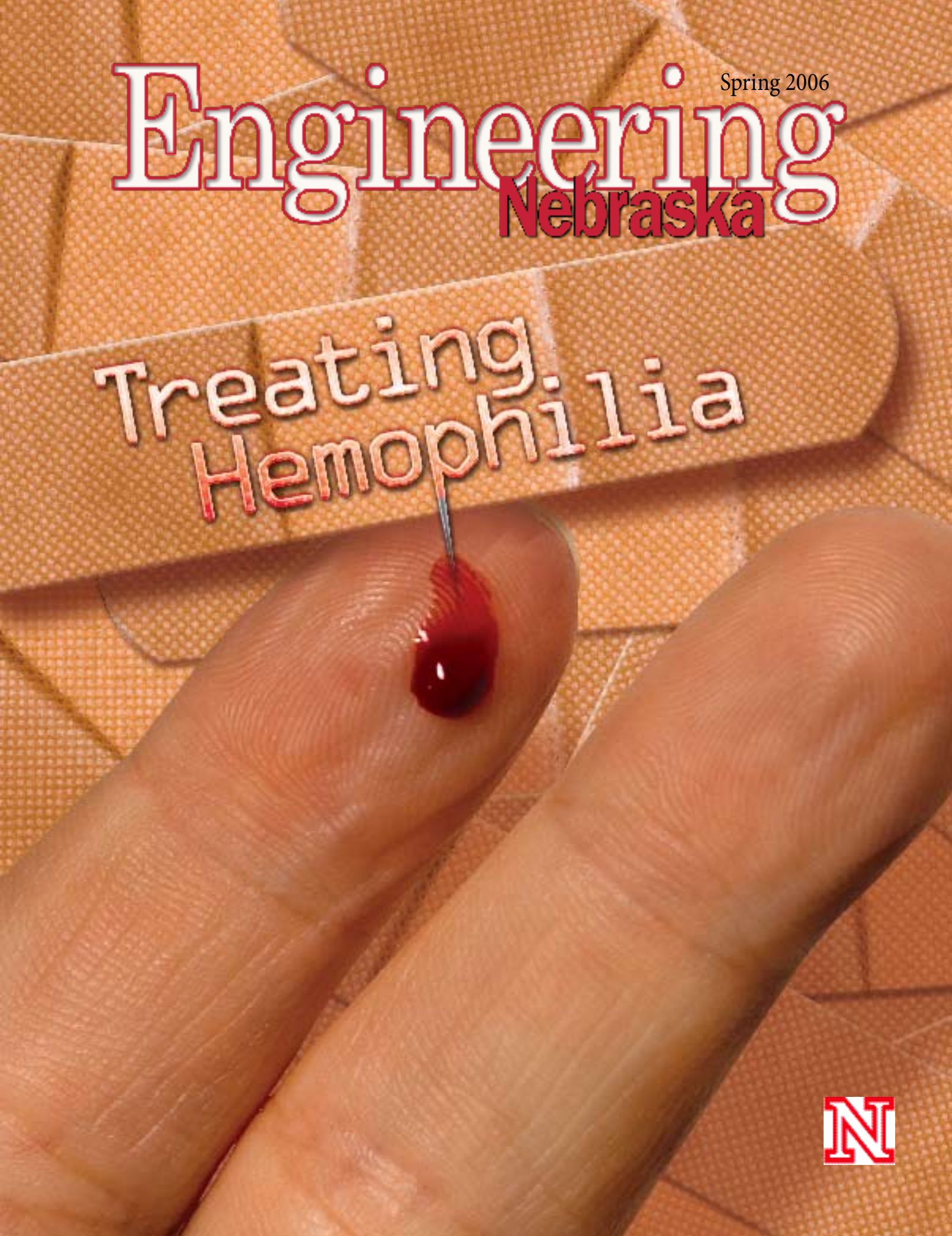
Spring 2006

Engineering@Nebraska - Spring 2006


Engineering
Nebraska
Spring 2006
Treating Hemophilia

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Nebraska Engineering

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features

When she's not dealing with student records, Lori Straatmann leads troops into battle or teaches fellow Society for Creative Anachronism colleagues how to create pottery. See page 29.

departments

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Engineering Nebraska
College of Engineering
University of Nebraska–Lincoln
Spring 2006

A New Era of Engineering

With this issue of *Engineering @ Nebraska*, we are beginning a new era in engineering in Nebraska. Our goal is to be the best engineering program in the country in providing creative opportunities for our students. We don't want our students to just "think outside the box," we want to throw the box away. To some of you this may sound strange, but we engineers actually love what we do, and we want to infect others with our passion for engineering.

In the College of Engineering at the University of Nebraska–Lincoln we are exploring an ever-growing ménage of educational offerings we will provide the next generation of innovative minds in our state. For too long higher education has been hampered by our own inability to grow beyond our educational parentage. This has been especially true in the engineering disciplines, wherein we have languished in classroom hegemony that is narrow in scope, thereby transferring our own shortcomings to those we intend to serve the most—our students. At Nebraska, we have recommitted ourselves to serving students, because they are our future. You see, for us, *engineering means ingenuity*!

Photo by Tim Randall

Dean David Allen

I want to take this opportunity to tell you about some of the programs we are developing that promise to change our students in ways you might never have imagined. First, we have the Engineering Learning Community, which allows freshmen with similar academic interests to live and take classes together, foster closer interactions with faculty and create a sense of community within the larger university atmosphere. In addition, every spring there is an Engineering Learning Community trip that allows students to see first-hand what goes on behind the scenes. One year they went to Disney World, another time to the Coors Brewery and yet another to Dade-Behring. This year, they went to Seattle to visit Microsoft, Boeing and HDR.

The College of Engineering is also heavily engaged in international education for our students. We currently have study abroad programs in Italy, France, Brazil and China, and we are developing opportunities in Venezuela and Sweden. We are one of the few engineering colleges in the country that offer a variety of true engineering programs abroad. In just three years our study abroad programs have grown to about 75 student participants each year. In fact, we are ranked in the top 25 engineering programs in study abroad offerings in the United States.

Finally, I am pleased to tell you that this year we are kicking off our first ever summer camp for entering freshmen. After a wildly successful program put on last year in the Department of Computer & Electronics Engineering, chaired by Professor Bing Chen, we have decided to go collegewide. This summer, approximately 30 percent of our entering freshman class will enjoy two days of activities that will introduce them to Nebraska Engineering.

