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Department of Chemical Engineering

Spring 2008

Spring 2008 ChE Newsletter

Department of Chemical Engineering, Michigan Technological University

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Special Interest

Articles:

- Student Honors Convocation 2008
- Senator Stabenaw visits MTU

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Awards Convocation Held

The Department of Chemical Engineering held its 2007-2008 Awards Convocation April 17 in the lobby of the Rosza Center. The Convocation is held each year to honor the graduating seniors, as well as to recognize the support of our industrial partners, alumni and friends who contribute to the success of the department.

The Convocation M.C. was Dr. Faith Morrison, and the featured speaker was Karen Mikkola-Swager of Mosaic Phosphates, MP, Inc. Karen is currently Manager of Mine Strategy and Execution, Phosphate Operations, a position she has held since 2004. Her responsibilities include developing and executing medium and long-term mining strategy, and measuring and executing synergies identified for the phosphate minerals group worth \$24 million over three years. She has also identified additional synergy savings of \$15 million over three years.

Prior to joining Mosaic, Karen spent 10 years at Cargill Incorporated in several different capacities, including Plant Metallurgist, Chemical Lab Supervisor, Assistant Mining Superintendent, and Engineering Manager, a position in which she was responsible for all process and

project engineering for four phosphate mining operations. Karen also served as Engineering Intern and Maintenance Supervisor at General Motors Corporation.

The holder of Bachelor and Master of Science degrees in Metallurgical Engineering from Michigan Tech, Karen is a licensed Professional Engineer in the state of Florida.

She is a member of the Society of Mining, Metallurgy, and Exploration, and is also a member of the Florida Institute of Phosphate Research Beneficiation and Column Flotation Technical Advisory Committee.

Karen told the graduating seniors that they "have accomplished a great deal," and that she wanted to inspire them to "go out and make a difference."

Other highlights of the 2008 event included a tribute by Dr. Tony Rogers for retiring Professor Bruce Barna, undergraduate student awards, and a history of Perry's Chemical Engineering Handbook, delivered by Dr. Dan Crowl. The 2008 event was attended by members of the MTU Presidential Council of Alumnae.

Written By: Dr. Sean Clancey



From Left to Right: Jill Meister- UOP, Karen Mikkola-Swager-Mosaic, Komar Kawatra-Chemical Engineering, Sally Heidtke-UP Special Delivery, Linda McNally-Dow Corning



Dr. S Komar Kawatra

Letter From the Chair

The 2007-2008 Academic Year was a very successful year, with an abundance of educational activities. Our Unit Operations laboratories remain the best in the nation, with industrial support from Dow Corning Inc., Midland, MI and Integrys Energy Corporation, Green Bay, WI. Our undergraduate students participated in the Enterprise Program, corporate internships, and the cutting edge research being carried out in the Department. Several of our graduate students conducted their experimental work in operating plants, allowing them to apply the basic concepts of engineering to improve plant performance. All of our students have been receiving

guidance from industry, and from the faculty in the Chemical Engineering Department.

We are providing educational programs that ensure that our students are not only on the cutting edge, but are also receiving "hands on" experience that will be of great value to them. Many corporations, such as Mosaic, Boeing, Veltec, Carbontec, and Cleveland Cliffs are providing financial support to build a premium graduate program in the Department of Chemical Engineering.

We are building our program with the help of our alumni, and your feedback is very important to us. Please provide your feedback regarding our educational programs to skkawatr@mtu.edu.

Senator Stabenaw Visits Chemical Engineering while at MTU



Dr. David Shonnard, Dr. Glenn Mroz, and Senator Debbie Stabenaw

When Senator Stabenaw and President Mroz visited the Chemical Engineering Department, they toured the Biochemical Engineering Laboratory. Dr. David Shonnard discussed his research program for processing woody biomass from forests in the UP into biofuels. The goal of the research is to improve rates of conversion and sugars yields that are then fermented into biofuels. Individual processing steps are being investigated: dilute acid hydrolysis,

enzymatic hydrolysis, and microbial fermentation.

