. Dr. Parker was my mentor and advised me well on this question."

Colleen's rapid acquisition of controls programming would prove crucial for her Senior Capstone Design project, which required coding up a programmable logic controller and developing a Human-Machine Interface (HMI). Quick to learn, she took Controls in her final semester, concurrently with Senior Design.

33

The number of technical electives available to ME-EM students



Seth takes a break in the library coffee bar to explain a working fuel cell device he assembled.

FUEL CELLS & ADVANCED CAD

As a senior, it was clear that Seth would likely continue his career in the automotive industry. He decided to expand his knowledge base with technical electives in fuel cell design and advanced CAD. These courses are two of the thirty-three technical electives offered by ME-EM faculty. "With a diverse group of professors and lecturers, we offer technical electives taught by experts across the spectrum of mechanical engineering," says ME-EM Department Chair Dr. William Predebon. "Our faculty focus on their interest areas and deliver in-depth courses at the senior level."

With fuel cell research advancing quickly in university environments, Seth was exposed to the challenges facing next-generation power systems. "We covered the many

challenges facing fuel cell design. I have to admit that the more we learned, the more daunting this technology became," he says.

Advanced CAD was the second technical elective that Seth chose, and he was able to leverage his self-taught CAD experience to come quickly up to speed. "I had already done some CAD for Enterprise and co-op assignments, but in this course, I was able to learn point modeling, sheet modeling, and other analytical tools that are difficult to acquire." As he entered the final phase of his Enterprise project, Seth would leverage advanced CAD to model the key components of a hybrid drivetrain.



Dr. Jeff Allen



Dr. Jason Blough



Dr. John Gershenson



Dr. Sheryl Sorby

Technical Directors Ensure Depth & Breadth

The wide range of technical electives available to ME undergraduates allows each individual to explore a topic of interest taught by an expert in the field. With thirty-three topics offered to juniors and seniors, technical electives are a rich source of engagement. Faculty members are able to involve the research they pursue, and undergraduates gain both depth and breadth outside the core curriculum. The curriculum as a whole is organized around four areas and managed by technical directors (pictured left)—senior faculty who ensure the courses remain both focused and vitalized with the latest technology.

BIOMECHANICS & HUMAN FACTORS

Although Colleen could choose from thirty-three technical elective courses, her choices dovetailed perfectly with her interest in healing through engineering. To expand her engineering toolkit, she enrolled in Finite Element Analysis and learned both theory and practical application of FEA software. “I wanted to be able to use the software for biological systems, and this meant gaining some theory behind the code,” she says.

Colleen’s second technical elective was Biomechanics, where she applied the principles of engineering mechanics to analyze the human body. As she describes it, “Out in the biomechanics industry, products are often developed using FEA for tissues or products. In this elective, we might develop a CAD model of the meniscus inside a human knee, then mesh it and analyze the stress and strain that it experiences during a walking gait cycle.” For Colleen, Biomechanics was “like getting an extra lab,” because of the combined theory and opportunity to apply engineering tools.

Colleen chose Human Factors as her final technical elective. “It was extremely interesting,” she says, “covering everything from design for the human form to design for the human mind.” Because her Senior Design project would require developing a user interface, Colleen was able to ensure it was easy to understand and user-friendly.



Watch Colleen talk about Michigan Tech in her own words:
www.me.mtu.edu/video



Colleen studies in the Van Pelt and Opie Library.

Enterprise



ENTERPRISE: THE ECOCAR CHALLENGE

By the time he was a senior, Seth had acquired a substantial body of practical experience. He had three years in Enterprise, worked nine months for Delphi, and secured a six-month co-op assignment at the Toyota North American Engineering Center. To continue expanding his experiences, Seth changed Enterprise teams, and joined the EcoCAR Challenge Enterprise. The EcoCAR Challenge is the premier North American design competition, with only seventeen schools qualifying to participate nationwide. It was fortunate for Seth that Michigan Tech was the only university from Michigan to qualify. Sponsored by DOE and GM, the goal of participants is to implement the hybrid architecture, improve vehicle performance, and simultaneously reduce vehicle emissions.

EcoCAR Enterprise would prove a perfect fit for Seth, whose initial responsibility was to lead the integration of a high voltage energy storage system. "A sponsor donated a high-voltage five-cell LI-ION battery pack. My first role was to package and mount the battery pack into the vehicle while adhering to rigorous crash safety standards," he says.

Seth later became the Mechanical Team Lead, with several sub-groups answering to him. "My goal was to employ the best management techniques I had experienced in industry." His leadership was recognized by recruiters, who actively sought to employ him. "I was fortunate to have choices as I considered my future," he notes.



Watch Seth talk about Michigan Tech in his own words:
www.me.mtu.edu/video



Seth and Dr. Adam Loukus, EcoCAR Enterprise team co-advisor, open the carbon fiber battery storage compartment of the hybrid drive vehicle.



Left to right: Senior Design Training Specialist Rob Rowe, Senior Design Training Specialist Pete Bingham, Master Machinist Marty Toth, and Research Associate Paul Kilpela.

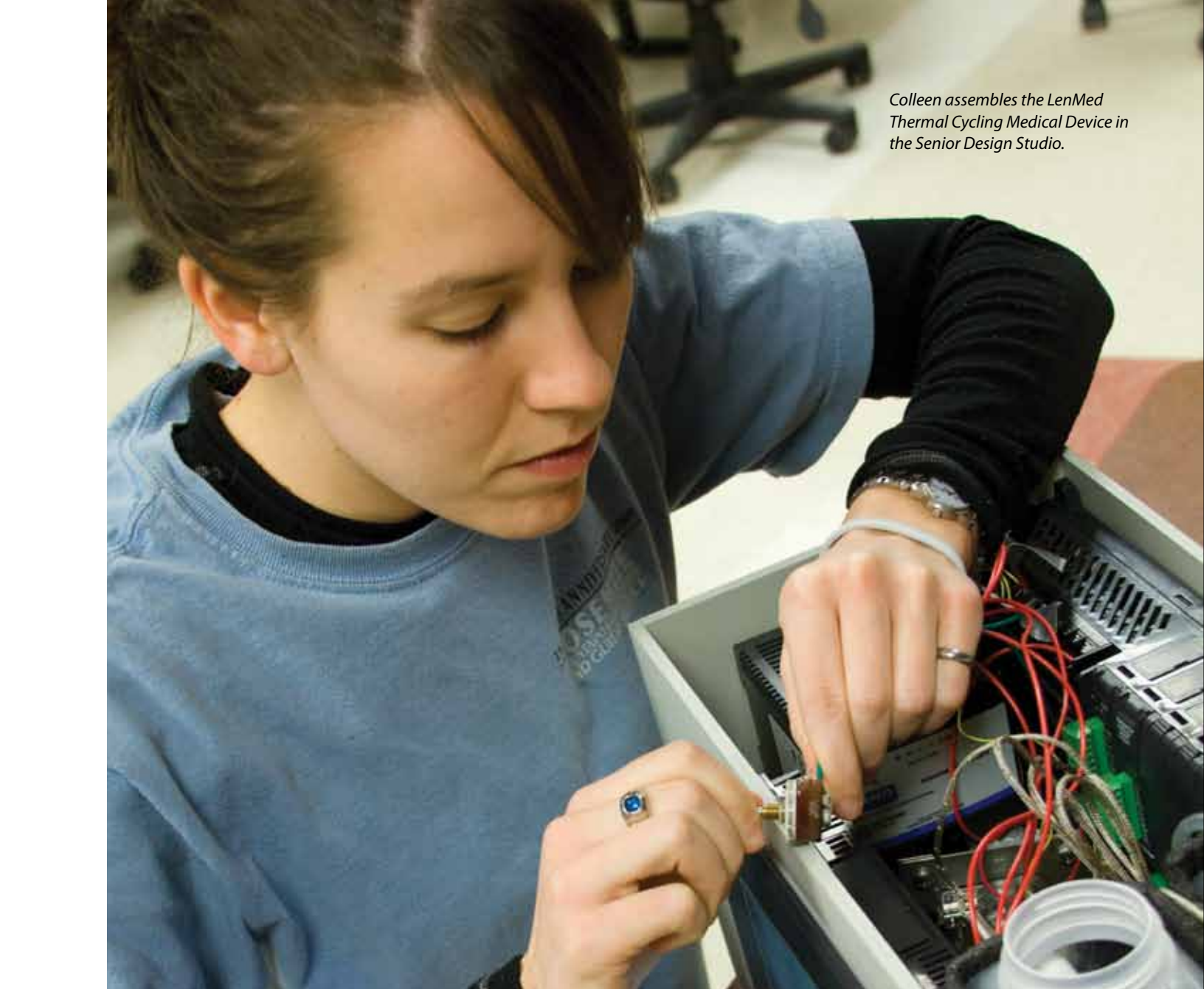
Enterprise: A Decade of Innovation

In the decade since Michigan Tech deployed the innovative Enterprise Program in 2000, thousands of ME students have participated. The approach has been mirrored at universities around the country: Enterprise teams are structured like corporations with responsibilities distributed among members. Each team has a CEO, with other members responsible for other business aspects, such as finance, technology, and communications.

The teams are generally open to any student on campus, though to qualify for the ME program, a design aspect must be central to the Enterprise endeavor. Many Enterprise teams participate in national design competitions, and several have taken home top honors. In 2010 the Aerospace Enterprise team took first prize in the US Air Force Research Lab's nanosatellite design competition, beating the top contenders from universities with dedicated aerospace degrees. The Michigan Tech team named their nanosatellite the *Oculus-ASR*.

28

The number of Enterprise teams at Michigan Tech available to ME students



Colleen assembles the LenMed Thermal Cycling Medical Device in the Senior Design Studio.

THERMAL CYCLING MEDICAL DEVICE

"I truly understood my Senior Design project after I went over the handlebars in a mountain bike race. My thigh came down on a rock and I was hurting badly. I expected to be unable to ride for two weeks," says Colleen. Her Senior Capstone Design team was tasked by project sponsor Mike Molenda with developing a new thermal cycling medical device to accelerate healing after injuries or surgery. The device delivers warm or cold water to a pad that is placed on the affected part of the body. It can cycle between warm and cold or maintain a single set temperature.

Molenda, a Michigan Tech ME grad who later earned his JD, explains why he chose to sponsor a Senior Design project: "The cost – time – management and engineering synergies among the exceptional ME-EM faculty, the team

of gifted students, and myself resulted in rapid product development, intellectual property confidentiality, and just plain excitement." The device has been named the LenMed system and is now approaching pilot production at a company affiliated with Tech.

Colleen decided to test a prototype on her injured leg, and was surprised at how quickly her sore muscles healed. "I was riding again within a few days, and that experience showed me what effective product engineering can do for people," she says. Her team successfully integrated the components, programmed the controls, and delivered their final report a few days before graduation.



Watch Colleen talk about Michigan Tech in her own words:
www.me.mtu.edu/video



Senior Design advisors, left to right, back row: Mike LaCourt, Josh Loukus, Chuck Van Karsen, Greg Odegard, Nancy Barr, and Bill Endres. Front row: John Armstead, Michele Miller, Chuck Margraves, Jim De Clerck, and John Beard.