I am proud of the efforts made by our faculty and staff to give the people of Nebraska an ever expanding and improving educational program in the College of Engineering. We believe that the new programs are just the start of a new era at Nebraska. We want you to know that at the University of Nebraska–Lincoln, engineering is not just a degree program, it's a way of life!

—David H. Allen

Engineering College Changes Name

To reflect its changing educational mission, the University of Nebraska–Lincoln's engineering college has shortened its name to the College of Engineering. It was known as the College of Engineering & Technology.

Dr. David Allen, dean of the college, said the college removed "technology" from its name because UNL is following a national movement to eliminate technology development programs from engineering curriculum. The college recently discontinued its industrial systems technology major and is in the process of discontinuing the construction engineering technology program.

"That is not to say we will no longer be in the business of educating people involved in technology," Allen said. "We will be teaching people the intellectual property to develop new technologies. This is what we believe is the most significant product our college can develop in the state of Nebraska."

The University of Nebraska Board of Regents and the state Coordinating Commission on Postsecondary Education approved the change.

The college had been known as the College of Engineering & Technology since 1974 when UNL's College of Engineering and Architecture merged with the University of Nebraska at Omaha's College of Engineering & Technology. The architecture program became the College of Architecture.

College Celebrates Opening of New Lab

Seniors in the Department of Chemical & Biomolecular Engineering returned from winter break to receive another gift—a new Unit Operations Lab.

The department hosted a ribbon-cutting ceremony Jan. 6 to mark the lab's move from the first floor of Othmer Hall to the basement.

The new lab mimics a factory so students can use equipment similar to that found in factories and research labs, said William Velander, chair of chemical & biomolecular engineering. It also features enhanced utility hookups necessary for chemical processing.

"This is really a beautiful facility. It's a state-of-the-art unit operations lab," Velander said.

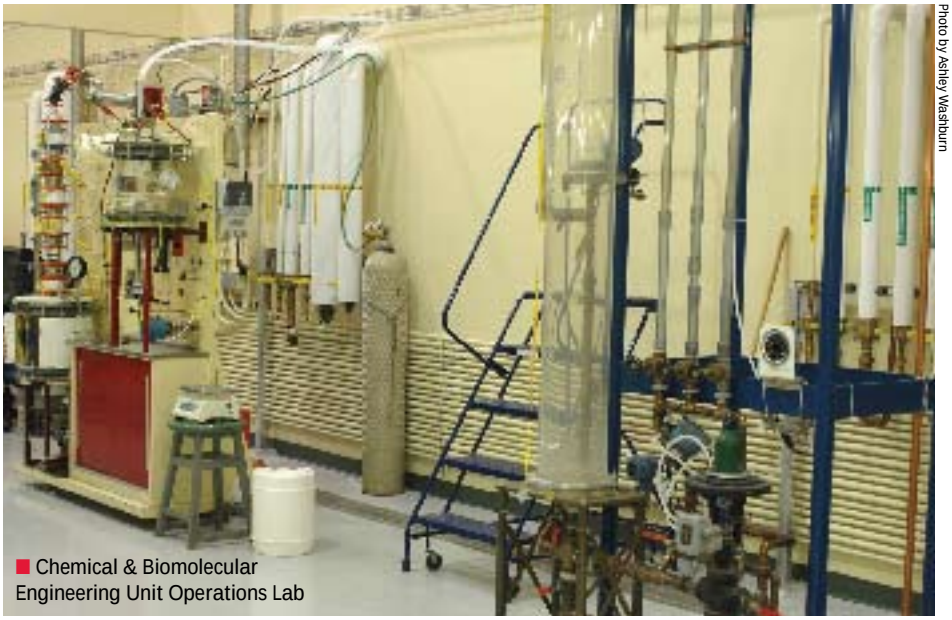


Photo by Ashley Washburn

■ Chemical & Biomolecular Engineering Unit Operations Lab

The lab is used for Chemical Engineering 430, a senior capstone class. It has stations for chemical reactions, continuous and batch distillation and other devices used to separate chemical mixtures. Students can control equipment manually, or remotely from a control room overlooking the workspace.

Construction began in early 2005. The space was configured for equipment that uses steam, pressurized air, heated and cooled water, and electricity. Velander said the lab is unique because the services needed to operate chemical processing equipment are at a significantly larger scale than those needed in a typical chemistry lab.

"Students need to have hands-on knowledge so they know how to work in the industry," said Leonard Akert, lab manager. "This room is much better for that type of operation."

—Ashley Washburn

Former Professor Dies

Russell Nelson, associate dean of graduate studies and Emeritus Professor in Mechanical Engineering at the University of Nebraska–Lincoln, died March 15. Nelson, who taught at UNL for 31 years, was instrumental in getting the metallurgy program started at UNL.

Nelson spent 10 years as associate dean in graduate studies. According to a 1993 Contacts article, Nelson witnessed a real change in the College of Engineering. "I walked in (the classroom) and we had 10 female students in the room and I thought I was in the wrong building," Nelson said.

A well-respected and admired professor, Nelson received eight teaching and service awards, including the Distinguished Teaching Award from UNL. The year he retired, 1992, he was elected a fellow in the American Society of Engineering Education.

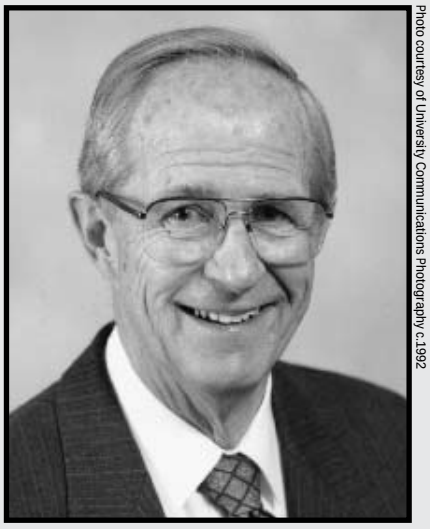


Photo courtesy of University Communications Photography c.1992

■ Russell Nelson

Nelson is survived by his wife, Dorothy, two children and grandchildren.

Small Piano Keyboard a Perfect Fit

Playing the piano can damage hands and wrists as much as spending hours typing on a keyboard—especially for musicians with small hands.

