



**University at Buffalo**  
*The State University of New York*

## ***CHEMICAL ENGINEERING NEWS***

Spring

2002

### **Message From The Chair**

**Carl R. F. Lund**

Spring/Summer 2002 is turning out to be a season of change in the Chemical Engineering Department. Angela Ethridge, the Department's receptionist and most recently graduate program secretary, has accepted a new position elsewhere at the university. She's now involved with student housing at one of the many new apartment-style housing units being built on campus. For years, Angela maintained all the department's purchasing and travel records, along with the supply room, postage meter, and copier. We're going to miss her, as well as all those long conversations with her about the state of the Bills, Sabres, or life in Buffalo. We wish her well in her new position!

Paul Orosz has been teaching the four unit operations labs on a temporary basis this past year, and he's done a fantastic job. Paul joined us after a long and productive career with Oxy-Chem on Grand Island. In short order, he added a new adsorption experiment to the labs, completely redesigned the CSTR experiment, and implemented an outstanding safety and materials handling plan for the undergraduate labs. Paul and a partner also started a small research and development company, and their success in that venture led Paul to decide not to continue teaching next year. Again, we're very sorry to see him leave, but we wish him continued success with his new business.

Not only is Paul leaving, but so are the undergraduate laboratories! The unit operations lab is scheduled to be moved from the first floor of Furnas Hall to Jarvis Hall over the course of this summer. The new location is being prepared as I write this, and if all goes according to plan, the equipment will be operational in its new location by the start of classes this fall. The materials lab is simultaneously being moved to the 8<sup>th</sup> floor of Furnas Hall to share space with the

Process Control Lab.

I really need to comment about the benefits we've been reaping from our corporate partners. Praxair has transformed our process control course and our process control facilities, and we really appreciate their efforts. There's an article elsewhere where you can read more of the details. Also, IsleChem, a new company that took over the former Oxy-Chem Development Center on Grand Island, has teamed with us to transform our M. Eng. program. Starting with two students this summer, IsleChem is providing hands on experience running a real-world process. It is an opportunity we'd never be able to provide without their partnership. I should also point out the key roles played by Joe Couche and Charles Rader, U. B. Chem. Eng. alumni, in making these partnerships work. The department truly appreciates their efforts. There are many other opportunities for partnerships that are mutually beneficial; if any of you reading this have ideas, drop a line or give a call!

The reason this newsletter is a little later than past issues is that we are in the middle of our ABET review process. Dave Kofke has done a fantastic job getting us ready for this, and I wanted to thank him for all his efforts. If you haven't visited our web site recently, pay us a visit. Besides getting caught up on what's new in the department, you can also participate in the ABET process by providing your feedback and suggestions.

I hope everyone has a good summer, and that those of you who'll be at the Annual AIChE meeting will stop by the department's reception and renew acquaintances. Check the message board for the exact time and location.

*We're looking forward to seeing you at  
our Hospitality Room at the  
Annual Fall AIChE Meeting in November*

## Praxair Helps Update Process Control Course

This spring, an elective course in chemical process control, CE 444, experienced a major overhaul. The Chemical Engineering department partnered with Praxair, Inc. to update the course so as to educate students using modern industry practices and tools. The chemical process course has been significantly modified to address practical process control issues. The goal is to continue to develop and improve the course content for both the junior and senior year courses so that graduating students will have a better appreciation for process control practice in industry. The chemical process laboratory has been completely updated with new instrumentation, a PLC, and a computer interface.

CE444 further expands on the principles taught in CE 307: Introduction to Process Control, and further incorporates more sophisticated and current theory and techniques in process control. This year's course, taught by four engineers from Praxair, Inc. and Dr. Michael Ryan, covered topics such as plant-wide control, controller enhancements, instrumentation and control components, control loop tuning, compressor control, reactor control, distillation column control, multi-loop control analysis, model predictive control and statistical process control. The instructors from Praxair, Inc., Dr. Solomon Dadebo, Dr. Thomas Hanson, Dr. Paul Belanger and Mr. Andy Engels, currently work on process control related projects. Dr. Solomon Dadebo and Dr. Thomas Hanson served as the two main instructors of the course. Dr. Paul Belanger and Mr. Andy Engels served as guest lecturers on control loop tuning and control system hardware, respectively.