Dedicated Advisory Team Supports Senior Design Students

The advisors pictured above are in the Cuskie Design and Creativity Center, made possible by the generous gift of Herman and Josephine Cuskie, created by the ME-EM department to enable student teams to effectively meet, collaborate, and construct their projects. The advisors coach, critique, and assist the design teams in all aspects of their projects: planning, operations, and communications.

Before completed projects are accepted by the department for credit, they must pass advisory board review and sign off. This intensive oversight ensures rigorous experiences for the students and robust results for the sponsoring organization.

Extensive machining and fabrication labs for prototyping are available to all teams. A dedicated staff of technicians oversees the labs and trains students in safe operation of machine tools and welding equipment.

205

The number of senior design projects from 2002-2010, sponsored by 92 different companies, entrepreneurs, and foundations at an average of \$15,000 per project

Graduation & New Careers

ME-EM Graduates Maintain High Job Placement Rates

Attracting students who will succeed on campus and assume leadership positions upon graduation is of paramount importance to the ME-EM department. Our 1100+ undergraduate students represent a diverse population with a common characteristic: the perseverance to meet difficult challenges and surmount them through innovation.

With enrollment in the top ten nationwide for over twenty years, we continuously improve our courses, labs, and student support facilities. Our mean placement rate for the past four years has been 92 percent, with average starting salaries approaching \$60,000. We believe the success of our students is the final measure of the success of our department.

PRODUCT DEVELOPMENT AT KIMBERLY-CLARK

While finishing her final semester in the fall of 2010, Colleen began interviewing with potential employers. "I wanted to continue pursuing engineering in the context of helping people," she says. "While most products help people one way or another, I wanted to have that direct benefit, like when my team built the LenMed system for Senior Design." As her team prepared for the final presentation and report, Colleen waited for news from an interview with Kimberly-Clark, a global manufacturer of health care products. With final exams and preparing to leave campus rapidly approaching, the stress for most students increases until those deadlines pass.

When Colleen received the call from Kimberly-Clark, she was thrilled to confirm that she would be joining a product development team. "It's exactly what I wanted to do," she says. "In the future I would like to get a master's degree, but that's a few years down the road, after I get some job experience behind me."

Adding to her success in academics, Colleen wrapped up her final semester with a major road biking challenge. Each fall, the Michigan Tech Color Tour offers 50km, 100km, and 200km rides. Of course, Colleen chose the 200km option, which left her uninjured but sore enough to give herself a healthy dose of thermal cycling treatments. She says, "For anyone looking to get a good education and enjoys the outdoors, definitely, Tech is the place to go."



Watch Colleen talk about Michigan Tech in her own words:
www.me.mtu.edu/video

CONCLUSION

The undergraduate ME program at Michigan Tech is unique in how the curriculum is delivered and results in graduates that are valued in industry for their agility and aggressive problem-solving skills. We achieve this through our strong emphasis on experiential learning that begins in our 75,000 square feet of state-of-the-art laboratories and concludes with the Enterprise experience or a Senior Capstone Design project, sponsored by industry at an average level of \$15,000. Our human resources are likewise dedicated to ensure ample guidance for the students as they navigate the myriad of problems posed by design, prototyping, and effective communication. The experiences recounted by Seth and Colleen illustrate how the ME-EM department has integrated these challenges to develop leadership and academic success for our students, from first year to first career.



92

Percentage average job placement of ME undergrad students over the last four years

CONTROLS ENGINEERING AT CONTINENTAL

Having successfully completed his role as Mechanical Lead for the EcoCAR Enterprise competition, Seth was able to hand over the project “with momentum” as it entered the third and final year. The completed hybrid SUV, originally donated by GM, will be finished and ready for “99 percent vehicle buyoff” and on-road testing.

It is precisely these “hands-on” experiences, taking ideas from sketch pad to launch pad, that makes engineers from Michigan Tech highly sought-after. “They hit the ground running, and are productive immediately,” says Terry Woychowski, (BSME ’78) Vice-President of Global Vehicle Program Management for GM.

Prior to his graduation in December 2010, Seth interviewed with several companies working in passenger and off-highway vehicle development. He accepted a position as Vehicle Test Engineer with Continental Corporation, a major producer of tires and brakes. Seth will be working with the controls programming for anti-lock brake systems, and was on-site for winter field testing within weeks of starting. “There were several reasons I chose Continental, including their track record of social responsibility,” he says. Looking back on his time at Michigan Tech, he concludes, “I’ve done more things at Tech than I ever could have imagined. I would not have changed anything, and I’d recommend it to anyone.”

Endowed Professorships



JOHN & JOAN CALDER ESTABLISH ENDOWED ASSOCIATE PROFESSORSHIP

John Calder earned a BS degree in Mechanical Engineering in 1967 at Michigan Tech and went on to earn an MS degree in Business Administration in 1976. After graduating from Michigan Tech, he started his career as a Design Engineer with Digital Integrated Circuit Systems in 1967. From 1968-1975 he rose from Application and Field Service Engineer for the east coast to Regional Sales Manager for the Midwest and West Coast Regions. In 1975 he joined Dorsey-Alexander in Cincinnati, Ohio, and in 1987, purchased the company. Dorsey-Alexander is a Manufacturer's Agent for motion control, sensing, and machine-guarding safety products.

In 1980 Calder co-founded Cincinnati Controls, Inc. which is a high-tech distributor of microprocessors for motion control products and human-machine systems, and in 1992 he purchased one hundred percent of the company. In 1985 he co-founded Integrated Manufacturing Control Systems, which developed motion and system software. In 1992 he became sole owner of Dorsey-Alexander. Also in 1992 he purchased Zenith Engineering Sales Company, doubled the sales volume in two years and sold the business. In 1993 he purchased K.F. Narez, Inc., doubled the sales volume in three years, and sold the company. In 2003 he purchased Rilco Industrial Controls, Inc. and in 2006 he purchased Gorilla Storage Company. Currently he is CEO and owner of Cincinnati Controls, Inc.

Calder's love for control systems led him, along with his wife Joan, to establish the Calder Systems and Controls

Laboratory in the Department of Mechanical Engineering-Engineering Mechanics.

In recognition of engineering contributions, Calder was inducted into the Academy of Mechanical Engineering and Engineering Mechanics at Michigan Tech in 2007.

Calder is a Michigan Tech Fund Board of Trustee, Chair of the ME-EM Phase II "Endowing Excellence" Campaign Committee, a member of the School of Business National Advisory Board, a Hubbell Society member, a member of the current University Capital Campaign Committee, and lifetime member of the Alumni Association.



JOHN & JOAN CALDER ENDOWED ASSOCIATE PROFESSOR IN MECHANICAL ENGINEERING

Dr. Jeff Allen's tenure at Michigan Tech has been highly successful in both the classroom and the laboratory. The endowed professor award means that his efforts will be increasingly focused on innovation, rather than on securing short-term grant funding. He says, "With this endowment we plan to bridge the gaps in our research that are otherwise funded separately." Allen's research covers two-phase flow, focused on experimentation with capillaries and microtubes which are utilized in fuel cells.

"I'm honored by the faith and trust the Calders have placed in me with their endowment," says Allen. "This endowment creates a special connection between my research and the Calders."



RONALD & ELAINE STARR ESTABLISH ENDOWED PROFESSORSHIPS

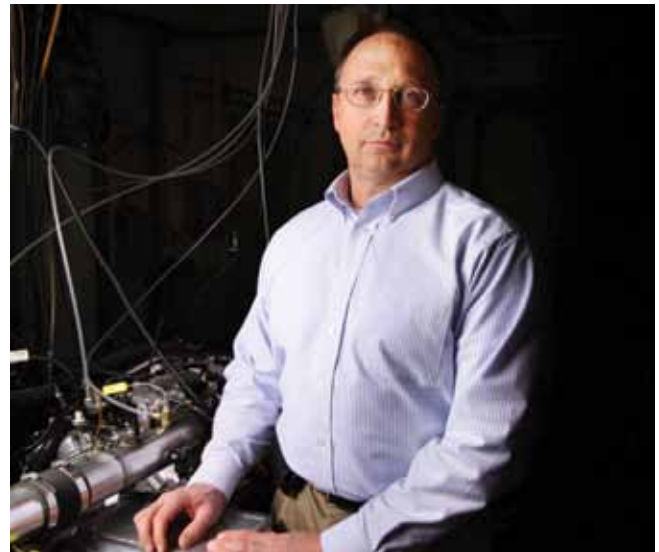
Ron Starr earned his BSME degree in Mechanical Engineering at Michigan Tech in 1967 and started his career as a development engineer at Alcoa in Pittsburgh. In 1968 he joined CS McKee & Co. in Pittsburgh and rose to assistant vice president. In 1971 he returned to Toronto, Canada, to join Morgan, Ostiguy & Hudon as a portfolio manager. In 1982 he founded and continues today as president of Deanlee Management Inc. in Mississauga, Ontario.

Starr is a Michigan Tech Fund Board Trustee, a member of the ME-EM Phase II "Endowing Excellence" Campaign Committee, a Hubbell Society member, a lifetime member of the Alumni Association, and past president of the MTU-McAllister Canadian Foundation.



RONALD & ELAINE STARR ENDOWED PROFESSOR IN SPACE SYSTEMS ENGINEERING

"This endowment had immediate impact on our students," says Dr. Brad King, who advises the one hundred students of the Aerospace Enterprise team. "With it, they were able to purchase the final components that completed their *Oculus-ASR* satellite and won the Air Force Research Lab's national competition." For over a decade, King has been steadily building the aerospace research program at Michigan Tech. This endowment means he can begin rounding out his aerospace research infrastructure. "Without the endowment, the students' satellite would have been designed, but not fully operational," says King.



RONALD & ELAINE STARR ENDOWED PROFESSOR IN ENERGY SYSTEMS

"This award is both exciting and humbling. We appreciate the responsibility that comes with the trust of our donors," says Dr. Jeff Naber. The endowment allows Naber to focus more fully on research with his team of graduate students and staff engineers. His team researches engine combustion and emissions aftertreatment systems, such as diesel particulate filters. Naber expects the endowment to effectively broaden the scope of his research by allowing him to freely choose the focus of his work. He says, "It enables our research team to explore topics that have higher potential benefit to society, but also slightly higher risk, which most funding agencies avoid."

Faculty Awards



Dr. Fernando Ponta

NATIONAL SCIENCE FOUNDATION CAREER AWARD

Dr. Fernando Ponta has researched wind turbines since the 1990s, when he was a graduate student at the University of Buenos Aires. As a thought leader in the field of fluid-structure interaction for turbine blades, Ponta was awarded a \$400,000 CAREER Award. This prestigious award by the National Science Foundation supports junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of education and research within the context of the mission of their organizations.

The award will further Ponta's investigation of how large wind turbine blades deform and flex in response to vortex formation and shedding. His experience with computational fluid dynamics and fluid-structure interaction is the basis for developing a computational tool that will be shared with industry to test innovative turbine blade designs. "Currently there is no practical means of testing new blade designs, so the industry stays with safe, familiar approaches," says Ponta. "Wind tunnel data cannot be applied to gigantic blades because the flow behavior and structural dynamics extrapolate differently."

Ponta and his team of researchers will develop a virtual test environment where the behavior of prototype blades can be predicted first in a quick, fundamental simulation. Blades that show promise would "graduate" to higher levels of computational rigor and cost. "The question becomes which blade designs are worthy of prototype investment," says Ponta. "This system will be a cost-effective way to identify those candidates."