Susan Hallbeck, associate professor of industrial and management systems engineering, and assistant music professor Brenda Wristen are studying how a smaller piano keyboard may prevent stress injuries in small-handed pianists. (A small-handed pianist's hand spans eight inches or less from the thumb to the pinky finger.)

The 7/8 keyboard is a smaller keyboard that comes attached to its own action and stack that contains the moving parts and hammers that strike the strings. To switch between a conventional keyboard and a 7/8 keyboard, the musician slides out the action and replaces it with another.

"The fundamental premise of ergonomics is to fit the task to the user, not the user to the task," Hallbeck said. "Thus, having a keyboard that fits the player and not the other way around just makes sense."

Wristen became interested in conducting a formal study after discovering that her upper back and neck muscles felt less fatigued after playing on a 7/8 keyboard. Her playing also improved.

"When practicing on the 7/8 piano, I noticed that my kinesthetic grasp of where the notes fit under my hand was very solid from one day to the next," Wristen said. "Once I learned a passage, it stayed in my hand, which is almost never the case for me when practicing on the full-sized keyboard."

Hallbeck and Wristen's study compares whether a smaller keyboard is easier for small-handed pianists to use than a conventional keyboard. The researchers completed their initial data collection in November 2005. The study included 26 expert and intermediate pianists with small hands.

Each pianist practiced the same piece of music for 10 hours on a conventional keyboard or the 7/8 keyboard. After practicing, the musicians had three chances to play a trial piece on the instrument they practiced on and were asked to choose their best performance. Then the participants switched instruments. Hallbeck and Wristen asked the musicians to spend 30 minutes practicing and getting acclimated to their new instrument. During this time, the pianists played the same excerpt at five-minute intervals and played practice music between the trials. While they played their assigned excerpts, electronic devices recorded the pianists' muscular exertion and joint angles.

Hallbeck and Wristen discovered that the musicians who learned the trial piece on the 7/8 keyboard had a harder time using the regular keyboard. Their accuracy and technique was better on the smaller keyboard.

"There are a number of injured pianists and others who do not become professionals; rather, they remain devoted amateurs due to repertoire that is beyond their capability," Hallbeck said. "Most of our subjects commented that they had never been able to play a 10th in their life. They just looked down at their hands in awe as they did something for the first time."

Results from the pilot study were presented at the 49th annual meeting of the Human Factors and Ergonomic Society and will be published in the journal "Medical Problems of Performing Artists."

The researchers' next step is to study how the 7/8 keyboard could be used to teach piano to children, who naturally have small hands.

The initial study was funded through a $20,000 interdisciplinary grant from the University of Nebraska–Lincoln Research Council and a $5,000 grant from the Hixson-Lied Endowment Fund.

—Ashley Washburn

■ Practice! Practice! Wristen undergoes testing on the new smaller keyboard.

Courtesy Photos

Courtesy Photo

The learning community and its sponsors at Microsoft headquarters.

Spring Break in Seattle

Spring break didn't include sand, sun or beaches, but it was a once in a lifetime opportunity for the College of Engineering's freshman learning community to explore Seattle's engineering industry.

The group toured Henningson, Durham and Richardson Inc. (HDR), Boeing's large commercial aircraft facility and Microsoft headquarters. Students also participated in a Titan business simulation competition that required them to assume the role of a CEO and operate their own manufacturing companies.

The learning community met with members of the Dean's Advisory Board and local alumni. Board president Bob Brightfelt, '65, '67, hosted the trip.

Between tours and meetings with industry leaders, the group visited the Seattle Space Needle, toured the Port of Tacoma, went on a Puget Sound dinner cruise and watched a Supersonics basketball game.

The college has had a freshman learning community for eight years. Students live in Abel Hall, take core classes together, participate in events with faculty and industry representatives and organize social activities. Seventy students are participating in the program this year.

—Ashley Washburn

Nowak Receives Top Engineering Award

Civil engineering professor Andrzej S. Nowak has received the most prestigious award given by the Warsaw University of Technology, Poland's top engineering school and Nowak's alma mater.

The Medal Politechniki Warszawskiej is given annually to someone who has made significant achievements in science and engineering. Nowak was recognized for his contributions to structural engineering. He studies the reliability of structures and conducts risk analysis for bridges and buildings.

"I feel very honored," Nowak said. "It was such a surprise. I didn't even know I was nominated."

Nowak came to the University of Nebraska–Lincoln in 2005. He previously taught at the University of Michigan for 25 years.

Rajurkar Receives National Award

Dr. Kamlakar Rajurkar, interim associate dean for research, received the 2005 Charles F. Carter Jr. Advancing Manufacturing Award from the Association for Manufacturing Technology. The award is given by AMT's Technology Issues Committee to honor academic contributions to the advancement of manufacturing, especially as it relates to members of AMT and industry. Consideration for the award is based upon nominations from an AMT member. Rajurkar was nominated by the Ex One Company, an advanced manufacturing equipment and instrumentation company based in Pennsylvania.

Rajurkar, who also is a professor in the Department of Industrial & Management Systems Engineering and the director of the Center for Nontraditional Manufacturing Research, said, "It is a great honor to be recognized by my peers in the U.S. industries. I am humbled by their selection of me for the Charles Carter Award." He received the award at the AMT/National Center for Manufacturing Sciences Manufacturing Technology Forum in April.

Photo by Ashley Washburn

Anthropology professor Peter Bleed speaks to the UHON 395 class about Japanese swordmaking.

Engineering Meets Liberal Arts in Honors Class

Engineering professor Jennifer Brand is teaching an honors course that explores engineering from a historical perspective.

Students in UHON 395: Fulcrums and Flights of Fantasy learn how advances in engineering have affected the arts, human relationships, world affairs and religion. Brand teaches the class with Karen Lyons, associate professor of English and women's and gender studies.

The three-credit class is open to sophomore, junior and senior students in the honors program. Eleven students are enrolled this semester.

Brand said by the end of the course, students should understand that developments in technology dramatically change how society functions. "There are no divisions between technology, humanities, the arts, and especially history," Brand said. "You can't take anything as one isolated incident. They're all interconnected."

Brand and Lyons also want students to consider the ethics of technology.

The class discusses innovations created during the Power and Energy Revolution, the Industrial Revolution and the Computer Revolution. Students listen to presentations from guest speakers and arrange field trips at historical landmarks such as the State Capitol.