The course also gave students the invaluable task of devising and tuning a control system for a real chemical process. Given as a project, students were tasked to put appropriate controllers, with the proper tuning, to ensure purity and optimize argon

recovery in a process currently used by Praxair. Students were given the opportunity to apply some of the learnings in controlling a plant model developed in HYSYS<sup>TM</sup>. HYSYS<sup>TM</sup> is a software package used in industry that allows users to simulate chemical processes.

The laboratory component of the course was completely updated. Praxair engineers took the existing lab, and redesigned it using modern instrumentation. The updates included installing a magnetic flowmeter and transmitter, a differential pressure transmitter, a SLC 5/03 programmable logic controller, a computer for use as a human-machine interface (HMI), new current to pressure transducers, and new pumps. This was all made possible by donations through a number of Praxair's suppliers, including Emerson Process Control, M.S. Jacobs, Rockwell Automation, Automatech, Intellution, Estabrook, and G&L Pumps. Praxair spent several hours on specifying the instrumentation, programming the PLC, setting up the HMI, performing the wiring installations and preparing the database to be easily exportable for analysis.

On Wednesday, May 15<sup>th</sup>, an inaugural ceremony was held for the updated process control lab. Present were Dean Mark Karwan, Department Chair Dr. Carl Lund, Dr. Michael Ryan, and numerous other members of the Chemical Engineering department faculty. Also present were the people from Praxair responsible for the completion of the updates and a number of the suppliers who donated equipment.

With this new course and Praxair's help in revising the syllabus for CE307, an area that has typically been a weak one for all graduating chemical engineers will now be a strength for students at UB.

*Please feel free to send us your articles or ideas of things you would like to see in YOUR newsletter! Let us know how we can make it better.*

## New Graduate Courses Offered Fall 2002

The CE Department has added some new courses to this year's graduate listings. The first course is a graduate elective course, CE 500, on Metabolic Engineering. This course will be offered beginning this Fall semester and studies the analysis and modification of metabolic pathways. It will provide an integration and quantitation approach towards metabolism and cell physiology. Areas that will be covered in this course will include a review of cellular metabolism, comprehensive models for cellular reactions, regulation of metabolic pathways, examples of pathway manipulations (metabolic engineering in practice), metabolic flux analysis and metabolic control analysis. Some concepts of bioinformatics in a way that relate with cell metabolism study will also be introduced. CE 500 will be taught by newly hired Assistant Professor, Mattheos Koffas. After receiving his PhD from MIT, Dr. Koffas has been spending the last 2 years in a Post-Doc appointment at DuPont in Delaware.

Another course being offered for the first time is CE 630/631, Research Methods in Chemical Engineering – Parts I & II. This is a required, two-semester course for all CE full-time, doctoral students. Its' purpose is to train these student in methodologies

and practices used in chemical engineering research. In the first semester, each student will be guided to develop an original research project in consultation with his/her research advisor and at least two additional faculty members. The students will be taught how to conduct literature searches, identify all published research, develop the new idea and formulate it into a novel research proposal. Instruction in the second semester will be targeted towards specific techniques that are necessary to advance the ideas developed in the first semester and obtain original results. Work will be presented by the student to the graduate faculty committee, and he/she will be required to defend the research idea and results in a presentation to faculty and students. Students entering Graduate School have seldom performed independent research or defended their ideas in public. This course will teach students' the procedure for developing original research ideas, as well as the experimental and computational techniques of modern chemical engineering science. In addition to provide training, the course will be used as a means to cross-fertilize projects and allow students to work efficiently in a multi-disciplinary research environment.

### Attention Classes of 2000, 1996, & 1992!

If you were graduated in one of these classes, **you're special!** (at least this year). We're targeting alumni in these classes for feedback on the education you received from us. We have implemented a process of continuous improvement in our undergraduate program, and to make it work we need to know how we're doing. Did your UB CE education prepare you for your job? What was useful, and what was missing?

So if you got your **B.S. in 1992, 1996, or 2000**, you can expect a follow-up mailing with a survey asking you to tell us how to do better. When it comes, please keep in mind that we're counting on you, and do respond with your candid input.