Dr. Charles Margraves

DISTINGUISHED TEACHING AWARD

Dr. Charles Margraves has always had a passion for teaching. In only his second year as a lecturer in the ME-EM department, Margraves was awarded the Michigan Tech 2010 Distinguished Teaching Award.

Growing up in Tennessee, Margraves was immersed in two worlds: his mother was a primary school teacher and his father, an engineer. Margraves studied mechanical engineering at the University of Tennessee-Chattanooga where he met his mentor, Dr. Michael H. Jones. "Dr. Jones is the reason why I chose Thermal Fluid Sciences. I took every class I could from him," says Margraves. Upon graduation, he accepted a corporate position in aerospace, where he was encouraged to undertake a master's degree program.

After earning his MS at Georgia Tech and his PhD from the University of Tennessee-Knoxville, Margraves brought the two worlds of teaching and engineering together. He felt called to apply for a lecturer position in the ME-EM department in 2008. "I absolutely love teaching," says Margraves. "When I can commit all my time to it, I find teaching even more rewarding than working in the corporate environment."

Margraves' devotion to teaching is evident: he is director of the Engineering Learning Center, an advisor for Senior Design, and coordinator of the Engineering Explorations Open House. His future goals include creating a program to help new faculty hone their teaching methods. Like his mentor, Dr. Jones, Margraves' engaging personality will lead him to inspire the next generation of engineers.



DOUG PARKS, CHIEF ENGINEER FOR ELECTRIC VEHICLES

In his role as Global Vehicle Line Executive and Vehicle Chief Engineer – Electric Vehicles at General Motors, Doug Parks is at the forefront of the transformations taking place in the American automobile industry. Parks graduated from Michigan Tech with a BSME degree in 1984 and currently plays a lead role in the development of the Chevrolet Volt, GM's new plug-in hybrid electric vehicle. In naming the Volt its 2011 Car of the Year, *Motor Trend* magazine proclaimed: "This automobile is a game-changer."

The game-changing technologies for the Volt involve new vehicle systems and the novel methods required to manufacture them. Innovation for the product and the supply chain requires engineers who have stellar technical skills and can apply those skills to develop realistic, cost-effective solutions. According to Parks, this is exactly the skill set that Michigan Tech engineers can offer. "I've worked with engineers from all over the world," he says. "Michigan Tech students have a unique combination of technical excellence and the ability to move from theory to the real world in order to actually get things done."

Parks credits the variety of hands-on projects required of ME-EM students with providing plenty of opportunities for them to explore and solve complex engineering problems. "With a Michigan Tech degree, engineers have a wealth of laboratory-to-real-world experience, from building and testing hardware to racing vehicles to developing senior design projects," he says. Parks adds that his own experiences at Michigan Tech taught him the importance of mastering the technical material before trying to design comprehensive solutions.

"The proof is always in the results," Parks says. When a well-designed product hits the market, sometimes those results are game-changing.

ME-EM DEPARTMENT EXECUTIVE COMMITTEE

Dr. Jason R. Blough
*Design and Dynamic Systems
Area Director*

Dr. John G. Gershenson
*Manufacturing and Industrial
Area Director*

Dr. Jeffrey S. Allen
Energy Thermofluids Area Director

Dr. Sheryl A. Sorby
Solid Mechanics Area Director

Dr. Craig R. Friedrich
*Associate Chair and Director
of Graduate Studies*

Chuck D. Van Karsen, MS
*Associate Chair and Director of
Undergraduate Studies*

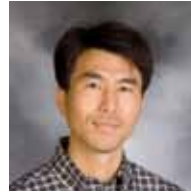
Paula F. Zenner, MS
Director of Operations and Finance

Dr. Gordon G. Parker
Research Director

Dr. William W. Predebon
Department Chair

New Faculty & Staff

The ME-EM department faculty bring a lot to the table—expertise, experience, industry connections, and international respect. The staff forms the functional base of the department’s education, research, and service activities. Together they have a direct impact on the success of the ME-EM department and the continued improvement of education at Michigan Tech.



Dr. Seung Hyun Kim

Assistant Professor, PhD,
Pohang University of
Science and Technology

Kim’s research focuses on the modeling of multiscale and multiphysics problems in relation to energy science and technology. Current areas of interest include the modeling of turbulent combustion, pollutant formation, and combustion instabilities; multiscale fuel cell modeling; multiphase flows in porous media; and carbon capture and sequestration.



Bob Page

Laboratory Facilities
Manager, MSME, Michigan
Technological University

Bringing eighteen years of industry experience with several companies, including the Ford Scientific Research Laboratory in Dearborn and Engineered Machined Products in Escanaba, Bob Page joined the department in October 2010 as Laboratory Facilities Manager. A Michigan Tech alum, he earned his BSME in 1988 and MSME in 1990.



Jillian Spagnotti

Office Assistant, BA,
Michigan Technological
University

Jillian Spagnotti joined the department in January 2010. She holds a BA in Business Administration from Michigan Technological University. As an office assistant, Jillian coordinates the department’s payroll, purchasing, and travel reimbursement functions. She also assists with different clerical aspects of the research program.



Dr. Kazuya Tajiri

Assistant Professor, PhD,
The Pennsylvania State
University

Dr. Tajiri’s research interest centers on the thermo-fluid dynamics and the transport phenomena in the energy conversion systems with multiscale, multiphase effects. The primary target of his current research is the polymer electrolyte fuel cell systems for transportation applications.



Ryan Towles

Academic Advisor, BSE,
Michigan Technological
University

A 1999 graduate of Michigan Tech, Ryan Towles joined the department as an employee in June 2010. He has worked in various industries as a product engineer, manufacturing engineer, purchasing manager, and technical sales person. He is also a former MTU cross country/track & field athlete and assistant coach.

Faculty & Staff Awards

Dr. Ossama Abdelkhalik

Appointed a member on the International Advisory Committee of the *International Islamic University Malaysia Engineering Journal*.

Dr. Jeffrey Allen

Along with Ezequiel Medici (PhD candidate, ME-EM), received the 2010 Bhakta Rath Research Award. They are the first recipients of the award which recognizes excellence in scientific and engineering research in the field of physical and natural sciences and engineering. It was made possible by an endowment from Bhakta B. Rath and his wife, Sushama Rath. The award recognizes a doctoral student at Michigan Tech and his or her faculty advisor for "exceptional research of particular value that anticipates the future needs of the nation while supporting advances in emerging technology."

Selected as a finalist for the Michigan Tech annual Distinguished Teaching Award in the Associate Professor/Professor Category.

Dr. Tammy Haut Donahue

Highlighted in the article "Tissue Engineering Could Yield Cure, Prevention For Osteoarthritis" in *Medical News Today*. Dr. Haut Donahue's research "ranges from computer modeling to working with animals (that) could revolutionize medicine." Dr. Haut Donahue is also collaborating with the University of Michigan researchers highlighted on radio station WWJ's website.

Dr. John Hill

Research on just how bad driving suffers while texting was featured on WLUC TV6.

Dr. Gopal Jayaraman

Highlighted in the October-November 2009 edition of the Engineering Society of Detroit's publication *Technology Century* for his research on helmets and head injuries. The article, "MTU Tackles Football Injuries Head-on" highlights the development of a new kind of helmet that mimics the structure of the human head. Jayaraman is quoted "Each (the skull, scalp, and spinal fluid) protects the brain in different ways. Our objective is to copy the biological system."

Dr. John H. Johnson

Appointed chair of the National Academies committee created to review phase two of the 21st Century Truck Partnership Program, which is a cooperative effort of the Department of Energy, the Department of Transportation, the Environmental Protection Agency and the Department of Defense. Launched in 2000, the program's mission is to explore technological improvements in commercial and military trucks and buses.

Dr. L. Brad King

Led the effort to make the ME-EM department a leadership partner along with the University of Michigan of the Michigan/Air Force Center of Excellence in Electric Propulsion (MACEEP). The other partners are: Colorado State, Penn State, UCLA, the University of Washington (UW) and MSNW/UW. It is a five-year program with an FY10 start. It is funded at \$6M by the Air Force. Michigan Tech's portion is \$1.04 M. AFRL in collaboration with AFOSR will focus academic investments in four thrust areas of fundamental research: High-Power Plasma Propulsion, Electro-spray Propulsion Development, Time-Resolved Plasma Diagnostics, Modeling and Simulation.

Michael LaCourt

Named Copper Country Habitat for Humanity Volunteer of the Year.

Dr. Charles H. Margraves

Received the 2010 Distinguished Teaching Award in the Assistant Professor, Professor of Practice, or Lecturer category (only one is awarded per year) after only two years at Michigan Tech.

Dr. Jeffrey D. Naber

Named a fellow by the Society of Automotive Engineers (SAE). Fellow is the SAE's highest grade of membership and recognizes important engineering, scientific, and leadership achievements. Members must be nominated by another SAE member to be considered for the honor.

Received the 2010 SAE Forest R. McFarland Award. This Award recognizes individuals for their outstanding contributions toward the work of the SAE Engineering Meetings Board (EMB) in the planning, development, and dissemination of technical information through technical meetings, conferences and professional development programs or outstanding contributions to the EMB operations in facilitating or enhancing the interchange of technical information.

Received the Best Graduate Student Mentor Award by Michigan Tech's Graduate Student Government.

Received one of the Engineering Society of Detroit's (ESD) Distinguished Service Awards on June 23, 2010. Dr. Naber taught a graduate course in Detroit in advanced hybrid electric propulsion technology for displaced and working engineers as a part of the tri-lateral partnership between GM, Michigan Tech and ESD.

The November issue of *Circle Track* magazine highlights the work on internal combustion by Naber and his research team. Jeremy Worm (research engineer, ME-EM) is quoted extensively in the story, "The Secret Is in the Burn."

Dr. Sudhakar M. Pandit

Named one of nine new Fellows of the Society of Manufacturing Engineers, a professional society serving the manufacturing industry for his outstanding contributions to the field of manufacturing. A main contribution to the manufacturing industry has been development of a new methodology called data dependent systems and its applications to design and manufacturing. He has written two books and is author or coauthor of more than 150 peer-reviewed papers. He is one of only ten scholars in the US so honored.

Dr. Fernando Ponta

Received a 2010 NSF CAREER Award. The National Science Foundation award is a prestigious award in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations.

Dr. William W. Predebon

Received the Michigan Tech Alumni Association's Honorary Alumni Award on August 7, 2010. The award recognizes individuals who have provided service and support to the University characteristic of dedicated alum. The Association reserves this award to recognize the strongest non-alumni supporters.

Dr. William R. Shapton

Elected to the SAE Fellow grade. The selection letter states that he "was selected based on his outstanding accomplishments in the development of experimental modal analysis and the use of transient excitations to identify the dynamic characteristics of mechanical systems."

Dr. Sheryl A. Sorby

Had her work referenced in a letter, "Teaching, Not Testing, for Scientific Vision", published in the October 16, 2009, edition of *Science*. Dr. Sorby is the Engineering Education Innovation Research Group Director and Solid Mechanics Technical Director in the ME-EM department.

Cited in "Why so Few? Women in Science, Technology, Engineering, and Mathematics highlighted on the AAUW website.