Although engineering students comprise half the class, honors students in any major may take the course. Lyons said diversity in a course such as UHON 395 is crucial because it exposes students to new ideas and viewpoints.

"It's designed to join disciplines that are not commonly pulled together," said Lyons, who also is the associate director of the University Honors Program.

Senior Amy Dimick is one of the engineering students. "A lot of our classes are technology based, and this brings humanities into our education. It's good to get a perspective on others' perceptions of engineering," said Dimick, a biological systems engineering major.

Students complete two individual projects and one group project. Projects have covered topics such as how the interstate system has affected society, how ship technology changed how wars are fought and the development of Technicolor.

Brand and Lyons said the projects help students sharpen their research and presentation skills.

"It challenges engineers to be creative and learn how to talk to laypeople about things they're passionate about," Brand said.

—Ashley Washburn

College Implements Shared Advising

John Ballard, associate dean of academics for the College of Engineering; Dennis Schulte, associate professor of biological systems engineering; Ann Koopmann, director of college relations; and Jennifer Nelson, advisor, General Studies, received a $25,000 Initiative for Teaching and Learning Award for their SAFE—Shared Advising for Engineers—proposal.

The project will implement a comprehensive, shared-advising model for the college, integrating existing advising and first-year class components with two new elements: student mentors and a Web-based portal for easily accessible advising information. A training program will be developed so every new student in the college will be assigned a peer mentor to guide him or her through the first three semesters of study at the university. Retention and attrition from the first through third semesters will be assessed. The net results should be increased breadth, depth and quality of student experience in content-coordinated first-year courses and improved retention and graduation rates of engineering students.

The ITLE projects, which are proposed by faculty and undergo a competitive review process, are funded by the University of Nebraska Foundation.

Photo by Tom Slocum

From left, Jennifer Nelson, Dennis Schulte, Ann Koopmann and John Ballard received a $25,000 grant to create a model for advising in the College of Engineering.

The Science of Prediction

Galileo said if we can understand nature, we can predict the future. While that may seem more like science fiction than scientific fact, the father of modern physics was right. And David Allen, dean of the College of Engineering, is working to prove it. An expert in blast mitigation, Allen creates mathematical models that predict how tank armor will react to a ballistic impact. This predictive methodology could have far-reaching applications, including medicine and the meat industry.

"One way to predict the response of tank armor to ballistics is to design armor of different thicknesses and materials, then shoot projectiles at it to see what happens," Allen says. Firing real ballistics at real tanks is cost prohibitive, so the army relies on models to keep costs down.

When designing models, Allen first decides what he wants to know about the thing he will be modeling. He then constructs a well-posed mathematical model, incorporating a set of equations that are sufficient to answer the problem. The key, he says, is using fundamental physics and keeping things simple. The models can predict the propagation of hundreds of cracks at the same time within a matter of microseconds.

Allen tests his tank armor models at Aberdeen Testing Grounds in Aberdeen, Md. The models predict the response of hypothetical armor to hypothetical ballistic impacts. From this he and other researchers determine how to design armor that better deflects ballistic impacts—and is lightweight.

"In the first Gulf War, many tanks were lost to the sand," Allen said. "At 80 tons each, the armor was simply too massive." The cost to the Army was exorbitant.

The objective is to find lightweight materials to get the weight down to 30 tons so tanks won't bog down in desert warfare, but will still protect soldiers.

The same premise can be applied to certain medical problems. For example, Allen says, a good predictor of an aneurysm could be used to save a person's life.

"Right now doctors can determine by direct observation if a person has an aneurysm through an MRI. But they really don't understand he physics of how it works when it kills a patient or when it will reach a critical point and burst."

If doctors could predict when the fracture of the aneurysm will occur, they could do a local procedure or find another method to treat it.

"Good predictors allow us to develop new inventions to treat patients."

—Constance Walter

■ David Allen creates mathematical models that predict how tank armor will react to ballistic impact.

Photo by Troy Fedderson

Student Kudos

Ph.D. student Erica Bowden received the prestigious 2006 F.V. Hunt Postdoctoral Fellowship from the Acoustical Society of America. The fellowship, valued at $55,000, was established by the ASA to further the science of and education in acoustics. Fellows receive a stipend, provided jointly by the Hunt estate and a fund established by the Acoustical Society, to support their research at an institution of their choice. Bowden will spend one year abroad doing postdoctoral research in Sweden. For more information about this award, go to: http://asa.aip.org/fellowships.html#hunt. In addition, Ph.D. student Jonathan Rathsam received the 2005 Martin Hirschorn IAC prize from the Institute of Noise Control Engineering, valued at $5,000. For more information, go to: http://www.inceusa.org/nc05/StudentPaper/HirschornApplication.doc. Both students work with Lily Wang, assistant professor of AE.

Anagh Lal, a graduate student in computer science and engineering, received the 2006 Folsom Distinguished Master's Thesis Award for his thesis, "Neighborhood Interchangeability for Non-Binary CSPs & Application to Databases," which he defended in spring 2005 under the supervision of Dr. Berthe Y. Choueiry, associate professor of CSE. The research was supported by an NSF CAREER award and a Graduate Faculty Fellowship from UNL's Research Council. Anagh works as a senior program analyst at the Metropolitan Utilities District in Omaha.

The student chapter of Mechanical-Electrical Specialty Contracting (MESC) reached the Final Four in the Mechanical Contractors Association of America's national competition. Other schools in the Final Four are Purdue University, the University of California at San Louis Obispo and the Milwaukee School of Engineering. The student delegation traveled to Maui, Hawaii, in March to compete for the national championship. Team members are Anne Arant, Brandon Limoges, Ben Johnson, Pat Rainbolt, Bill Jansen, John Tinius and Mark Hofschulte.

Construction Management's Sigma Lambda Chi chapter collected and donated 724 pounds of food to the Lincoln Food Bank, a 418 percent increase over last year's 173 pounds of food, to serve those in need within the Lincoln community. The group's advisor is Terry Stentz.

The National Association of Home Builders (NAHB) student chapter received several honors at the International Builders Show in January. UNL and Southeast Community College shared the Outstanding Student Chapter award. This is the second consecutive year that UNL has won the award. The NAHB Women's Council granted Erin Royal, a senior in construction management, the "National Housing Endowment Strategies for Success" scholarship. The scholarship is for $1,000. More information about the award can be found at http://www.nahbmonday.com/stuchap/issues/2005-09-27/3.html. In addition, Nicole Karr, construction management, received the Centex Homes/National Housing Endowment Build Your Future scholarship, valued at $3,000, and Ryan Robertshaw was named the outstanding student.