## A New Look for the AIChE Student Chapter

After a fun 2001-2002 academic year, AIChE has retooled and is looking to have another successful year in 2002-2003. The new year ushers in a well-rounded set of officers who are motivated and determined to make AIChE a noticed and respected club on campus. Shawn Patterson will take on the Internal Vice President role and bring hard work and organization to the club. Rob Sawyer is the incoming External Vice President looking to take advantage of his knowledge of SA and his contacts there. Matt Zimmer takes over as Treasurer and will play a vital role in the financing of the first major project for AIChE, our trip to Indianapolis. Matt Cole will take over the Secretary responsibilities and provide valued support for the club. Zack Fowler takes over the presidential duties and looks to bring more involvement from all of the chemical engineering classes to the club.

This year's annual trip to the National Student Convention for AIChE will be a short one in distance, but valued nonetheless. The trip to Indianapolis will showcase the ChemE Car Team, headed by Shawn Patterson and Jesse Wagner, and looks to be a learning experience for all. Although many of the technical seminars are later in the week, we are going to encourage students to take advantage of the seminars taking place during our time there and to take advantage of the job and graduate school fairs.

Not only is AIChE getting involved in national events again this year, but we are going to get involved with

some community events too. Science Fest 2002 is a science fair that is being sponsored by the UB engineering clubs and the Buffalo Museum of Science. AIChE will be putting on a demonstration throughout the day to local middle school and high school students displaying basic chemical engineering principles, as well as demonstrating the fun chemical engineers can have. Another community event to be scheduled is tutoring at a local school. In the past AIChE has done this with Sweet Home HS and, if the schedules of those involved work out, we would like to bring this back as a part of AIChE.

Continuing ongoing traditions, student faculty bowling and happy hours are going to be scheduled periodically throughout the semester. Getting the underclassmen out to these functions will be the primary goal, although continuing to improve the relations between professors and students of the senior and junior classes is vital to our success as well. Some new things we would like to do for small events are possibly play a round of mini-golf with the professors, with Bills and Sabres games being options too. One of the big draws for new student involvement will be the local business contacts. This year AIChE is determined to set up more trips to local industry to have a plant tour and to get guest speakers in to talk about their experiences in industry. Seeing what we are working towards is a great motivator and learning experience. With all these activities scheduled, involvement from all the classes and for professors will be essential to our success.

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(and how well we taught them to you).**

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***[www.cheme.buffalo.edu/curriculum](http://www.cheme.buffalo.edu/curriculum)***

# My Retirement ... I Gave Up Thermo for Golf

By Dr. Thomas W. Weber

A few years ago before I retired, my son, daughter, and son-in-law gave me a set of golf clubs for my birthday. My wife tells me that upon opening the box, I said, "What the hell am I going to do with these?" A short time later, she received a set of clubs from them so we'd have something to do together after I retired. Neither of us had ever played the game before.

We took a few lessons. The instructor would tell us to relax and pretend our arms were like cooked spaghetti. We tried out what we learned at a local par-3 course. I can't say that that advice did much for my swing. Then last summer, my wife broke her wrist. At that point, I had a choice -- either give up the game, or go out to the golf course on my own. I chose the latter, and found that if I got up early enough, I could play the par-3 course alone, and even hit a few balls on each hole. My interest intensified to the point where I became -- should we say -- hooked?

But it was near the end of the golf season. To continue with my newly-found hobby, I practiced in golf domes. The first was in Tonawanda. In February, a wind and ice storm destroyed it. I switched over to the dome on Wehrle Drive. Oftentimes, I'd run over there after my noon swim. While I ate my lunch, I'd watch the techniques of people practicing their swings, hoping to pick up some pointers. I observed every imaginable swing. I was mystified -- some people would swing very hard and the ball would scarcely get off the ground; others (most notably people who were more than fifty years younger than I am) would, with very little effort, get absolutely tremendous results. What I needed was some lessons to unlock this mystery for me.

One time there I observed someone taking a lesson from an instructor who seemed to be really intent upon **teaching** his students. Here was a person that I could empathize with, so I signed up for some lessons with him. Early on, he told me that the whole thing was "just a matter of physics." Needless to say, that bit of information captured my interest. That set me to reading some chapters of a book that I had bought years ago but never had much time to read: "*Sport Science -- Physical Laws and Optimum Performance*" by Peter J. Brancazio. I figured that I might be able to put the physics I know to good use -- perhaps I could use this knowledge to give me an edge over opponents who had never studied the subject.