Quoted in the article "Closing the Gender Gap" in the July 2010 issue of *Civil Engineering*.

Martin Toth

Received the Michigan Tech Staff Making a Difference Award in the Unsung Hero category in recognition of his contribution to the University's and the Department of Mechanical Engineering - Engineering Mechanics' educational, research and public service missions through his work as a master machinist.

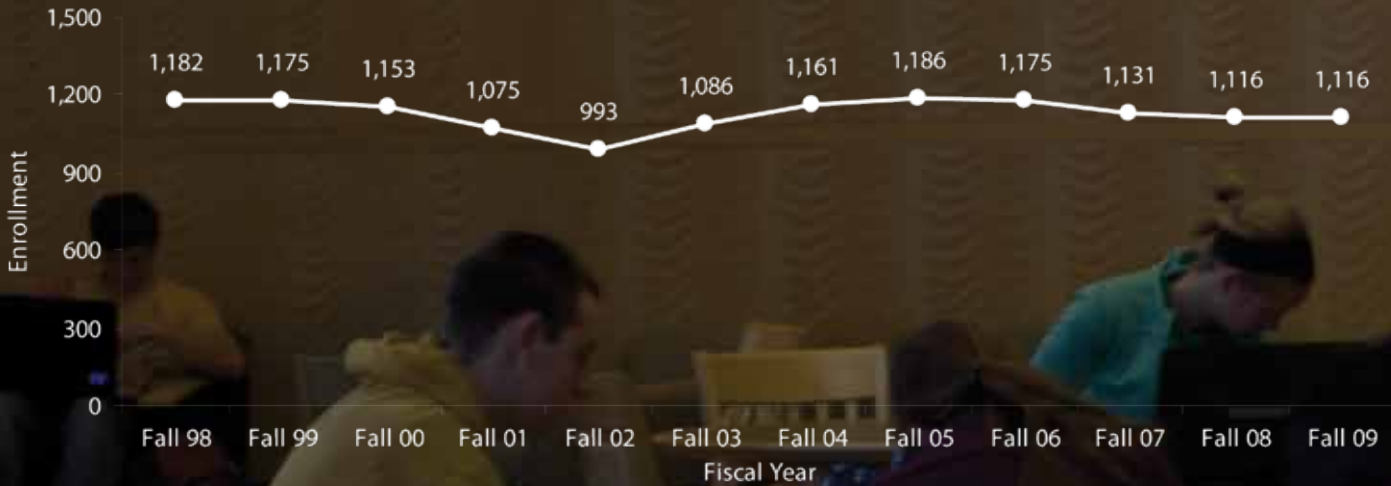
Dr. John Sutherland

Selected to receive the 2010 SAE John Connor Environmental Award in recognition of his outstanding contributions in the area of environmentally responsible manufacturing.

Department Enrollment

BS Enrollment

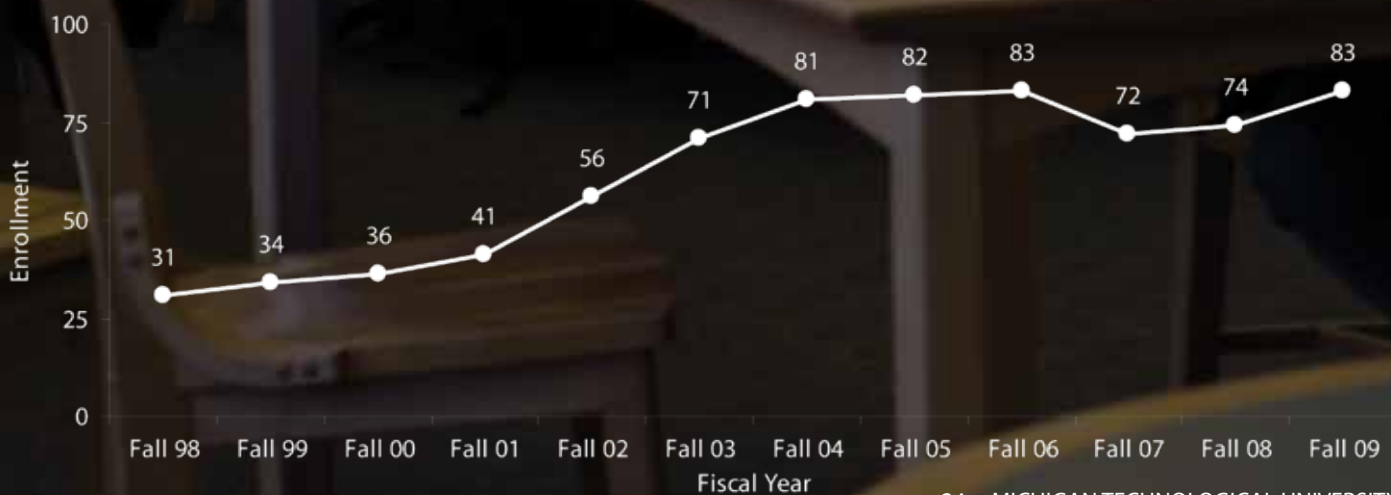
Note: In a few cases, the BS enrollment data shown below differs from past publications because the official final enrollment data is only available after this publication goes to press.



MS Enrollment

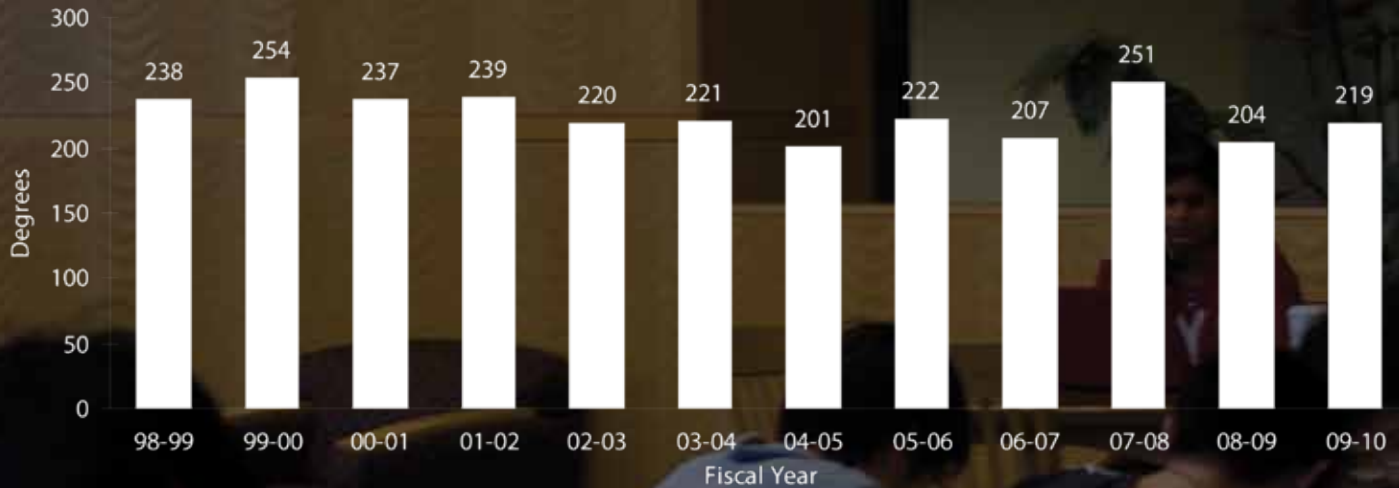


PhD Enrollment

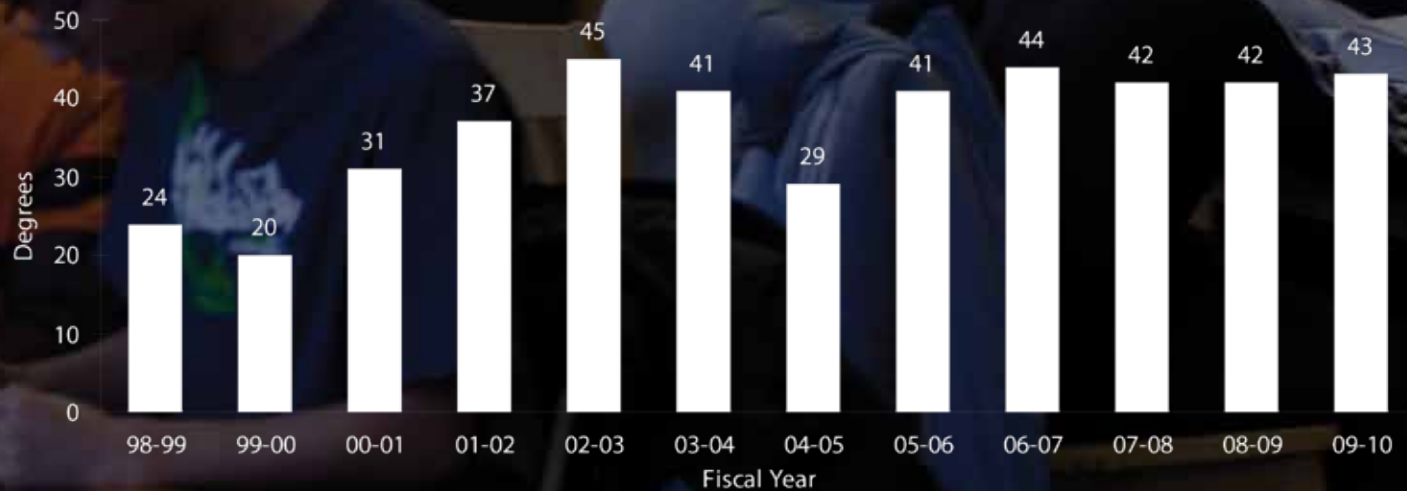


Department Degrees

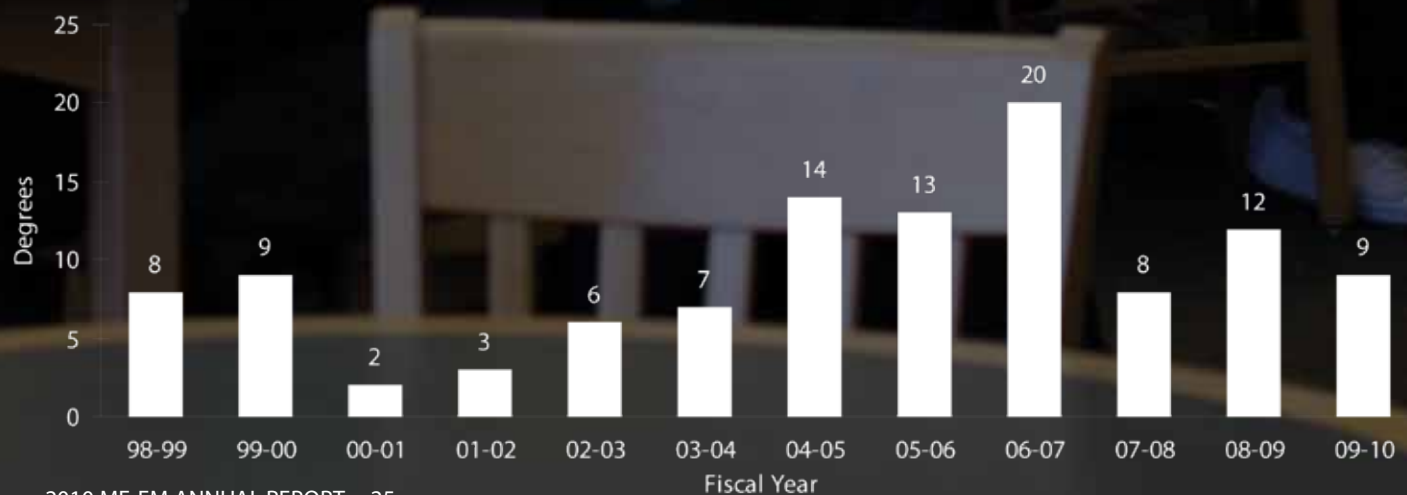
BS Degrees



MS Degrees



PhD Degrees



Alumni Awards

Dr. William W. Predebon Honorary Alumni Award



William (Bill) Predebon has been a faithful and dependable leader on campus, in the community, and in his profession as he advances the department's mission and vision.