Both experimental and process modeling research are being conducted. Collaborations with Dr. Susan Bagley of Biological Sciences in microbial strain development, Dr. Patricia Heiden of Chemistry, and Drs. Victor Busov and Shekhar Joshi of SFRES on improved trees are ongoing. The senator visited Chemical Engineering on February 9, 2008.

You Can't Stack Them Too High

Jason Keith, an associate professor of chemical engineering, researches fuel cells and explains them in simple language. "To power a car, a Dagwood sandwich of fuel cells is required," he says.

"To power many electric motors, you need about 300 volts, and each cell in a fuel cell generates less than one volt. So, you may need about 430 cells to run

a car, which is too huge," he says.

Since 2004, he has taught a course on the topic, and he has also been developing modules to introduce fuel cell concepts into all the courses in the Chemical Engineering curriculum. "It's a hot topic, and it's not in most texts," he notes.

Written By: Marcia Goodrich



Dr. Jason Keith

"It's a hot topic, and it's not in most texts,"

Dr. Gerard Caneba Promoted to Full Professor

Dr. Gerard Caneba came to MTU in 1985 from the University of California, Berkeley. He was promoted to Full Professor in the spring of 2008, and is currently writing a monograph about the Free-Radical Retrograde-Precipitation Polymerization process, which is scheduled to be published through Springer-Verlag (Heidelberg) after May 2009.



Dr. Gerard Caneba

Dr. Komar Kawatra Receives Award



for his extensive technical contributions and hard work in virtually every capacity for SME. Komar has been a friend to the Society, a friend and mentor to his students, and a friend and supporter of his colleagues. His quiet, determined competence working with Mineral Processing Journal, Mineral Processing Division, the Society for Mining, Metallurgy and Exploration Board and all of his endless other functions have been invaluable to the Society for Mining Metallurgy and Exploration.

Daniel Crowl Quoted in the Wall Street Journal



Dr. Daniel Crowl

BLAST PROMPTS REGULATORY DEBATE : 13 DIE, STEEL MELTS, SUGAR FLOWS LIKE LAVA

BY PAUL PRADA, BETSY MCKAY AND STEPHANIE CHEN

MAY 2, 2008

Superheated sugar flowed like lava until it cooled and formed rock-hard barriers. The building's steel frame melted. It took firefighters a week to finally put out the fire.

The disaster at the 91-year-old factory, known for its "Dixie Crystals" brand, killed 13 of Mr. Sexton's co-workers and injured 45 others - the deadliest such accident in more than 25 years.

"We have a complete scientific and engineering understanding of how these things occur," says Daniel Crowl, chemical engineering professor at Michigan Technological University, who has studied dust explosions and found them to be preventable through careful

cleaning. "If you had an accident, you must have done something wrong." But OSHA, which makes and enforces workplace-safety rules, has resisted for more than a year. The safety board's recommendations that it develop specific standards for the many other industries, such as sugar, that produce combustible dust.

The complete article can be read in the Wall Street Journal, May 2, 2008 copy.

"- the deadliest such accident in more than 25 years"

CM majors have a chance to broaden their preparation in several important technical fields

AICHE SACHE, SAFETY & AMP HEALTH DIVISION AWARD WINNERS

Thomas Brennan has won the Safety and Health Division Design Award for the Best Individual Utilization of the Principles of Inherent Safety in the 2007 AIChE Student Contest Problem (in honor of Ted Ventrone).

Minors for Chemical Engineers...AND OTHERS!

Getting a minor in an academic subject is very common at universities and at Tech, but up until recently, there were no minors associated with MTU's Department of Chemical Engineering. This is no longer the case since Tech ChemE inaugurated three minors in Fall 2004 in *Polymer Science and*

Engineering, Minerals Processing, and *Bioprocess Engineering.*

There are currently 17 students registered for the PSE minor, 25 for the *Minerals* minor, and 10 are signed up for the *Bioprocess* minor.

The *Minerals Processing* minor, technically speaking, is not new to Tech. When the minerals

processing program was housed in the Metallurgical Engineering Department (now Materials Science and Engineering), there was a minor in minerals processing.