## *What Aspects of Physics Come into Play in Golf?*

- ◆ Momentum and energy are conserved. What you'd like to do is transfer all of the energy of your swing into propelling the ball. (Hopefully in the right direction!)
- ◆ The club head exerts a force on the ball during a finite time. Hence, the better the "follow-through," the better the transfer of energy.
- ◆ For a golf club, there is a "center of percussion" and the notion of a "sweet spot" on the face of the club. Golfers try to hit the ball on the sweet spot. Baseball players try to do the same with a baseball bat. If the ball is hit on the sweet spot, the ball goes far with seemingly little effort.
- ◆ As a ball moves through the air, several forces come into play, namely, gravitational, buoyant, drag, and lift. The first three of these are used in the calculation of the terminal velocity of solids falling through liquids and gases. Lift results from the spin of the ball. If the ball is hit properly, there is backspin that carries the ball further than it would go without the spin. "Hooks" and "slices" come from side spins. The dimples on the ball (between 318 and 552) favorably affect the drag and lift.

With all of this knowledge about what makes for a good golf shot, what has it meant for me in pursuit of a technique like that of Tiger Woods? **Not much.** In fact, it may have **hindered** my progress because I think about the physics too much. I have concluded that this is a situation where ignorance is bliss.

What similarities and differences are there to learning a golf swing and learning some engineering subject, say thermodynamics? First of all, a golf swing is a physical skill, whereas the First and Second Laws are mental skills. Amongst golfers, swings vary all over the place. Whatever works for you is fine. In my case, my instructor is trying to teach me a swing that is totally counter-intuitive. There are perhaps a dozen things for me to think about on each swing; examples are my stance, weight distribution between my feet at various times during the swing, keeping my head

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down, and controlling the position of my shoulders. My teacher has invented some “training aids” to help his students. (I’m using them all.) Every time I swing, I try to go through a mental “check list” of about a half dozen items to try to keep in mind. That’s a challenge.

The laws of Thermodynamics are a different matter. The concept of the First Law – conservation of energy – is basically intuitive. (For much of recorded history, it wasn’t!); the Second Law is not so intuitive, but the ideas involved in it do “grow on you.” A good teacher helps you learn these laws and apply them to problems. However, it’s not feasible to have a teacher hover over you as you work on problems – he or she cannot read your mind. On the other hand, my golf instructor can often tell me immediately what’s wrong with my swing.

But golf and thermo have one thing in common – practice makes perfect, whether it’s doing homework problems or swinging at balls at a golf range. A good teacher can help you to make your practice count, so you don’t waste your time or go off on tangents. Each student is different, and what teaching style works for one, may not work for another.

### ***Is Golf Dangerous?***

Because golf is not a contact sport, it is not considered to be dangerous. Well, at I least I didn’t consider it to be so until the day after the Department held a retirement party for me.

Dan, my son-in-law, and I were playing a quick round at the local par-3. The fourth hole has some water, and quite naturally, I drove my T-shot into it. I could see the ball, and was in the process of reaching for it with my ball-retriever. The ground around the water was a bit steep in the location I was standing. Next thing I knew, I slid towards the water, spraining my left ankle in the process. It was pretty painful, but I thought I could “walk the sprain off.” (I’d seen professional football players do this on TV.) I continued for a couple of more holes but my ankle was swelling and the pain definitely wasn’t going away, so we quit.

When I got home, my wife told me that I was a candidate for the hospital emergency room. It was declared a sprain, and fortunately not a break, nothing that six to eight weeks wouldn’t cure. For the first time in my life, I learned how to use crutches. Ugh! The next day, we drove three hundred miles to an “Elderhostel” and reunion with some of my wife’s classmates from nursing school. She chauffeured me around in a wheel chair. At 3:30 in the morning of the first night, we were roused out of bed in response to a fire alarm. Unlike all of the fire alarms I’ve been through at UB, this one was for real!!

Fortunately, we had kept the wheel chair in the room and my wife was able to wheel me to safety. Much of the hotel subsequently burned to the ground. Miraculously, more than three hundred people escaped safely. That was the end of the reunion and the end of my golfing endeavors for the season.

My son, Bill, was married here a few weeks ago. The day before, Bill, Dan, another friend, and I went out for an early round of golf to commemorate Bill’s last day of “freedom.” I was doing reasonably well until the eighth hole. It bordered a lake that had been drained. Even though there was no water in it, my T-shot was magically drawn into the lakebed. It looked dry enough to walk on. As the other guys went ahead, I went into the lakebed to retrieve the ball. Although it appeared to be dry, it turned out to be smelly mud that had the consistency of quicksand. The mud was well above my ankles. To ensure that I got out alive, I put my hands down in it as well. (Fortunately, there were no cameras around!) At the end of the ninth hole, I headed for a restroom where I attempted a clean-up operation. My golf glove was saturated with water, and there was mud on just about everything. I must have been rattled as my performance on the last nine holes left something to be desired.