He earned his bachelor's degree from the University of Notre Dame in 1965 and his master's

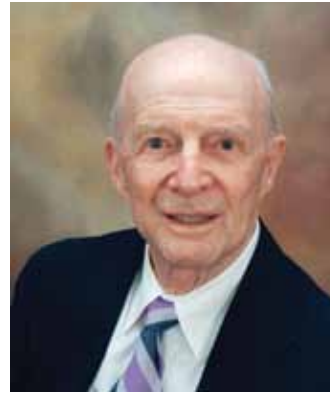
and doctorate from Iowa State University in 1968 and 1970, respectively. He worked at what is now the US Army Research Laboratory for five years and then joined the Department of Mechanical Engineering-Engineering Mechanics at Michigan Tech in 1975. He was associate chair and director of graduate studies from 1993-1997 and has been chair of the department since 1997.

Dr. Predebon, a fellow of the American Society of Mechanical Engineers, has received numerous honors, including membership in Michigan Tech's Academy of Teaching Excellence; the Outstanding Service Award from the student chapter of the Society of Automotive Engineers; Michigan Tech's Distinguished Teaching Award; the first annual Martin Luther King Award from the Black Students Association; and the Distinguished Faculty Award from the Michigan Association of Governing Boards of Colleges.

He has held summer appointments at Argonne National Laboratory, Southwest Research Institute, and Honeywell Inc./Alliant Techsystems Inc. His research has involved experimental, analytical, and computational elements and has been supported by the National Science Foundation, the Department of Defense, and other government agencies and industrial partners. He has two US patents.

He is a captain in the US Army Reserves and is a member of four honor societies: Tau Beta Pi (engineering), Phi Kappa Phi (academic excellence), Omicron Delta Kappa (leadership), and Theta Tau (engineering). His leadership has contributed to a more effective and enriching academic community.

Richard Henes Distinguished Alumni Award



Richard Henes fashioned considerable success from diligence and opportunity. A native of Menominee, Michigan, Henes earned a Bachelor of Science degree in Mechanical Engineering from Michigan Tech in 1948, followed by a law degree from the University of Michigan. In 1958, after working as an engineer

and lawyer, he moved to Arizona and established what was to become the Henes Manufacturing Company, Henes Products, and Henes Stamping. He also became a successful real estate investor in Phoenix.

He parlayed his education and his business sense into a remarkable company, turning out products as varied as electronic instruments, semiconductor parts, aircraft components, exercise equipment, a gas generator, and a cover for pickup truck beds.

Along the way, that prosperity translated into philanthropy, and Richard and Elizabeth Henes acted on their charitable instincts, with Michigan Tech the primary beneficiary. Over the course of ten years, the couple established the Henes Endowed Scholarship for students in mechanical, computer, electrical, and chemical engineering; and the Henes Chair in the Department of Mechanical Engineering-Engineering Mechanics. Most recently, they have given \$1 million to endow the Richard and Elizabeth Henes Professorship in Mathematical Sciences.

Richard and Elizabeth Henes are members of Tech's Hubbell Society for their lifetime giving and the McNair Society for their estate gift commitments. Richard is a member of the ME-EM Academy, which recognizes excellence and leadership; and a member of Michigan Tech Fund's Campaign Committee. In 2010, the Michigan Tech Alumni Association recognized his accomplishments with their highest honor, the Distinguished Alumni Award.

Henes has retired from all but real estate investing. He and his wife, Elizabeth, divide their time between Paradise Valley and Flagstaff, Arizona.

Elzbieta G. Berak and Wendy L. Kram (Davidson) are the most recent ME alumni to be inducted into the Presidential Council of Alumnae (PCA) at Michigan Tech. The PCA recognizes successful Michigan Tech women graduates for their educational excellence, past student service, professional accomplishments, and community contributions.



Elzbieta G. Berak

In 1978 Elzbieta Berak graduated from the Technical University of Wroclaw, Poland, with a master's degree in civil engineering. While at Michigan Tech, she earned two degrees—a master's in civil engineering in 1981 and a PhD in mechanical engineering—engineering mechanics in 1985. She is the first woman in Michigan Tech's history to obtain a PhD in engineering.

After graduation from Tech, Berak started her career in the nuclear power industry at Sargent and Lundy Engineers, ABB Impell Corporation, performing design and seismic analysis of nuclear power plant systems, as well as analysis of erosion-corrosion effects on structural performance of piping components. Subsequently, she worked in other industries diversifying her technical background. She is currently working on projects related to thermal and vibration fatigue issues, providing technical support to the engineering groups to ensure safe and reliable operation of nuclear power plants at Exelon Corporation.

Currently, Berak is a senior member of ASME (American Society of Mechanical Engineers) and PAEA (Polish–American Engineers Association). Recently, she received a distinguished member award from PAEA. Other professional memberships include the American Society for Civil Engineers, Society for Experimental Mechanics, and the Institute of Environmental Sciences and Technology.

Berak continues her relationship with the University by keeping in touch with the Alumni Association and the ME-EM department. While a student, she was an active member of the International Club, the German Language Club, and Phi Kappa Phi. In her community, Berak is involved in American and Polish Catholic church activities, including the John Paul II Foundation. She is passionate about skiing, skating, swimming, and playing tennis. She lives in Park Ridge, Ill., with her husband Andrzej Badziak and daughter Natalia.



Wendy L. Kram (Davidson)

Wendy Kram received a bachelor's degree in mechanical engineering from Michigan Tech in 1991. She is currently the president of Edgestone Consulting Inc., a firm she founded in 2002. Kram is also a graduate of the FastTrac II Entrepreneurial Program from the University of St. Thomas in St. Paul, Minn., and a business coach.

She began her career as a project engineer with Flint Hills Resources (formerly Koch Refining Company) in St. Paul, Minn. In 1998, Kram became a business consultant with GE Capital Consulting. In 2001, she moved into the world of small business when she joined The Credit Department, Inc., a provider of outsourced credit management services. Her experience there exposed her to the development needs of emerging small businesses. Next, Kram founded Edgestone Consulting Inc. and helped dozens of small business owners overcome growth challenges, seize new opportunities and increase their business success.

In 2007, she launched Entrespect®, a ground-breaking online community where women entrepreneurs link up to share best practices, solve tough problems and amplify their business insight and skills. In 2009, Kram launched the Propel Business Leadership Program, a unique 12-month program that brings women business owners (in like industries and similar stages of business maturity) together to help them define and achieve their business growth goals.

She serves on the Board of Directors for the Association of Women Contractors. She is a member of the Minnesota Coaches Association, Women Construction Owners & Executives USA, and the National Association of Women Business Owners. While a student, Wendy was a member of Alpha Delta Alpha sorority and continues to participate in alumni activities. She resides in Eagan, Minn., with her husband, Lynn, and their children, Rachel and Joe.

ME-EM PCA Members

(as of Fall 2010)

Mary Barker
Diana Brehob
Nancy Cragel
Mary Fisher
Kathy Grisdela
Cynthia Hodges
Susan Jesse
Tanya Klain (deceased)
Rose Koronkiewicz
Wendy Kram
Merrily Madero
Christine Roberts
Sandra Skinner
Sheryl Sorby
Martha Sullivan
Judy Swann
Susan Trahan
Kimberly Turner
Paula Zenner

2010-2011 External Advisory Board



The External Advisory Board (formerly the Industrial Advisory Committee) is a select group of corporate, university, and government leaders, many of whom are Michigan Tech alumni. EAB members share their expertise and provide assistance with curriculum direction, research topics, resource development, and education-and-industry partnerships. They offer professional insight and provide valuable input—shaping the state-of-the-art engineering education that takes place in the ME-EM department.

MEMBER	COMPANY	POSITION	MEMBER	COMPANY	POSITION
Kirby Baumgard	John Deere	Member	Brenda Moyer	Dana Corporation	Member
Steven W. Cook	American Axle & Mfg.	Member	Seth Newlin	Oshkosh Corporation	Member
John P. Davenport	GE Health Care	Member	Christopher Oberski	Ford Motor Co.	Member
Alan Frank	Whirlpool Corporation	Co-Chair	Leigh Otterlei	3M Corporation	Member
Dr. Richard R. Hofer	NASA Jet Propulsion Lab	Member	Douglas Parks	General Motors	Member
Michael Hofman	Roush Industries	Member	Christine Roberts	Motorola	Member
Brian Johnson	Chrysler	Member	Dr. Rush Robinett	Sandia National Laboratories	Member
Erin Johnson	Zimmer	Member	Dr. Paul Rogers	US Army	Member
Dr. Shashi Karna	US Army Research Laboratory	Member	Peter Sandretto	Chrysler	Member
Roger Keranen	Visteon Corporation	Member	James Sickinger	Caterpillar Inc.	Member
Frank Leban	Naval Surface Warfare Center	Member	Tom Williamson	Kimberly-Clark	Member
John Leinonen	Exponent	Member	Jeff Zawisza	Dow Chemical Co.	Co-Chair
Kevin Manor	Toyota Motor Sales	Member	Dr. Hussein M. Zbib	Washington State University	Member
Mark Masco	Bayer MaterialScience	Member			

2010 ME-EM Donations

Donors are critical to the success of the Department of Mechanical Engineering-Engineering Mechanics. Their contributions assist ME-EM in “Endowing Excellence,” a campaign that promotes the development and expansion of our education and research.

The following list encompasses the many people who have generously shared their treasure to create an outstanding ME-EM department. We are extremely grateful for their ongoing support. *Those contributing from December 1, 2009 to November 30, 2010 are listed below:*

\$100,000 - \$500,000

John & Cathi Drake
Richard & Elizabeth Henes
Forest C. Randall

\$20,000 - \$99,999

John & Joan Calder
Rudolph & Judith Shunta
Rex D. Stone P.E.