(continued on page 4)

Minors for Chemical Engineering...Continued

This minor went dormant as the minerals processing faculty were moved first to their own department and then to the department of Geological Engineering and Sciences, but once the faculty found a home in Chemical Engineering, we re-vamped and reinvigorated the minor; this 16-19 credit minor is now the most popular of the three chemical-engineering minors, drawing students from many departments. There is even a scholarship program that directly targets students in the *Minerals Processing* minor—an excellent way to encourage participation.

The ChemE program has long had a focus in polymers and polymer engineering, and many discussions have taken place over the years of how to allow students to focus in this area. The minor in *Polymer Science and Engineering* is the outgrowth of this program. The *PSE* minor has two tracks: a 16-17 credit polymer-science track that is optimized for chemical engineers and chemists, and a 16 credit polymer-engineering track that is aimed at mechanical and materials engineers. The students signed up for the *PSE* minor often participate in independent research with one of the three CM faculty doing research in polymers.

The *Bioprocess Engineering* minor is Tech's answer to the problem of how to bring Tech students into this fast growing field

while allowing them to remain chemical engineers, biologists, or materials engineers. Most degree programs do not have much space for all the biological and engineering courses one needs to understand bioprocess engineering; our solution to this is a 16-credit interdisciplinary minor which requires most majors to take extra credits, but which rewards students with the added credential of the minor. There are 10 students currently signed up for this minor, and there would be more if it were not so challenging to schedule all the classes that are required in this course of study. The CM Department is aware of the problem and is working on solutions to it so that more students can take advantage of this minor.

Other minors that are popular among CM majors are the *Math* minor (requires only two classes above the CM minimum), the *Economics* minor (many General Education classes can double count for this), and foreign language minors. The *Chemistry* minor would seem to be a natural for ChemE's, but again a scheduling difficulty has stymied interested students. With encouragement from the ChemE department, the Chemistry Department recently made a change to their minor that should make the minor in chemistry easier for a CM major to schedule.

Another new minor that should appear soon is the minor in *Pharmaceutical Chemistry*. The Pharm Chem major went on the books at

MTU in 2006, and the courses for this subject are now well established.

The Chemistry Department is actively developing the minor in Pharm Chem, and we anticipate that CM majors will be drawn to this minor.

The opportunities in pharmaceuticals are quite apparent to anyone reading the many national news stories about the pharmaceuticals industry in the US.

Thus, although CM majors are quite busy with the required 131 semester credits needed to graduate from Tech, the high quality students we attract to Chemical Engineering are not satisfied with the minimum and often seek greater challenges such as co-ops and study abroad. Now the opportunity to minor is a popular choice, and with the establishment of three minors in our Department, we are able to give CM majors a chance to broaden their preparation in several important technical fields.

Written by: Dr. Faith Morrison,
Associate Professor Chemical Engineering



Dr. Faith Morrison

Getting a minor
in an academic
subject is very
common

AICHE Broomball Game



The MTU AICHE members and the Chem. Eng Faculty had their annual broomball game on March 1, 2008. This year, the event was held at the Baltic Ice Rink and it started at noon and lasted till 2pm. The students won over the faculty team, as expected, with a minor injury on the faculty side - a small black eye for Dr. Mike Mullins. At the end of the game, hotdogs and soda were served.



Consumer Product Manufacturing (CPM)



**KBC Co-owner
observing testing
run**

*“Work and play
are important
components of
the CPM student
experience.”*



Consumer Product Manufacturing (CPM) has won the Enterprise competition at Undergraduate Expo no less than four times over the past six years. What is the secret to their success? Actually, there is no single secret, but a number of factors continue to make the CPM Enterprise attractive to students and sponsors.

Project Variety. CPM's purpose is to explore the steps required to design and manufacture products that are new to the consumer market. Typically, CPM students begin a new project by brainstorming product ideas. The ideas are reviewed and constrained to those that can be designed, prototyped, and tested at Michigan Tech. This review process further prioritizes the ideas by looking at the end business and consumer benefits. Manufacturing requirements, market and IP research, consumer use studies, and profitability analyses assist in selecting a class project. The result is a business plan or project proposal to a potential sponsor.