The American Institute of Constructors (AIC) Constructor Certification Commission reported that more than 83 percent of CM students passed its examination. Nationally, the results are 59.9 percent.

Books Published

Khalid Sayood, electrical engineering, "Understanding Circuits: Learning Problem Solving Using Circuit Analysis," 2005, San Francisco, Morgan Claypool; and "Introduction to Data Compression, 3rd Edition," 2005, San Francisco, Morgan Kaufmann.

Millard F. Beatty, engineering mechanics, and Michael Hayes, eds., "Mechanics and Mathematics of Crystals: Selected Papers of J.L. Ericksen," 2005, Singapore, World Scientific Publishing Company.

Jiashi Yang, engineering mechanics, "An Introduction to the Theory of Piezoelectricity (Advances in Mechanics and Mathematics)," 2005, Berlin, Springer.

Grants Over $200,000

Dzenis, Y., NSF/NIRT, "Manufacturing of Novel Continuous Nanocrystalline Ceramic Nanofibers with Superior Mechanical Properties," $200,000 ■ Noureddini, H., Nebraska Corn Board, "Reduction of Phosphorus from Ethanol By-Product Used as Livestock Feed," $210,781 ■ Goddard, S., Department of Agriculture-RMA, "Climate & Soil Risk Information System," $213,322 ■ Saraf, R., NSF, "Nanodevice for Imaging Normal Stress Distribution with Application in Sensing Texture & Feel by Touching," $217,156 ■ Rilett, L., NDOR, "Development of State-of-the-Art Traffic Micro-Simulation Model for Nebraska," $222,896 ■ Azizinamini, A., NDOR. "Simple for Dead-Continuous for Live Load System with Partial Pre-Fabricated Deck System," $242,038 ■ Azizinamini A., NDOR, "Roads Simple for Dead-Continuous for Live Load System with Partial Pre-Fabricated Deck System," $242,038 ■ Stentz, T., DoT-FRA, "Human Factors in Railway Operation," $371,700 ■ Rohde, J., NDOR, "Midwest States Pooled Fund Program for Roadside Safety, Year 16," $535,000 ■ Van Cott, K., DHHS-NIH-NHLBI, "cGMP Recombinant FIX & Oral Hemophilia B Therapy," $660,706.86 ■ Meagher, M., DHHS-NIH-NHLBI, "cGMP Recombinant FIX & Oral Hemophilia B Therapy," $660,706.86 ■ Velander, W., DHHS-NIH-NHLBI, "cGMP Recombinant FIX & Oral Hemophilia B Therapy," $680,728.28 ■ Goddard, S., Department of Agriculture-RMA-FCIC, "Drought Risk, Impact & Mitigation Information System," $711,229.50 ■ Velander, W., DOD-Army Medical Research, "Production & Purification of Fibrinogen Components for Production Fibrin Sealant of Hemostatic Dressing," $761,151.50 ■ Inan, M., DOD-Army Medical Research, "Production & Purification of Fibrinogen Components for Production Fibrin Sealant of Hemostatic Dressing," $761,151.50 ■ Meagher, M., DOD-Army Medical Research, "Production & Purification of Fibrinogen Components for Production Fibrin Sealant of Hemostatic Dressing," $761,151.50 ■ Van Cott, K., DOD-Army Medical Research, "Production & Purification of Fibrinogen Components for Production Fibrin Sealant of Hemostatic Dressing," $761,151.50 ■ Chen, B., NSF, "SPIRIT: Silicon Prairie Initiative on Robotics in IT," $1,170,488 ■ Allen, D., DOD-Army Research Laboratory, "Advanced Materials & Technologies for Weapons Detection & Blast Mitigation," $1,485,000

New Faculty

Civil Engineering Shannon Bartelt-Hunt joined the Department of Civil Engineering in January. Her research interests focus on applications of geo-environmental engineering, specifically, contaminant fate and transport in soil and groundwater systems and landfills; engineering properties of solid waste; and the design of remediation strate-

gies for hazardous waste sites. Bartelt-Hunt received her Ph.D. in Civil Engineering (2004) and her M.S. in Civil Engineering (2000) from the University of Virginia; and her bachelor's in Environmental Engineering (1998) from Northwestern University.

Electrical Engineering Mathias Schubert, associate professor. Schubert came from Germany's Universitat Leipzig. He received his M.S. and Ph.D. from Universitat Leipzig in 1997. His research interests are ellipsometry and terhertz spectroscopy. Tino Hofmann, research associate, will be working closely with Schubert. He received his Ph.D. from Universitat Keipzig in 2000. Mark Bauer, senior lecturer, came to the university in January. He received his M.S. and Ph.D. from UNL in 2001. He is teaching EE 215 and EE 494.

New Staff

Biological Systems Engineering Valdeen Nelson, program technician, Partners in Pollution Prevention Program

Business and Finance Mary Ellen Reeves, accounts specialist

Chemical & Biomolecular Engineering Jill Morgan, administrative technician; Carlos Arango, office assistant