\$5,000 - \$19,999

Frank & Leslee Agosti
Dr. Sigrid Weinmann

\$1,000 - \$4,999

Jeffrey & Pamela Allen
John & Elizabeth Allen
Jean & LaVerne Anderson
Richard J. Annesser
William & Wendy Basta
Wei Chen
Robert & Gaylann Cleereman
Paul V. De Baeke
Bernard & Marilyn Finn
Mark & Michelle Gauthier
Norman & Norma Glomski
Dean & Mary Goldbeck
Kenneth & Shirley Graesser
Gerald & Ann Haycock
Ronald W. Henning
Gerald & Verla Hill
Randolph & Cheryl Hill
Daniel Kapp & Linda
Lavastida-Kapp
Charles & Marilyn Knauer
Frederick & Lou Anne
Koerschner
Andrew Kolosiuk
Gary & Corliss Lawrey
James & Carolyn Luyckx
Dianne A. Malesko
Raymond & Juliana Marttila
Donna J. Michalek
William & Mary Mohs
Darwin & Margarita Moon
Hugh & Nancy Moore
Brenda M. Moyer
Eric & Vicky Nielsen

Michael & Carol Paradis
Lynn E. Peterson
Gerald & Kathleen Philo
William & Mary Ann Predebon
Jan & Ellen Rankinen
Daniel & Eleanor Rivard
Dale & Sarah Roberto
Peter & Anita Sandretto
Earl & Sylvia Seppala
David & Julee Sipes
Ronald & Elaine Starr
David & Linda Stone
Timothy & Lori Thomas
Camiel & Anne Marie Thorrez
John & Beverly Van Nieuwal
Larry & Deborah Vojtech
Dean & Suzi Waldie
Gary L. Wick
Louis & Jo Ann Wozniak
Jeffery & Melissa Zawisza

\$500 - \$999

Gregory & Ann Agosti
Donald & Lavina Barkel
John & Sharon Campbell
Robert & Patricia Carlson
Juan & Dorothy Dalla Rizza
Larry & Kathryn Dinkel
Gaylord & Mary Faul
Steven J. Fornetti
Thomas & Barbara Fowler
Alvin & Janice Gebeau
Prof. Aubrey W. Gibson
James & Susan Hall
William C. Hamilton P.E.
Paul & Tracy Hewelt
Jason & Andrea Holman
Thomas K. Hopp
Marc & Janet Hotchkiss
Thomas & Susan Jamar
Arthur J. Koski
Mark & Patricia Lecznar
Susan & Ray Lewis
Patrick & Joanne Macaulay
Terrence & Rosalie Maki
Michael S. O'Brien

William & Claire Ojala
Nathalie E. Osborn
William & Mary Owens
Kenneth & Cathy Panasiewicz
Charles & Judy Paterka
William H. Risteen
Charles & Terry Roossien
Helena & David Seiver
James & Charlene Sickinger
Jacque C. Smith
Don & Mary Wacker
Robert & Sandra Westphal
Wayne & JoAnne Wheelock
Duane & Claire Williams
Kenneth & Jennifer Williams

\$250 - \$499

Valerie J. Allan
John & Barbara Baker
Ruth E. Balagna
Michael & Terese Banas
Robert P. Batchelder
Kirby Baumgard & Lisa
Brodersen
Steven & Julie Bergdolt
Dale & Margaret Bero
Ralph & Wilamae Bockstahler
Michael P. Bria
Dr. Nels S. Christopherson
Richard & Georgia Crosby
Ronald & Kathey Czischke
Danny & Carol Dodge
Lawrence & Sharon Duhaime
Bruce & Barbara Duiser
Robert & Amalia Earley
Christopher J. Essenburg
R. James & C. Anita Fagan
Kathleen A. Goulette
Gary & Cheryl Grinn
Gary & Mary Guertin
David & Janice Hegg
Jerold & Joyce Hershberger
Joanne Hofman
Kenneth & Mary Horton
Donald & Terralynn
Keski-Hynnili

Timothy & Laura Kilbride
Edward F. Kodunce
James & Megan Koski
Stanley & Mary Kramer
Charles & Gayle Lamoreaux
Roger W. Lange
Wendy & Paul Lange
Amber B. Lass
Charles & Phyllis Laurila
John & Joan Leinonen
James & Jenny Leitch
Paul & Vera Lempio
Michael & Audrey Lovell
Graham & Tulim Markes
James & Linda Mattson
Roy T. Mattson
Bruce Monroe & Rachel
Nixon-Monroe
Charles & Judith Nemec
Sudhakar & Maneesha Pandit
Dennis & Julia Person
Dale & Lisa Peterson
Christopher & Melissa Plude
Daniel Raubinger & Debra
Messina Raubinger
Andrew & Evelyn Robinson
Gregory & Renee Roth
Trista K. Schieffer
Allyn & Joan Smith
James & Eleanor Sorenson
Harry & Kristina Squibb
James & Beth Stickland
Scott R. Stilson
Eugene & Nancy Suppelsa
Chester J. Taylor
William & Judy Todd
John E. Twa
William & Beth Unaitis
Kenneth A. Waisanen
Daniel D. Watson
Jeanne A. Watz
Rodney & Donna Wegner
Rita & John Williams
Larry & Sue Yager
Paula & Mark Zenner
Mark & Teresa Zimmerman

Contracts & Grants

Space Systems

\$1,602,149

TITLE	NAME	SPONSOR	AWARD
A Nanosatellite Calibration Target for Attitude and Shape Recognition Models	Brad King	US Dept of Defense	\$159,958
Michigan/AFRL Center of Excellence in Electric Propulsion	Brad King	University of Michigan	\$1,039,904
Oculus-ASR Nanosatellite	Brad King Co-PI: Philip Hohnstadt	University of Michigan - Michigan Space Grant Consortium	\$2,500
Photogrammetric Small Unmanned Aerial Vehicle (PSUAV) -Aerospace Enterprise	Brad King Co-PI: Benjamin Gerhardt	University of Michigan - Michigan Space Grant Consortium	\$2,500
Flow Prediction and Fluctuation-sensitivity Investigations for Quasi-steady Shear Driven Condensing Flows in Milli-meter to Micro-meter Scale Two-Phase Systems	Amitabh Narain	National Science Foundation	\$297,287
Ground-based Experimental and Computational Investigations of Shear Driven Internal Condensing/ Boiling Flows for Flight Experiments and Space-based Two-Phase Systems	Amitabh Narain	National Aeronautics Space Administration	\$100,000

Multi-Scale Sensors and Systems

\$7, 590,915

TITLE	NAME	SPONSOR	AWARD
Multiscale Modeling of the Effects of Physical, Chemical, and Hydrothermal Aging on Failure of Graphite/Epoxy Composites	Gregory Odegard	National Aeronautics Space Administration	\$201,254
Finite Element Modeling of Intraneural Ganglion Cysts	Gregory Odegard	Mayo Clinic Rochester	\$146,480
Multiscale Modeling of Failure and Damage of Thermosetting Polymer Networks	Gregory Odegard	US Dept of Defense	\$225,618
Crane Pendulation Control System Development and Demonstration	Gordon Parker Co-PI: Jason Blough	BMT Designers & Planners Inc	\$181,112
CRI II: New: Data-Parallel Platform for Large-Scale Simulation of Agent-Based Models in Systems Biology	D'Souza, Roshan	National Science Foundation	\$349,910
Development of a Ship-Launched Aerial Delivery System	Gordon Parker	Craft Engineering Associates Inc	\$159,901
Multiscale Modeling of Polymer Nanocomposites	Gregory Odegard	National Aeronautics Space Administration	\$134,748
An Engineering Research Center in Wireless Integrated Microsystems	Robert Warrington Co-PI: Craig Friedrich	University of Michigan	\$6,191,892

Mechanics of Multi-Scale Materials

\$1,920,504

TITLE	NAME	SPONSOR	AWARD
Structure and Function of Meniscal Horn Attachments	Tammy Haut-Donahue	US Dept of Health & Human Services	\$451,199
A Microstructure-Based Modeling Approach to Characterize Asphalt Materials	Zhanping You Co-PI: Qingli Dai Co-PI: Thomas Van Dam	National Science Foundation	\$216,819
EAGER: Accurate and Efficient Surrogate Modeling Applied to Computational Mechanics	Spandan Maiti	National Science Foundation	\$106,123
Dynamic Gait Replication of Normal Loading and Disuse of the Human Knee	Tammy Haut-Donahue Co-PI: Adam Abraham	University of Michigan - Michigan Space Grant Consortium	\$5,000
Design of Nanosphere Drug Delivery for Disuse Model	Tammy Haut-Donahue Co-PI: Megan Killian	University of Michigan - Michigan Space Grant Consortium	\$5,000
Laboratory Evaluation of Warm Mix Asphalt	Zhanping You Co-PI: Qingli Dai	Michigan Dept of Transportation	\$190,001
New Methodologies in Design of Small Blood Pumps	Tammy Haut-Donahue	Pennsylvania State University	\$70,034
Microfluidic Fabrication of Self-Healing Microfibers for Composite Construction Materials	Dennis Meng Co-PI: Qingli Dai Co-PI: Zhanping You	National Science Foundation	\$380,818
Real Time, In Vivo Mapping of Tibiofemoral Contact Pressures in Knee Arthroplasty Implants	Keat Ghee Ong Co-PI: Tammy Haut-Donahue	US Dept of Health & Human Services	\$167,747
A New Prospective on Energy Harvesting Nanowires: The Role of Chemistry and Structures of Nanowires	Reza Shahbazian Yassar Co-PI: Yoke Khin Yap	National Science Foundation	\$327,763

Engineering Education Innovation

\$2,270,169

TITLE	NAME	SPONSOR	AWARD
Weaving Threads of Sustainability into the Fabric of the Mechanical Engineering Curriculum: Impacting the Fundamental Manner in which Students Solve Problems	Michele Miller Co-PI: John Gershenson Co-PI: Charles Margraves Co-PI: Ibrahim Miskioglu Co-PI: Gordon Parker	National Science Foundation	\$144,605
Multi-disciplinary Systems Engineering: Engaging MSI STEM Students through Space-based Capstone Design	John Gershenson Co-PI: Michele Miller Co-PI: Shalini Suryanarayana	Universidad del Turabo	\$81,840
Michigan Tech SSEED: Sustained Support to Ensure Engineering Degrees	Michele Miller Co-PI: Christine Anderson Co-PI: Jackie Huntoon Co-PI: James Turnquist Co-PI: Christopher Wojick	National Science Foundation	\$622,144

Contracts & Grants

Strategies for Support of the STEP Program	Sheryl Sorby Co-PI: Tammy Haut-Donahue	National Science Foundation	\$351,371
Workshops to Increase Engineering Participation in the Noyce Program	Sheryl Sorby Co-PI: Tammy Haut-Donahue	National Science Foundation	\$278,156
US Air Force Academy IPA	Edward Lumsdaine	US Dept of Defense	\$309,809
Hydrogen Education Curriculum Path at Michigan Technological University	Jason Keith Co-PI: Jeffrey Allen Co-PI: David Caspary Co-PI: Daniel Crowl Co-PI: Jay Meldrum Co-PI: Dennis Meng Co-PI: Abhijit Mukherjee Co-PI: Jeffrey Naber	US Dept of Energy	\$482,244