By following this process, CPM students learn to combine traditional engineering work with an awareness of business and economic motives. CPM students talk directly with sponsors to secure funding for proposed projects. Our current sponsoring partner is the local Keweenaw Brewing Company, with loca-

tions in Houghton and South Range.

Student Ownership. CPM students pick their projects and define the path to success. Their ideas are valued and encouraged within the Enterprise. A lot of effort by the students goes into improving *their* CPM Enterprise and positioning it for future success.

Accountability. CPM students are accountable to each other and to their team leaders and executive officers. An environment is created in which each person is expected to contribute so that the big goals are achieved. The students also learn the importance of keeping CPM management and their sponsor regularly informed about progress.

Mentoring. The faculty co-advisors to CPM, Tony Rogers and Sean Clancey, mainly act to facilitate the students' efforts. The advisors are members of the Enterprise. They offer advice and suggestions, but it is the prerogative of the students to adopt their own path and goals. They are free to fail or succeed, in a low-stress environment, and their track record is overwhelmingly positive.

Inclusiveness. CPM currently has approximately 15 students from several majors, the majority of whom are chemical, mechanical, and biomedical engineers. Technology and business students also regularly join. About one-half of our students are women, and CPM

continues to attract students from under-represented groups.

Flexibility. Practical experience is obtained by students interested in the consumer products industry without requiring the commitment of a formal coop. Smaller, in-depth senior design projects for up to three students allow CPM to pursue complementary areas of consumer product research in addition to the main class projects. These reinforce CPM's vision of being a consumer product "idea incubator".

Fun. CPM students have discovered many ways to bond as a group. They participate in Winter Carnival with their popular cotton-candy giveaway, hold recruiting events that double as social gatherings, play games, and generally have a good time. Work and play are important components of the CPM student experience. And, of course, winning the Enterprise competition at the Expo is rewarding and fun!

Anyone interested in knowing more about CPM should visit our website, www.cpmenterprise.mtu.edu, or contact Tony Rogers (tnrogers@mtu.edu, 906-487-2210).



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Newsletter Question:

Looking back at your career, what changes would you suggest in the Chemical Engineering educational programs at Michigan Tech?

cmabrams@mtu.edu

Alumni Updates

Worked for Schlumberger as an oilfield engineer on land and off shore in both Vietnam and Thailand. Now married with two lovely children. **Casey Behles, oilfield engineer, 2006.**

Currently General Manager, Shell Oil, Anacortes WA. I have worked for Marathon in Canton, OH; Williams in Memphis, TN and Mobil Oil in multiple locations. **Susan Grosvenor, 1979.**

Karen (Mikkola) Swager has been promoted to Director of Operations Strategy at Mosaic Phosphates and she will lead various initiatives, planning and executing operating strategies at all Mosaic Phosphates North America and International Operations. Karen and her team are located in Pierce, Florida. **Karen (Mikkola) Swager, Director of Operations, 1992:1994.**

I graduated in 1957 and was then hired by Exxon. I spent 42 fabulous years working for this company. I was the matching funds contact with Exxon for a number of years. I have been retired since 1999 and now reside in Ful-shear, Texas. **Bob Tusch, 1957.**

I graduated in November of 1996 with my BS in Chemical Engineering. My wife also graduated in February of 1996 with her BS in Forestry. I am currently working as a Product Development Specialist for Camie-Campbell, Inc. in St. Louis. I am the proud new father of twins, Johnathan Nicholas and Miranda Marie. **Nick Yates, 1996.**

Giving Opportunities

A tax deductible gift to the department can be made by visiting the Tech Fund website at www.mtf.mtu.edu. Go to **Online Giving** to obtain the form needed. In order for funds to be designated to the Chemical Engineering Department, please make that notation in the **Gift Information** area of the form. **If you would like to mail a gift**, please make your check payable to the Michigan Tech Fund, designate funds to the Chemical Engineering Department and mail to Michigan Tech Fund, 1400 Townsend Drive, Houghton, MI 49931.