As we loaded our bags into the back of the car, I was concerned about the mess that my still-muddy pants were going to make on the seat of the car. I turned to the other three guys for some advice. They all came to the same conclusion.

### ***Golf Is Not Inexpensive***

One can spend all sorts of money on clubs, bags, greens fees, club memberships, and lessons. With respect to equipment, there’s a saying that “The more you pay, the better you’ll play.” I’ve replaced my first set of irons. I can’t say that I’ve seen significant improvement.

The game can cost you in other ways. Consider this: Last night, my wife told me that I had left a golf tee in the pocket of a pair of pants I had worn. That’s OK, except that she had unknowingly washed the pants with the tee in it. The tee remained in the pants pocket during the washing operation, but came out in the dryer. It ended up in the lint trap. As she withdrew the filter, the tee dropped into the exhaust fan chamber where it became wedged in the cowling around the fan. The fan made a terrible noise, and I could just see the motor burning out. I made an attempt to disassemble the dryer, but wound up having to call the Maytag repairman. He was successful in twenty minutes, but left us with a bill for \$74.47. Surprisingly, the tee came through all of this unscathed, but my wallet didn’t!

Hopefully, a silver lining awaits me if I work on my game long enough!

## Student & Faculty Honors and Awards

The Chemical Engineering Department is proud to announce that a number of our students have received special recognition by receiving the following awards. The winners include:

**Dustin Skare** was awarded the *Donald F. and Mildred Topp Othmer National Scholarship Award* from the American Institute of Chemical Engineers.

**Bryan Patel, Rainee Van Natter and Kelly McLaughlin** all received *Allied Signal Scholarship Awards* from the Chemical Engineering Department.

**Jonathan Danner** is this year's recipient of the CE Department's *ACS Outstanding Senior Award*.

**Adam Cummings, David Hess, Bryan Patel, and HongWang Zhang** all received *Society of Plastics Engineers Education Awards*.

**Zhao Fang** received the *AIChE Othmer Sophomore Award for Excellence*.

CE Master's student, **Carla Ng** was awarded a *National Science Foundation Graduate Fellowship*, which she will use to pursue her PhD at Northwestern University this coming Fall.

Graduate Student, **Xuegeng Li**, was awarded *Second Place* in the "Best Poster Competition" from among about 40 posters presented in the "Advances in Particle Technology" Poster Session at the *AIChE 2001*

*Fall National Meeting* in Reno, NV in November 2001. Xuegeng's entry was entitled, "Kinetic Monte Carlo Simulation of Homogeneous Nucleation of Hydrogenated Silicon Particles during Silane Decomposition."

We would like to congratulate all of these students on their dedication and hard work for a job well-done!

We are also pleased to announce the following Faculty Honors and Awards:

**Dr. Vladimir Hlavacek** was recently honored by receiving an *Honorary Doctorate of Chemical Sciences Degree* presented to him by the Technical University of Bratislava in the Slovak Republic.

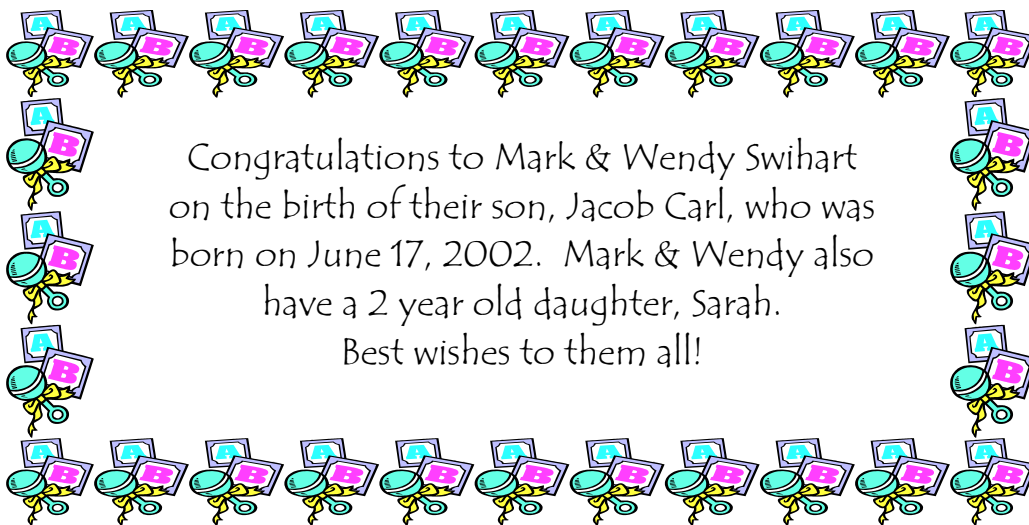
In addition, the School of Engineering and Applied Sciences recently presented three Chemical Engineering faculty with awards for their outstanding research achievements. They include:

**Dr. Paschalis Alexandridis**, the *UB Sustained Achievement Award*.

**Dr. David A. Kofke**, the *UB Sustained Achievement Award*.

**Dr. Sriram Neelamegham**, the *UB Young Investigator Award*.

Once again, congratulations to all!



## *Alumni News ~ What are they up to now?*

**Matthew M. Fay (BS, 1995).** Matt is currently working at T/J Technologies, a small R&D company in Ann Arbor, MI, developing improved materials for energy storage/conversion devices. Specifically, he is working on anode and cathode materials for lithium-based batteries. He is also working on fuel cell catalysts, hydrogen storage materials, and ultracapacitors.

**Ronald W. Foster (BS, 1965).** Ron has recently accepted a new position as Senior Process Engineer with Conestoga-Rovers & Associates (CRA) in Niagara Falls. Prior to this, he worked at Occidental Chemical for 35 years, mostly as a Process Design Engineer. He continues to reside in Kenmore, NY with his wife of 33 years, Penny. Ron and Penny have two grown children, Robin and Eric. Ron tells us that he was amazed to see himself in the long forgotten photo of the 1965 graduating class that appeared in the Spring 2000 issue. Ron is pictured in the very back on the right in that photo.

**James W. Harris (BS, 1990).** Jim has been working in the Process Control and Instrumentation field continuously since starting at UOP in 1990. His first patent was issued earlier this year for a process innovation to UOP's Sorbex separation technology which incorporates the unit operation of Dividing Wall Column Technology. As a member of the Technical Service Skill Center with UOP, Jim gets the chance to consult on many different refining and petrochemical process technologies. This interaction includes applying new ideas to improving UOP's technology, offering engineering solutions to meet a design need, or assisting with troubleshooting to the field service group, who may be on assignment at any refinery site worldwide.

**Mahmood N. A. Jawaaid (MS, 1977).** Mahmood has been working for Celanese for 18+ years. He is currently a Staff Process Engineer, and has three US patents under his belt. He spent about six years in the polyacetal area, and has been working in acrylates for the last 12 years. He has also been awarded a P.E. in Texas. Mahmood is a member of a local chapter of the Toastmasters International where he has given over 100 speeches.

**Michael C. Mercer (BS, 1967).** A Buffalo native, Mike Mercer moved to Minnesota in 1967 to attend Graduate School at the University of Minnesota. He has spent his entire professional career working for 3M. He is currently a Senior Quality Engineering