Advanced Power Systems

\$9,483,578

TITLE	NAME	SPONSOR	AWARD
Analysis of Ranking Cycle Waste Heat Recovery System Using Simulation Tools	Scott Miers	Carbontec Energy Corp	\$21,729
Biomass Combustion Studies at L'Anse Warden Electric Company, LLC (LWEC)	Jeffrey Naber Co-PI: Rikard Gebart Co-PI: Jeremy Worm	L'Anse Warden Electric Co LLC	\$23,071
Market Trading Optimization	Jeffrey Naber Co-PI: Karthik Krishna	White Pine Electric Power, LLC	\$32,993
Modeling of a Diesel Oxidation Catalyst and Catalyzed Particulate Filter (DOC-CPF) System with Active Regeneration Using a Hydrocarbon Injection System (Year 4)	John Johnson Co-PI: Jason Yang	John Deere Co	\$476,650
E3 Spark Plugs - Chemiluminescence Images for Movie Creation	Seong-Young Lee Co-PI: Jeffrey Naber	E3 Sparkplugs	\$7,001
Characterizing Torque Converter Noise Generation at Various Speed Ratios to Enable Vehicle Efficiency Improvements	Jason Blough Co-PI: Carl Anderson Co-PI: Mark Johnson	General Motors Corp	\$102,560
Statement of Work for Nostrum Energy: Engine Studies and Modeling Phase II	Jeffrey Naber Co-PI: Bo Chen Co-PI: Jeremy Worm	Nostrum Energy, LLC	\$39,969
Investigation of Combustion Instabilities in Lean-Premixed Gas Turbine Combustors	Seong-Young Lee Co-PI: Andrew Ramsey	University of Michigan - Michigan Space Grant Consortium	\$2,500
Visualization of Vaporizing Diesel Sprays in the Combustion Vessel	Naber, Jeffrey Co-PI: Seong-Young Lee	Ford Motor Co	\$62,863
Demeter Fuel Catalyst Testing on Small, Internal Combustion Engines with Open-Loop Fuel Control Systems	Scott Miers	Demeter Systems, LLC	\$129,855

Stability, Cellular Structure, and Heat Transfer of Evaporating Films in Normal and Reduced Gravity	Jeffrey Allen	National Aeronautics Space Administration	\$120,602
Development of P & W SDG's PIV and PLIF System Applicable to Non-Reacting Flow System	Seong-Young Lee	Pratt & Whitney	\$45,000
CAREER: Dynamics of Fluid-Structure-Control Interaction in Rotating Aerodynamic Bodies	Fernando Ponta	National Science Foundation	\$548,111
Imaging Ignition and Flame Kernel Development	Seong-Young Lee Co-PI: Jeffrey Naber	E3 Sparkplugs	\$12,900
An Interdisciplinary Program for Education and Outreach in Transportation Electrification	Carl Anderson Co-PI: Jeffrey Allen Co-PI: John Beard Co-PI: Leonard Bohmann Co-PI: Bo Chen Co-PI: Stephen Hackney Co-PI: Jason Keith Co-PI: Jay Meldrum Co-PI: Bruce Mork Co-PI: Jeffrey Naber Co-PI: Chris Passerello Co-PI: Wayne Weaver Co-PI: Jeremy Worm	US Dept of Energy	\$3,791,030
Research Collaboration with Argonne National Laboratories for Graduate Student Research in Internal Combustion Engines	Jeffrey Naber Co-PI: Scott Miers	Argonne National Laboratory	\$102,064
Development of Microstructural Mitigation Strategies for PEM Fuel Cells: Morphological Simulations and Experimental Approaches	Jeffrey Allen Co-PI: Reza Shahbazian Yassar	Ballard Power Systems	\$529,936
CAREER: Gas-Liquid Interface Dynamics and Dissipation Mechanisms in Capillary-Scale Two-Phase Flow	Jeffrey Allen	National Science Foundation	\$824,783
Experimental Studies for DPF and SCR Model, Control System, and OBD Development for Engines Using Diesel and Biodiesel Fuels	John Johnson Co-PI: Gordon Parker Co-PI: Jeffrey Naber Co-PI: Jason Yang	US Dept of Energy	\$2,345,181
Effects of Dispersed Carbon Nanotubes on Acoustic Properties of Polymer Foams	Mohan Rao Co-PI: Andrew Willemsen	National Aeronautics Space Administration	\$60,000
A Fluid-Structure Interaction Study in Wind-Turbine Blades	Fernando Ponta	National Science Foundation	\$204,780

Manufacturing and Product Design

\$46,224

TITLE	NAME	SPONSOR	AWARD
Identifying Costs and Funding Alternatives for Equipping Operating-While-Intoxicated (OWI) Offenders with Ignition Interlock Devices	John Hill	Wisconsin Department of Transportation	\$46,224

Graduate Distance Learning Program



PROFESSIONALS GAINING DEGREES

One of the best-kept secrets within the ME-EM department may be the graduate distance learning program. And according to Dr. Craig Friedrich, Director of ME-EM Graduate Studies, that is entirely intentional.

Even without the benefit of active marketing, the ME-EM graduate distance learning program currently enrolls approximately forty students, half master's students and half PhD students. Many, but not all, students received their BSME degrees from Michigan Tech. They are employed by companies such as General Motors, Ford, Mercury Marine, General Electric, TARDEC, and the Mayo Clinic. Courses are delivered online, and Michigan Tech instructors continue to experiment with different course-delivery technologies. Live, web-based sessions can be set up when interactivity is required, such as in question and answer sessions. PhD students must complete a research project under the supervision of a faculty advisor, just as in the on-campus programs.

Friedrich says that because the ME-EM graduate distance learning students are already employed in the field, they often have qualities that on-campus students do not typically possess. "These students can see where their knowledge gaps are and where the technological challenges lie," he says. "Most of these students have also been involved in a corporate research type of environment and are aware of areas their companies would like to have researched." The exposure to real-world



problems also benefits Michigan Tech faculty who advise these students. "Our faculty have the opportunity to see a broader set of problems and different challenges and can develop expertise in new areas," Friedrich says.

Given all of this success and interest, why not launch a marketing campaign to sign up as many graduate distance learning students as possible? Friedrich feels it is essential that the program's growth be carefully managed. The rapid rise in distance learning programs in recent years has led people to question the integrity and rigor of some programs. "We must ensure that the online program is the same degree and just as rigorous as the on-campus degree. The ME-EM department is committed to making sure that our online programs are true Michigan Tech degrees and are valued as such," Friedrich says. "We are unwilling to let the standards slip."

Graduate Seminar Series

A committee of Michigan Tech faculty members organizes the ME-EM Graduate Seminar Series each year, offering graduate students opportunities to expand their knowledge base to areas of study outside their specific research. During academic year 2009-2010, Dr. Ibrahim Miskioglu was the chair of the committee which creates an agenda of compelling topics for both students and faculty. Composed of a diverse mix of renowned leaders representing academia, industry, and government, the 2009-2010 Academic Year Seminar Series featured the following speakers:

EXTERNAL SPEAKERS

Linda Ng Boyle

University of Washington
Mitigating the Effects of Driver Distraction

Silvia Salinas Blemker

University of Virginia
Multi-scale modeling as a framework for uncovering the relationships between skeletal muscle structure, function, and injury

Seonghwan Kim

Oak Ridge National Laboratory
Nanomechanical microcantilever sensor: a versatile platform for physical, chemical, and biological detection and analysis

Michelle L. Oyen

Cambridge University
Characterization of Poroelastic Properties of Hydrated Tissues by Indentation Testing

Daniel Kelly

University of Dublin, Trinity College
The role of environmental factors in regulating chondrogenesis of mesenchymal stem cells – Implications for cell based cartilage repair therapies

Hussein Jirdeh

University Space Research Association
The Universities Space Research Association

James C. Hermanson

University of Washington
Structure and Emissions of Strongly-Pulsed Turbulent Diffusion Flames in Normal- and Microgravity

Mark Musculus

Sandia National Laboratories
Laser-Based Imaging of combustion Processes in Clean Diesel Engines

Wendy Crone

University of Wisconsin - Madison
Bioactive Polyurethane Copolymers: Hemocompatibility, Mechanics, and Medical Device Applications

Scott Retterer

Oak Ridge National Laboratory
Development of Nanoporous Silicon Bioreactors within a Microfluidic Platform

Roop L. Mahajan

Tucker Chair Professor at Virginia Tech
Beyond Silos: Integrating Interdisciplinary Research and Education in the Academe

Terry Woychowski

Vice-president of General Motor's Global Vehicle Program Management
Leadership - Changing the World Through Influence

Adam J Rutkowski

Air Force Research Laboratory
Bio-Inspired Odor Source Localization

Dave Windstein

President, Twin Pines Solutions, LLC
Some Random Thoughts on the Role of Statistics in Product Design

Thomas O. Fowler

Shell Exploration and Production
Energy Challenges in USA, Oil Shale's Potential Role

Kazuya Tajiri

Argonne National Laboratory
Startup and Shutdown of Automotive Fuel Cell Stacks

T. Alan Lovell

Air Force Research Laboratory, Space Vehicles Directorate
An Overview of the Space Scholars Program: Summer Research Opportunities in the Air Force Research Laboratory

MICHIGAN TECH SPEAKERS

Bo Chen

Mechanical Engineering - Engineering Mechanics department at Michigan Technological University
Building Adaptive Monitoring Networks: Applying Lessons Learned from Biological Systems

Sheryl A. Sorby

Mechanical Engineering - Engineering Mechanics department at Michigan Technological University
Developing 3-D Spatial Skills for Engineering Students

Seong-Young Lee

Mechanical Engineering - Engineering Mechanics department at Michigan Technological University
Fundamentals and Applications of Pulse Detonation Engine

Jeffrey S. Allen

Department of Mechanical Engineering - Engineering Mechanics at Michigan Technological University
Capillary Phenomena in Fuel Cells

James De Clerck

Department of Mechanical Engineering - Engineering Mechanics at Michigan Technological University
Comparison of Test and Analysis Results for the Purpose of Model Validation

Gregory Odegard

Michigan Technological University
Powerpoint Presentation Guidelines

John Hill

Michigan Technological University
A Systems Engineering Approach to Human Factors Research

Reza Shahbazian-Yassar

Michigan Technological University
Real-Time Electro-Mechanical Coupling in One-Dimensional Materials

Keat Ghee Ong

Department of Biomedical Engineering, Michigan Technological University
Wireless, Passive Sensor Technologies

Chang Kyong Choi

Mechanical Engineering - Engineering Mechanics department at Michigan Technological University
Research in the areas of microscopic imaging techniques, microfluidics, micro/nano-fabrication, and opto-electric cellular sensing

PhD & MS Graduates

PhD GRADUATES FOR SUMMER 2009, FALL 2009, and SPRING 2010 (9)

Clarke-Sather, Abigail R. Advisor: John W. Sutherland
Decentralized or Centralized Production: Impacts to the Environment, Industry, and the Economy

Diaz-Gonzalez, James Advisor: Gordon G. Parker
Closed Loop Docking with a Nearly Periodic Moving Target

Dilworth, Brandon J. Advisor: Jason R. Blough
Identification of Ground and Environmental Effects to the Pass-by Noise Testing of Snowmobiles

Fossum, Emily C. Advisor: Lyon B. King
Electron Mobility in ExB Devices

Hutchins, Margot J. Advisor: John W. Sutherland
Framework, Indicators, and Techniques to Support Decision Making Related to Societal Sustainability

Lin, Fei Advisor: Mohan D. Rao
Vibro-Acoustical Analysis and Design of a Multiple-Layer Constrained Viscoelastic Damping Structure

Makela, Jason M. Advisor: Lyon B. King
Re-generable Field Emission Cathodes for Electric Propulsion

Polonowski, Christopher J. Advisor: Jeffrey D. Naber
Accelerometer Based Measurements of Combustion in an Automotive Turbocharged Diesel Engine