Kudos

■ Raymond Moore, associate dean for Omaha-based programs, was elected an "Emeritus Member" of the Cementitious Stabilization Committee at the 85th Transportation Research Board of the National Academies' annual meeting in Washington D.C. Moore has been active in TRB since 1970, having served as the chair of the Lime and Lime-Fly Stabilization Committee (1987-1993), chair of the Geomaterials Section (1993-1999) and chair of the Design and Construction of Transportation Group (1999-2002). ■ Terry Stentz, associate professor of construction management, was awarded a "cluster grant" that includes team members from educational psychology, psychology, human development and family science, and construction management. The research involves brain-mapping (quantitative EEG) experiments that focus on brain activity. Although this particular research involves interactions between children and their mothers, the goal is to use these same research techniques to study how adults make decisions under conditions of uncertainty, pressure and fatigue. Stentz also was elected to the international Board of Directors of the CM honorary, Sigma Lambda Chi. ■ Lily Wang, assistant professor of architectural engineering, received the UNL Excellence in Graduate Education Award. Ellen Weissinger, executive associate dean for Graduate Studies, presented the award and said, "Dr. Wang's advising and mentoring efforts and abilities are best left to student letters but words like 'enthusiasm,' 'listens carefully to ideas,' 'shares my excitement,' 'encourages students to broaden their horizons,' 'intelligent,' 'talented,' and 'energetic' show up repeatedly. Obviously her students are very pleased with her abilities and the direction she is taking them." ■ Mike Brenneman, construction engineering, was the guest coach for the Cornhuskers on Nov. 12. His duties/activities included tours of the facilities, observations of volleyball and football practices, observation of warm-ups (from the sidelines), brunch at the Hewit Center, recognition on HuskerVision screens and seats in Section 4. The Huskers played Kansas State and won 27-25. It is unclear how, if at all, Brenneman's involvement affected the outcome of the game. ■ Bruce Fischer, assistant professor of construction management, received a "Certificate of Recognition for Contributions to Students" from the UNL Teaching Council and the UNL Parents Association. ■ Charles Berryman, associate professor of construction management, was named the Outstanding Educator at this year's International Home Builders Show in Orlando, Fla. Berryman is the advisor to the student chapter of the National Association of Home Builders. Nadine Condello, executive vice president of the national association said Berryman was an excellent educator and that he "has a gift for inspiring true leadership among chapter members." ■ Byrav Ramamurthy, associate professor of computer science and engineering, was elected Secretary of the Optical Networking Technical Committee (ONTC) at its November meeting. ONTC is part of the IEEE Communications Society and serves as its focal point in the area of optical networking technologies. Ramamurthy will serve successive two-year terms as secretary, vice chair and chair of ONTC. More details on ONTC can be found at: http://cse.unl.edu/~byrav/ONTC/. ■ Paul Savory, industrial and management systems engineering, received the TIAA-CREF Institute's Theodore M. Hesburgh Award Certificate of Excellence. ■ Derrel Martin, Suat Irmak, Dean Yonts, Jose Payero, William Kranz, Dean Eisenhauer and Steve Melvin of biological systems engineering and agricultural sciences and natural resources, received the Bureau of Reclamation Commissioner's Water Conservation Award for their efforts in irrigation. ■ Jitender S. Deogun, computer science and engineering, received a Best Paper Award from the Institute of Electrical and Electronics Engineers International Conference on Broadband Networks (BROADNETS 05). ■ Tami M. Brown-Brandl, biological systems engineering, received the American Society of Agricultural and Biological Engineers' Superior Paper Award for "A Literature Review of Swine Heat Production." ■ Atorad Azizinamini was selected to serve on the Federal Highway Administration's New York City BQE triple cantilever project ACTT workshop. Azizi is one of three bridge experts in the country chosen to participate in this project, which has a cost of more than $25 million. The workshop provided recommendations for improvement to the New York Department of Transportation. ■ Dr. R. J. Soukup, Henson Professor of Electrical Engineering, received the prestigious 2005 Meritorious Service Award from the Education Society of the Institute of Electrical and Electronics Engineers at the Frontiers in Education Conference in Indianapolis. His plaque reads "For meritorious service to the Education Society, for service as Treasurer, and for mentoring many members of the society."

A Swine Sensation

Protein from the milk of transgenic pigs could be a revolutionary treatment for hemophilia

By Ashley Washburn

Courtesy Photos

Until the height of the AIDS crisis in the 1980s, few Americans were aware of hemophilia, a genetic disorder that prevents blood from clotting efficiently and causes its victims to bleed in their muscles and joints. Then Ryan White, a 16-year-old from Kokomo, Ind., contracted the HIV virus when he received a transfusion of contaminated blood plasma intended to treat his hemophilia. Thanks to extensive media coverage, White's story raised the public's consciousness of both diseases.

Blood transfusions are infinitely safer than they were 20 years ago, largely because of improved screening at blood banks and advanced purification processes. But each time a hemophiliac receives a plasma treatment, he or she still has a small chance of being exposed to HIV, hepatitis C and other blood-borne diseases. While safety has improved, the ability to obtain enough protein to effectively treat the disease has not. Thus, blood-based treatments are limited and expensive. That's a serious obstacle, especially in underdeveloped countries where 80 percent of the world's hemophiliacs live.

Since 1987, William Velander, chair of chemical & biomolecular engineering, has been researching safer, low-cost treatments for hemophilia. His efforts have resulted in genetically engineered pigs with the potential to produce large amounts of Factor VIII and Factor IX in their milk. Factors VIII and IX are blood proteins produced in the liver that are genetically deficient in people with hemophilia type A and type B, respectively.

Velander, the D.R. Voelte and N.A. Keegan Endowed Chair in Engineering, and a team of researchers will test the pig-derived Factor IX coagulant in hemophiliac dogs during the next two years. So far, the tests in vitro and in hemophiliac mice have been highly successful, and Velander believes clinical trials in humans will begin within five years.

An unconventional solution

Velander, whose background is in biochemistry and biomolecular engineering, described his journey into hemophilia research as serendipitous. He formed a close relationship with coagulation science specialists during his undergraduate and postgraduate studies and became fascinated with the idea of combining engineering and medical knowledge to treat blood disorders.

He began his research as a professor at Virginia Tech University. Velander was assisted by Kevin Van Cott, a doctoral student from Purdue University who is now an associate professor of chemical & biomolecular engineering at the University of Nebraska–Lincoln. Velander and Van Cott formed a partnership with the American Red Cross to produce genetically engineered versions of anti-hemophilic factors VIII and IX. While research for Factor IX is three years ahead of research for Factor VIII, a collaboration with University of Michigan researchers Randall Kaufman and Steven Pipe has accelerated the progress on a therapy for hemophilia type A.

Velander's first step was to isolate the hemophilic factor in human blood. At first, researchers believed they could use a monoclonal antibody to capture the protein in human blood, and then purify it to eliminate viruses. However, they decided that although the process was safe, the supply would still be inadequate. Using a genetically engineered animal cell was the best way to increase the abundance of Factor IX.

They had to find the perfect animal—and the perfect cell. Velander said researchers considered several criteria: the animal needed the ability to produce complex proteins because Factor VIII Factor IX are two of the most complex proteins known; the animal's biochemistry had to be similar to humans'; the cell had to be stable and prodigious in its production setting; and the molecules needed a long circulation lifetime once inserted into the body.