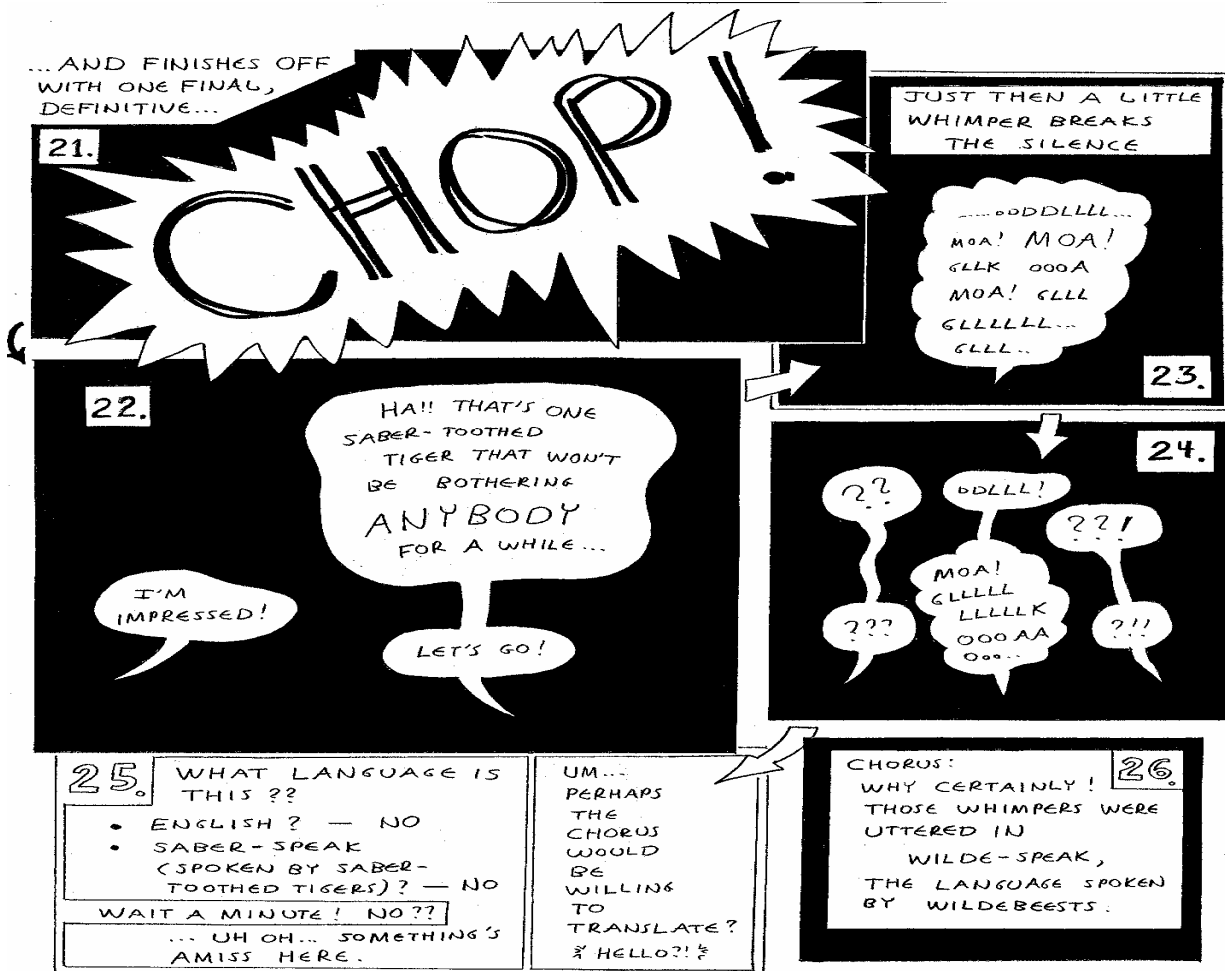
Specialist working to establish an ISO 9001:2000 Quality Management System for the Engineered Adhesives Division of 3M. They have already achieved QS-9000 resitration and are now expanding the registration to the Design and Development Engineering function. One of Mike's recent projects at 3M is working with his son, Tom, an Electrical Engineer also at 3M, to develop a service business using RFID technology in an automotive application. Mike's youngest son, David, is entering NDSU in the fall to study architecture. Middle sons, James and John attend(ed) Mankato State University and majored in finance and business.

**Frederick R. Phelan, Jr. (BS, 1983).** After graduating from UB in 1983, Fred attended the University of Massachusetts at Amherst. He received a Ph.D. in Chemical Engineering from UMASS in 1989 working under Profs. Henning Winter and Mike Malone. Since 1989, he has been working in the Polymers Division at the National Institute of Standards and Technology in Gaithersburg, MD. Most of his work involves developing numerical methods for modeling the processing of polymer composites and polymer blends. He recently presented a seminar at the University of West Virginia by the invitation of Prof. Rakesh Gupta, his old fluid mechanics instructor at UB! Fred lives with his wife and three children in Frederick, MD.



**Mike Mercer (BS, 1967)** disguised as 'Dilbert' delivering a recent ISO presentation.

## Elroy and the Big Technical Conference — Episode 6



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State University at Buffalo

307 Furnas Hall

Buffalo, NY 14260-4200



## University at Buffalo

### *The State University of New York*

Department of Chemical Engineering  
Clifford C. Furnas Hall  
Buffalo, NY 14260-4200

Phone: (716) 645-2911

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