Xie, Kang Advisor: Jaime A. Camelio
Analysis, Prediction and Control of Variation Propagation in Non-Linear Sheet Metal Assembly Processes

MS GRADUATES FOR SUMMER 2009, FALL 2009, and SPRING 2010 (43)

Abdollahzadeh, Navid Advisor: Craig R. Friedrich
Course work only

Agarwal, Aabhas S. Advisor: Craig R. Friedrich
Course work only

Agrawal, Vijay M. Advisor: Craig R. Friedrich
Course work only

Austin, Gregory T. Advisor: Jeffrey D. Naber
Effects of Biodiesel Blends on Particulate Matter Oxidation in a Catalyzed Particulate Filter during Active Regeneration

Barkley, Matthew D. Advisor: Craig R. Friedrich
Course work only

Bhagwat, Adwait G. Advisor: Craig R. Friedrich
Course work only

Blecke, Jill C. Advisor: Gordon G. Parker
Course work only

Camps, Ryan D. Advisor: Michael R. Neuman
Course work only

Coughlin, Christopher J. Advisor: John E Beard
Characterization of Ball Nut Support Bearings in an Electric Power Steering Rack

Garg, Bhanu Advisor: Craig R. Friedrich
Course work only

Gillahan, David M. Advisor: Craig R. Friedrich
Course work only

Gouthaman, Varun Advisor: Reza Shahbazian-Yassar
Micro-Fabrication of a Bio-MEMS Force Sensor for Measuring Force Response of a Living Cell

Ji, Shuangke Advisor: Craig R. Friedrich
Course work only

Johnson, Samuel E. Advisor: Jeffrey D. Naber
Premixed Lean Gas Combustion and HPCR Rate of Injection used with a Constant Volume Combustion Vessel

Kalenauskas, Eric W. Advisor: Jeffrey Allen
Calibration Methods of an Acoustic Doppler Current Profiler & Investigations of the Critical Wave number in Unstable Evaporating Thin Films

Kaushik, Anirudh Advisor: Craig R. Friedrich
Course work only

Khandale, Rohan S. Advisor: Craig R. Friedrich
Course work only

Kikani, Dhairya A. Advisor: Craig R. Friedrich
Course work only

Kipf, Matthew W. Advisor: Craig R. Friedrich
Course work only

Kumar, Ram V. Advisor: Craig R. Friedrich
Course work only

Kurup, Varun V. Advisor: Craig R. Friedrich
Course work only

Ladia, Saurabh Advisor: Jeffrey D. Naber
Course work only

Lange, Robert A. Advisor: Scott A. Miers
Course work only

Lu, Wen Advisor: Craig R. Friedrich
Course work only

Lund, Karl O. Advisor: Craig R. Friedrich
Course work only

Mehta, Jigar K. Advisor: Craig R. Friedrich
Course work only

Melitz, Benjamin M. Advisor: Charles D. Van Karsen
Feasibility Assessment of Inverse Frequency Based Substructuring to Obtain Automotive Powertrain Mount Properties

Mohan, Shiriraj Advisor: Craig R. Friedrich
Course work only

Nabar, Vikram A. Advisor: Craig R Friedrich
Course work only

Narendranath, Aneet D. Advisor: Abhijit Mukherjee
Course work only

Ng, Kenny Advisor: Jeffrey Allen
Experimental Analysis of a Micro Tube Hydroforming Process

Niemela, Carrie S. Advisor: Lyon B. King
Course work only

Parekh, Brijesh B. Advisor: Craig R Friedrich
Course work only

Rouse, Brandon T. Advisor: Jeffrey D. Naber
Part Load Combustion Characterization of Ethanol-Gasoline Fuel Blends in a Single Cylinder Spark Ignition Direct Injection Variable Cam Timing Variable Compression Ratio Engine

Shah, Jay K. Advisor: Jeffrey D. Naber
Estimating Residual Gas Fraction for SI Engines with Dual Independent Variable Valve Timing Systems

Shah, Pritesh A. Advisor: Craig R. Friedrich
Course work only

Sinha, Abhimanyu S. Advisor: Craig R. Friedrich
Course work only

Stacy, Russell E. Advisor: Jeffrey Allen
Contact Angle Measurement Technique for Rough Surfaces

Surenahalli, Harsha S. Advisor: John H. Johnson
A Modeling Study of a Diesel Oxidation Catalyst and Catalyzed Particulate Filter During Loading and Active Regeneration

Swanson, Tara E. Advisor: Craig R. Friedrich
Titanium Surface Morphologies and their Effect on Vancomycin Loading and Release Profiles for Orthopedic Applications

Thangavelu, Giridharan Advisor: Craig R. Friedrich
Course work only

Willemsen, Andrew M. Advisor: Mohan D. Rao
Objective Metric for Assessing the Perceived Annoyance of Impulsive Sounds

Zhao, Fangzhou Advisor: Craig R. Friedrich
Course work only

ME-EM ACADEMY LIST

The purpose of the Michigan Tech Academy of Mechanical Engineering and Engineering Mechanics is to honor outstanding graduates of the department. Selection recognizes excellence and leadership in engineering and civic affairs. This induction honors some of the most successful of the department's more than 11,000 alumni. Academy members serve as role models for future students.

Frank Agosti, BSME 1958*
Carl Avers, BSME 1962
Richard Bayer, BSME 1944
Wilfred Bobier, BSME 1943
John Cook, BSME 1942
Charles Cretors, BSME 1963
Charles Cronenworth, BSME 1944
Robert D'Amour, BSME 1948
Dean Diver, BSME 1965
John Drake, BMSE 1964, MSBA 1969
Theodore Edwards, BSME 1950
Edward Gaffney, BSME 1951
Joseph Gemignani, BSME 1953
John Hallquist, MSEM 1972, PhD ME-EM 1974
William Hartwick, BSME 1948
Gerald Haycock, BSME 1968
Ralph Hayden, BSME 1933
Hussein M. Zbib, BSME 1981, MSME 1983, PhD ME-EM 1987
Raymond Kauppila, MSME 1960
Pete Knudson, BSME 1964
Martin Lagina, BSME 1977
Charles Laurila, BSME 1959
Gary Lawrey, BSME 1979
Craig Lazzari, BSME 1942
Albert Maki, BSME 1948
Paul Masini, BSME/BBA 1969
Tom McKie, BSME 1947
Fred Mitchell, BSME 1961
Bob Monica, BSME 1950
Merle Potter, BSME 1958, MSEM 1961
Norman Pratt, BSME 1942
Jack Real, BSME 1939
James L. Reum, BSME 1953
Dan Rivard, BSME 1959.
Richard Robbins, BSME 1956
Fred Sherriff, BSME 1963
James Sorenson, BSME 1960, MSEM 1961
James Stone, BSME 1940
Paul Swift, BSME 1933
Camiel Thorrez, BSME 1970
Robert Thresher, BSME 1962, MSME 1967
William Turunen, BSME 1939
James Vorhes, BSME 1947
Thomas Walker, BSME 1968
Harold Wiens, BSME 1968

* Only MTU degrees listed.

BS Graduates (218)

SUMMER 2009

Christopher P Ahnen
Adam C Bono
Keegan Erik Burggren
Shawn P Fanello - Cum Laude
Kaylyn Marie Gaul
Charles Peter Hebert
Georgio Martel Holt
Adam Roger Kantor
Michael TC Lennon
Aaron John Marzean
Derrick D Metz
Victoria Leigh Rankin
Tyler Franklin Schoenherr - Summa Cum Laude
Sudhanshu Talwar
Caleb C Walker - Magna Cum Laude
Brett Thomas Waterson-Rosso - Cum Laude
Joseph Charles Wlodyka
Yi Xue - Summa Cum Laude

FALL 2009

Nicole J Barna - Cum Laude
Thomas Daniel Blakeslee
William John Bodeis
Raymond Thomas Cross
Joshua John Culliton
Joshua James DeSmet - Cum Laude
Jeffrey Cight Decker - Magna Cum Laude
Joshua James Dorr
James A Evanski
Matthew L Goddard
Chad Matthew Goffar
Patrick Arthur Green
Adam Douglas Habegger
Kristopher Alan Harrington
Emily J Harrison - Cum Laude
Christopher Paul Heczko
Vang You Her
Daniel John Jacobson
Karen Marie Jarvey - Magna Cum Laude
Kent Steven Kalen
Nicholas Matthew Kevnick
Nathan Stephen Fredrick Klein
Michael Adam Lecureux - Cum Laude
Jacob Paul Longhini
Nurgali Makhmutov - Summa Cum Laude

William Michael Matson
Akihiro Max Matsumura
Jay Scott Meldrum - Cum Laude
Edmond Joseph Meyer
Jason Robert Noland
Anthony Wesley Osborne
Marcus J Pennala
Nicholas C Peot
Xiao Jun Qiao
Peter Paul Radecki - Magna Cum Laude
Tyler Matthew Reno
Heather Leah Robertson - Cum Laude
Jonathan Alan Salzman - Summa Cum Laude
Charles T Schlaud
Quincy A Schultz
Lee Semmerling
Ashal Jagdish Shah - Magna Cum Laude
Shivank Sharma
Matthew Alexander Springs
Jordan Daniel Stank - Cum Laude
Bryan Dennis Steinhoff - Magna Cum Laude
Bradley Robert Szkrybalo
Matt T Thielking
David M Thomasini
Patrick Joseph Timmons
Derek Lee VandenBosch
Aaron Hansen Vergin - Summa Cum Laude
Jason Michael Vincenz
Robert Randall Waara
William Geromy White
Andrew J Wickenheiser - Magna Cum Laude

SPRING 2010

Brett Raymond Anderson - Magna Cum Laude
William Ryan Atkinson
Elliot Lawrence Beck
Joseph M Berwyn - Cum Laude
Adam Joseph Bieber - Summa Cum Laude
Matthew P Boertman
James Patrick Boex
Andrew Garrick Bomstad - Summa Cum Laude
Kyle Shane Bowman
Tyler David Bushelle - Cum Laude

Joshua William Cassavoy
Michael Jeffrey Clark
Jacob A Colantonio
Timothy W Cook - Cum Laude
Zachary D Cousineau
Kevin A Crass
Khanh Duc Cung
Chelsea M Curriston
Simon Gabriel Dezelski - Summa Cum Laude
Jennifer Mariel Diaz - Cum Laude
Paul Whitney Dice
Eric Peter Diehr - Cum Laude
Brendan Richardson Dodge
Kyle Gene Domagalski
William C Donovan
Peter Ernest Duesing
Jeremy James Egger
Glenn Richard Erickson
David J Flessert
Brandon Lee Fralick
Jason Dwain Freudigmann
Michael Lawrence Freundl
Derek Michael Frie
Daniel J Ganzel
Jacob Leo Gatien
Michael Phillip Gebauer
Brett D Gerner
Kenneth John Gilkerson - Summa Cum Laude
Robert W Gisch
Evan M Giusti
Ryan Patrick Glaske
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Senior Manager Fabric Care
Approval Labs
Whirlpool Corporation

Fall 2010
Glen Simula
President and Co-Founder
GS Engineering

Journal Articles

* Please note: **Bold text** indicates ME-EM faculty members and *italicized text* indicates ME-EM students.

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