In the 1980s, advances in breast cancer research proved that mammals' mammary glands make and secrete large volumes of protein. Researchers at universities in the United States, the Netherlands and Scotland were engineering transgenic cows, sheep and goats and using the milk to produce therapeutic proteins.

Velander considered using traditional dairy livestock, but found that ruminants' mammary glands placed a problematic molecular signature on proteins made in milk. Any protein bearing this signature wouldn't survive in the human body long enough to be effective, Velander said.

His decision to obtain milk proteins from a pig was unorthodox. However, Velander said, the biochemistry of pigs is the closest to our own. Pigs produce less milk than most dairy animals, but that doesn't matter. "Pig proteins are so concentrated and potent that only a tiny amount needs to be injected in the body to work," he said.

Velander produced genetically engineered cells by inserting the human Factor IX gene into the animal cell. Figuring out how to reproduce the cell was a challenge. Reproducing cells in a stainless steel bioreactor prevented disease and contamination. However, Velander found that a bioreactor was 100 to 1,000 times less effective than cells living within tissue. This is because fewer cells can grow and receive nutrients in a culture setting compared with tissue.

Not a typical barnyard animal

Thus, Velander used the natural productivity of tissue as a bioreactor setting—in this case, the mammary gland of a transgenic pig. To produce such an animal, he inserts the Factor IX gene into several freshly fertilized one- or two-cell embryos. The embryos are transferred to a surrogate mother pig. Through its natural gene maintenance machinery, the cell slices the Factor IX gene into the pig's chromosomes. The gene becomes a transgene, or a permanent part of the unborn pig's heredity. Ten to 30 percent of a litter derived from these embryos is transgenic. Once a transgenic pig reaches maturity, they are bred with ordinary production pigs. After farrowing, the pigs are milked for two 50-day lactation cycles. Each sow typically yields 100 to 300 liters of milk annually.

The first pig able to produce Factor IX was born in 1994. Her milk contained about 75 times more Factor IX than human plasma. With optimization in molecular design of the transgene, recent pigs have produced more than 100 times the amount of Factor IX found in human plasma. Velander estimates that milk from just 100 to 200 transgenic pigs could produce enough Factor IX to meet the world's demand for hemophilia type B therapy.

The first Factor VIII pig produced as much as 20 times the amount of the protein found in human blood. Newer versions of this pig, expected to become available within two years, should produce high levels of the protein needed for hemophilia type A treatment.

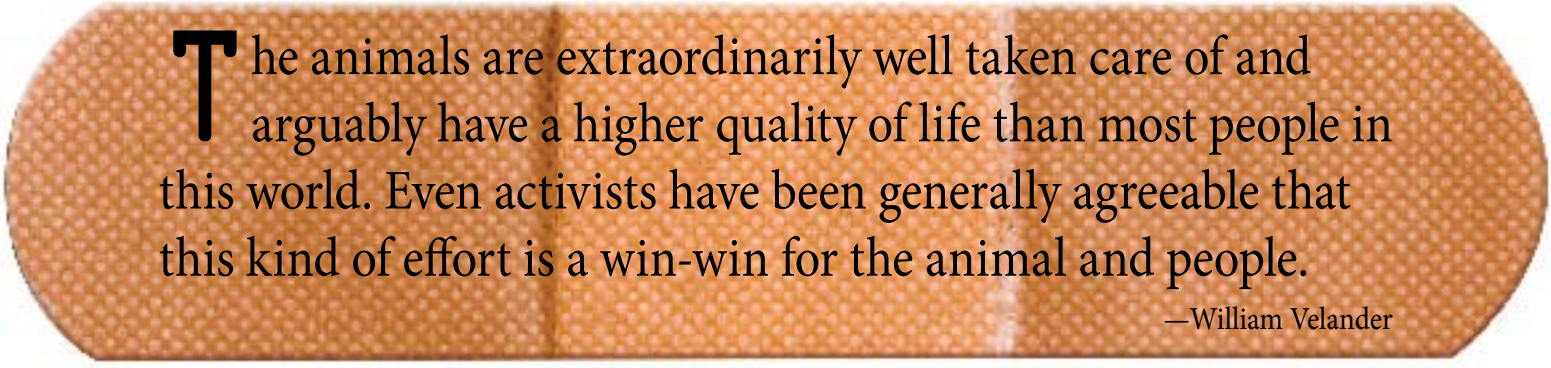
Velander acknowledges that the public is skeptical of the benefits of cloning and genetically modified animals. His pigs live in a secluded facility in the mountains of Virginia to shield them from disease. Visitors are required to shower and change into clean clothing before entering. "The animals are extraordinarily well taken care of and arguably have a higher quality of life than most people in this world," he said. "Even activists have been generally agreeable that this kind of effort is a win-win for the animal and people."

Tackling a global problem

About 100,000 people worldwide have hemophilia type B, and 500,000 have hemophilia type A. The World Federation of Hemophilia estimates that the real total may be two or three times higher, but many hemophiliacs die during infancy because they're not properly diagnosed and treated. And while Americans have difficulty stomaching the cost of treatment, people in Third-World countries can't afford treatment at all, Velander said. He estimates that his new drug would cost $2,000 to $10,000 annually. For a severe hemophiliac living in the United States, plasma treatments cost up to $200,000 annually. The cost of drug therapy is several times higher.

"While the U.S. can certainly benefit from this technology, it's important to note that the biggest impact will be in lesser developed countries where 80 percent of the dire need exists," Velander said. "This has the potential to give them access to sophisticated healthcare they don't have now."

Researchers will test the potent, pig-based coagulant in hemophiliac dogs, and Velander said the results in hemophiliac mice have been promising. In September 2005, UNL received a five-year grant in excess of $10 million from the National Institute of Health's (NIH) National Heart, Lung and Blood Institute. The grant is being used to complete preclinical research in animals. If everything goes according to plan, Velander will seek approval from the federal Food and Drug Administration to do clinical evaluations in humans within five years.



UNL chemical & biomolecular engineering professors Van Cott and Michael Meagher and research assistant professor Todd Swanson are assisting Velander. Paul Monahan and Timothy Nichols from the University of North Carolina-Chapel Hill are leading the animal trials. Others involved in the grant are Stephan Abramson, LifeSci Partners of California; Julian Cooper, ProGenetics LLC of Virginia; and William Dernell and Mark Manning of Colorado State University.

The researchers also are studying new ways to administer the drug because chronic intravenous injections are dangerous, especially in young children and infants. He hopes the drug can be administered through the mouth, nose or trachea. This may be possible because of the abundance of medicine that transgenic pigs provide.

