A SUSTAINABLE FUTURE

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When Professor John Sutherland looks at a product, he sees not only the engineering effort that went into designing and manufacturing it, but also all the wastes created and resources consumed associated with the entire life-cycle of the product. Given the way that consumers and industry create waste and consume resources, he wonders whether future generations will be able to enjoy the same standard of living that we all currently enjoy. Sutherland is trying to do his part to ensure a sustainable future by working with industry to achieve an economically successful balance with nature.

"Environmental problems are complex and require careful study in order to be prevented," says Sutherland. To solve these problems, Sutherland focuses his efforts on improving the efficient use of resources and advocating the development of sustainable and renewable materials and energy sources. His work centers upon the evaluation of current industry products and their processes.

As Co-Director of Michigan Tech's Sustainable Futures Institute, Sutherland leads an interdisciplinary effort to create and disseminate new tools, methods, knowledge, and technologies that promote, enable and support environmental, economic, and societal sustainability principles.

Sutherland, a native of Illinois, has been a faculty member at Michigan Tech since 1991. Before coming to Houghton, he received a BS and an MS in Industrial Engineering and a PhD in Mechanical Engineering from the University of Illinois at Urbana-Champaign. As a faculty member at MTU, he has won numerous awards for both his teaching and research, has worked as an investigator on grants totaling nearly $15 million, and has mentored approximately sixty students to the completion of graduate degrees. His skills as a researcher combined with his interests in sustainable development are leading to the creation of viable solutions to environmental problems.

One such problem is the mist produced by machining operations in factories. This mist and other airborne particles can be harmful to employees. Sutherland, along with Mechanical Engineering Associate Professor Donna Michalek, is currently investigating alternatives to reduce pulmonary health risks posed by these harmful mists. By examining emissions from these manufacturing processes, he

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Sutherland interacting with students.

and Michalek are able to recommend and help implement changes that lead to environmentally safe, "green" processes.

Sutherland is also working with Professors David Shonnard (Chemical Engineering) and James Mihelcic (Environmental Engineering) on the development of decision-making aids to reduce the environmental impact of manufacturing. This research is beginning to yield tremendous advantages to manufacturers in terms of their competitiveness, as well as producing demonstrable environmental benefits. "In our work with industry, we identify new, transforming ideas that are win-win in terms of competitiveness and the environment," notes Sutherland. Improvements in environmental performance are generally accompanied by improvements in production efficiency. As Sutherland says, "The status quo is rarely the optimal way to do business. We are helping manufacturers to improve both competitiveness and the environment."

Sutherland's research interests are driven by his "strategic concern" for the well-being of U.S. industry in the global market. He points out, "The U.S. lags behind many industrialized nations in designing green products and then manufactures them with environmentally benign processes. With wide-open spaces and abundant natural resources, we tend to be wasteful. Global competitors, faced with limited space and expensive energy, will innovate in response to these circumstances, leaving the U.S. to fall behind because we're not subjected to the same drivers in terms of sustainable development." This motivates Sutherland to help stimulate innovation and change attitudes in American industry.

Similar scenarios have plagued industry in the past, In the late 1800s, explains Sutherland, Frederick Winslow Taylor pioneered the concept of scientific management. Manufacturing companies that failed to adopt this new concept and its associated practices became uncompetitive and often went bankrupt. In the 1970s, Japanese industry gained leadership in terms of quality by adopting the principles of W. Edwards Deming. Again, because many U.S. companies did not adopt this new quality philosophy, they failed in the global marketplace.

"I am legitimately concerned that this scenario is going to play out again, this time with a new set of competitors that practice a *green* philosophy."

To counteract this potentially damaging situation, Sutherland cites the need for cooperation among industries, government, and U.S. citizens to create a sustainable future for ourselves, achieving a balance between economic development, the environment, and society. He and his collaborators have received support from industry, government, and foundations. Their work towards a sustainable future has resulted in a $3.6 million award through the National Science Foundation's Integrative Graduate Education and Research Traineeship (IGERT) program. Industry support for the Sustainable Futures Institute ranges from money to materials and equipment. "Our industry partners recognize that a fully informed decision is a better one, with more opportunities for innovation. The key starting point is for forward-looking American companies to recognize that environmental responsibility will give them a competitive edge."

FACULTY & STAFF AWARDING EXCELLENCE

FACULTY AWARDS

Dr. John E. Beard
Outstanding Faculty Advisor
National Science Foundation, 2003

Dr. Peck Cho
MTU Distinguished Service Award
Michigan Technological University, 2003

Dr. L. Brad King
Presidential Early Career Award for Scientists and Engineers
President's Office of Science and Technology Policy, 2004

CAREER Award
National Science Foundation, 2004

Dr. Kee S. Moon
P.K. McElroy Award for Best Paper
Reliability and Maintainability Symposium, 2004

Dr. Gordon G. Parker
SAE Ralph R. Teetor Education Award
Society of Automotive Engineers, 2003

Dr. Ghatu Subhash
Fellow of ASME
American Society of Mechanical Engineers, 2004

ASME Student Section Advisor Award
American Society of Mechanical Engineers, 2003

STAFF AWARD

Michael A. LaCourt
Engineer/Scientist
Employee Excellence Award
Michigan Tech, 2004