

7 FACULTY & STAFF IMPROVING THE FUTURE—ONE STEP AT A TIME

JOHN K. GERSHENSON
ASSOCIATE PROFESSOR



Since arriving at Michigan Tech in 2000, John Gershenson has been teaching and researching product and process design in the ME-EM Department. He views product and process design as extending from a technological need to producing a tool for that need, or a “widget,” as he calls it. Gershenson’s central focus is on achieving lean and agile methods of design and manufacturing, with an emphasis on function, efficiency, and cost reduction.

His contracts with industrial sponsors such as General Motors Corporation (GM) are an important part of his research. “While working within the walls of the university is a valuable experience, unless one can get out there and talk with industry, work with industry, and experience industry, your impact within the field is limited,” he said.

Gershenson is currently researching product modularity and architecture through a project sponsored by the National Science Foundation (NSF). This research will allow companies to quantify the relationship between product modularity and the cost of developing and manufacturing a product.

For example, suppose a company produces twenty-seven different refrigerator models. They could choose to manufacture twenty-seven unique fridges. Alternatively, they could modularize their design and production and rely on only three different door styles, three different volumes, and three colors to offer twenty-seven refrigerators. Modularity can lead to considerable savings across the entire life-cycle of a product from development to manufacturing. “When you modularize

your design you gain economies of scale,” summarizes Dr. Gershenson. Manufacturing, assembly, and service are all simpler and cost less.

His research is different from other projects in the field because it focuses on the connection between the level of a product’s modularity and the type of product architecture that would be most efficient for a company to use. Product architecture is the organization of product families within a company.

The relationship between modularity and efficiency in manufacturing and design has historically been murky. Gershenson’s work with the NSF is a comprehensive study that examines the entire life-cycle of a product. His research will allow companies to more clearly understand how modularity and product architecture affect efficiency so that they can make informed, quantitative decisions about their production processes.

Efficiency plays an important role in another of Gershenson’s research projects that is sponsored by GM. He is studying how to apply lean principles to engineering processes. The goal is to more efficiently

use resources such as employee time, capital costs, and machine availability to minimize waste in engineering. GM has already seen significant benefits from Gershenson’s research. They applied lean engineering principles to a manufacturing engineering process to reduce the process lead time by over ninety-six percent.

Gershenson is the director of Michigan Tech’s Life-cycle Engineering Lab. He supervises twelve students who range in experience from undergraduates to PhD



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candidates. Gershenson encourages the students to work as a team and consult with each other on their projects. The cooperative effort gives them a broad view of their work that is valued in both industry and academia. Students who have worked in the MTU's Life-cycle Engineering Lab have had very good job placement in leading organizations.

Gershenson, a 37-year-old New York native, earned his BA in Physics from Cornell University. He then moved on to Ohio State University to earn his MS in Mechanical Engineering and finally to the University of Idaho, where he earned his PhD in Mechanical Engineering. After completing his studies at the University of Idaho, he taught at both the University of Alabama and Utah State University before joining the Michigan Tech faculty.

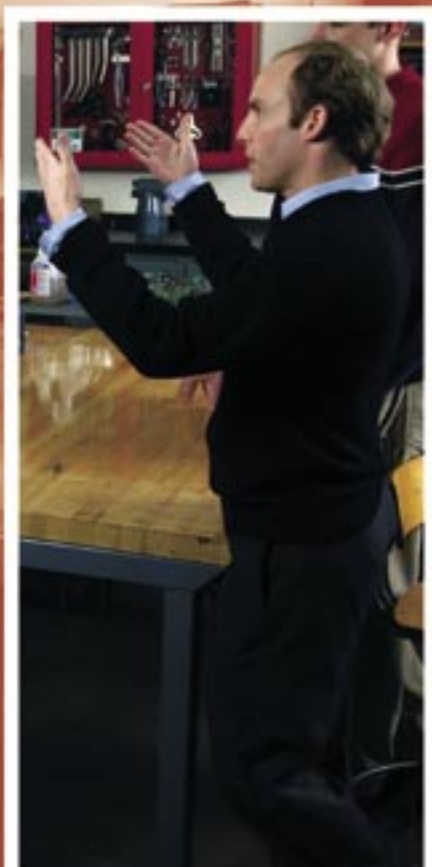
Geographically, MTU lies in the heart of Northern Michigan's Copper Country. Named for the great copper mining surge in the 1800s, the Copper Country is surrounded by Lake Superior and thousands of acres of great northwoods

that provide endless opportunities for the outdoor enthusiast. Gershenson enjoys activities like mountain biking and snowboarding. He says, "This place has everything to offer just outside my back door."

Gershenson enjoys the collaborative atmosphere among the University's faculty. "I've never had this opportunity before," he says. "This is why I came to MTU." He also enjoys contributing to one of the largest mechanical engineering programs in the country. "Statistics speak for themselves," he says. "For twenty-one years we've been among the top five programs in the country, in terms of undergraduate degrees awarded. You don't stay in the top five if you're not producing top quality."

Gershenson is committed to continuing Michigan Tech's tradition of excellence. He enjoys teaching and highly values the rich interaction with students as he supports their ongoing education and development. As part of the ME-EM faculty, Gershenson can actively pursue his passion to improve our future through efficient, less wasteful engineering and manufacturing.

Gershenson with Human-Powered Vehicle senior design students.



QUOTABLE QUOTES

"The (EPA) test needs to include more fundamental engineering," says John H. Johnson, an automotive expert who co-authored a 2002 National Academy of Sciences report on fuel-efficiency standards. "They haven't been updated to encompass hybrids." *Wired News*, May 2004

Carl Anderson, Professor of Mechanical Engineering at Michigan Tech and one of the founders of the Enterprise Program, said, "Fifteen to twenty years ago, I recall teaching mostly just engineering fundamentals at the chalkboard; students would graduate and come back three years later dressed in a suit and tie and understanding ethos that were only learned off-campus. Today, as a result of the Enterprise Program, I am seeing that metamorphosis of learning the business, communication, and commitment-to-project aspects of engineering that industry is seeking on campus." *AEI*, January 2004

William J. Endres, PhD, associate professor in the Department of Mechanical Engineering-Engineering Mechanics at Michigan Technological University, Houghton, Mich., has studied edge preparation for more than a dozen years. The effects of edge preparation are under-appreciated, he said, because "The control of edge prep has not been particularly good. It's hard to assess in any solid fashion the effect of a variable when you don't have good control of that variable in the first place." *Cutting Tool Engineering*, February 2004

Dr. Mohan D. Rao's paper, entitled "Recent applications of viscoelastic damping for noise control in automobiles and commercial airplanes, published in the *Journal of Sound and Vibration*, Vol. 262, No. 3, pages 457-474, 2003 was among the five most downloaded articles from the JSV web site in 2003.