"This would be a welcomed miracle for the parents of hemophilic infants," Velander said.

Cows that Could Save Lives

While developing his hemophilia treatment, Chemical and Biomolecular Engineering Professor William Velander discovered that genetically engineered fibrinogen made in milk could fill a shortage of human plasma.

He rejected cow milk as a potential source of hemophilia proteins because the cow protein contains a signature that causes it to die shortly after being infused into the human body. However, fibrinogen is masterful at clotting wounds while acting topically. With help from the American Red Cross and Pharming NV, a decade ago Velander began making transgenic cows that produce genetically engineered fibrinogen in their milk.

He incorporates the fibrinogen into a heavy-duty bandage that stops bleeding on contact. "When you put that much clotting power in the palm of your hand, it's so powerful that you can hear the wound gushing," Velander said.

One can make a fibrinogen bandage from the protein in human plasma, but it's difficult to obtain large amounts of the protein. On the other hand, milk from transgenic cows contains an abundant supply. That means an animal-based fibrinogen bandage can be mass-produced at a relatively low cost.

Because hemorrhaging causes 50 percent of war casualties, the bandage is a needed tool for treating battle wounds. The U.S. Army gave Velander a $3 million grant to mass-produce the bandage for military use. Velander's goal is to increase production from 100,000 bandages annually to millions. That would satisfy the military's needs, plus make the bandage available to paramedics and surgeons. "It has already been tested in Iraq and has saved lives," Velander said.

Bridging A Community

Photos and story by Ashley Washburn

A Ravenna fourth-grader said the new bridge in town looked "just like the San Francisco bridge."

At first glance, the long arch and narrow rods conjure images of the Golden Gate Bridge. But the greatest similarity between the two bridges is that both are significant engineering feats, expected to be industry models for decades.

"This bridge is the icon of the Nebraska highway system right now and is receiving attention around the world," said Lyman Freemon, director of the Nebraska Department of Roads Bridge Division.

The $4.2 million bridge is a tied arch, a shallow structure that can span long distances. It is one of the best choices for navigational channels, said civil engineering professor Maher Tadros.

He and Freemon first thought of building a tied arch bridge during a 1997 trip to Japan, where they met with leaders of the Japanese construction industry. As a result of the meeting, the United States and Japan each agreed to build a tied arch bridge for demonstration purposes. (Japan has not built its bridge yet.)

For the next five years, the university and NDOR researched how to build such a bridge. The university also applied for federal funding.

In 2002, Tadros and Freemon found an ideal location for their experiment. Ravenna was already planning to replace a storm sewer and several culverts. The infrastructure lay near the viaduct that stretches from Utica Street to Highway 68. Built in the 1930s, the viaduct was corroding and obsolete, so NDOR determined that the bridge needed replacement.

Tadros said the site presented many challenges that ultimately led to engineers choosing a tied arch design. First, the bridge crosses Burlington Northern-Santa Fe railroad tracks, and the railroad requires a 25-foot clearance between the tracks and the bridge. Second, BNSF allows only three hours of train traffic interruption at any time during construction. Third, the project had a tight budget, and the bridge had to be built quickly.

A design team considered several options.

The Inverted Tee, a system Tadros developed for short-span bridges, would have easily met railroad clearance requirements. However, it could not span the length of the viaduct—174 feet—without pier supports. Tadros said building piers close to railroad tracks would have been difficult, dangerous and expensive.

The team also considered the NU I-Girder system, developed by Tadros and other university researchers. The I-Girder met the length requirement, but the deck would have been more than six feet deep, requiring NDOR to raise the road. In contrast, the tied arch bridge is just 32 inches deep.

Tadros said engineers determined that raising the road would be expensive, time-consuming and harmful to local businesses.

Therefore, the team embraced the challenge of building the United States' first tied arch bridge that has post-tensioned steel tubes filled with concrete.

"The pieces of the puzzle fit together nicely," Tadros said. "Nothing was forced."

The defining element of the bridge is the steel tubes used for the arch.

> You always run into problems, but coming up with the solutions is part of the fun.
>
> —Kirk Weber, NDOR project manager

Two 12-inch tubes, separated by a 12-inch spacer, are filled with concrete and reinforced with steel tendons. The steel pipe prevents the concrete from crushing. "When you fill a steel tube with concrete, it is much greater than the sum of the capacities of its two parts," Tadros said.

The twin arches are as sturdy as one large arch, but streamlined. "It's just like a string in the air," Tadros said. "It's very slender and attractive, yet it's wide and wind resistant."

The feature Tadros is most proud of is the bottom UNL-patented tie beam that

supports the floor. The tie beam is composed of steel tubes filled with concrete and post-tensioned with high-strength steel strands.

"The trouble with conventional design is that the steel tube becomes fracture-critical, which means we have to over-design them so they won't fracture under traffic. Post-tensioning essentially eliminates that problem by preloading the steel to put it in permanent compression," Tadros said.

The slab resting on the floor beams also is post-tensioned, guaranteeing the bridge will not crack.

Kirk Weber, NDOR project manager, said the project was tricky because nothing like it had been attempted.

At first, designers thought bridge elements could be built offsite and installed in a few weeks. However, the department could not find a crane powerful enough to lift the arches.

"You always run into problems, but coming up with the solutions is part of the fun," Weber said.

Construction on the four foundation shafts and abutment columns began in February 2005. Normally, Weber said, NDOR removes an old structure before starting construction on a new one. However, the contractor decided to keep the old viaduct in place to support pieces of the new bridge during construction. The arch was built in pieces at Capital Steel in Lincoln and transported to Ravenna for assembly.

Once the arches were assembled, temporary stilts braced them on the abutment columns. NDOR used the existing deck as a platform for placing the steel floor beams between the arches.

The viaduct was completed in November 2005. Tadros said it's already being used as a template for a 240-foot bridge in Columbus and would be feasible for a proposed 410-foot Missouri River bridge.

Tadros said building "a bridge Ravenna could be proud of" was as important as the engineering itself. A passenger walkway connects southern Ravenna with the downtown business district. This spring NDOR will add the finishing touches when it paints the arches royal blue, Ravenna's school color, and stains the retaining walls.

"This viaduct is certainly going to be a great addition to the community," Mayor Gerald Reimers said.

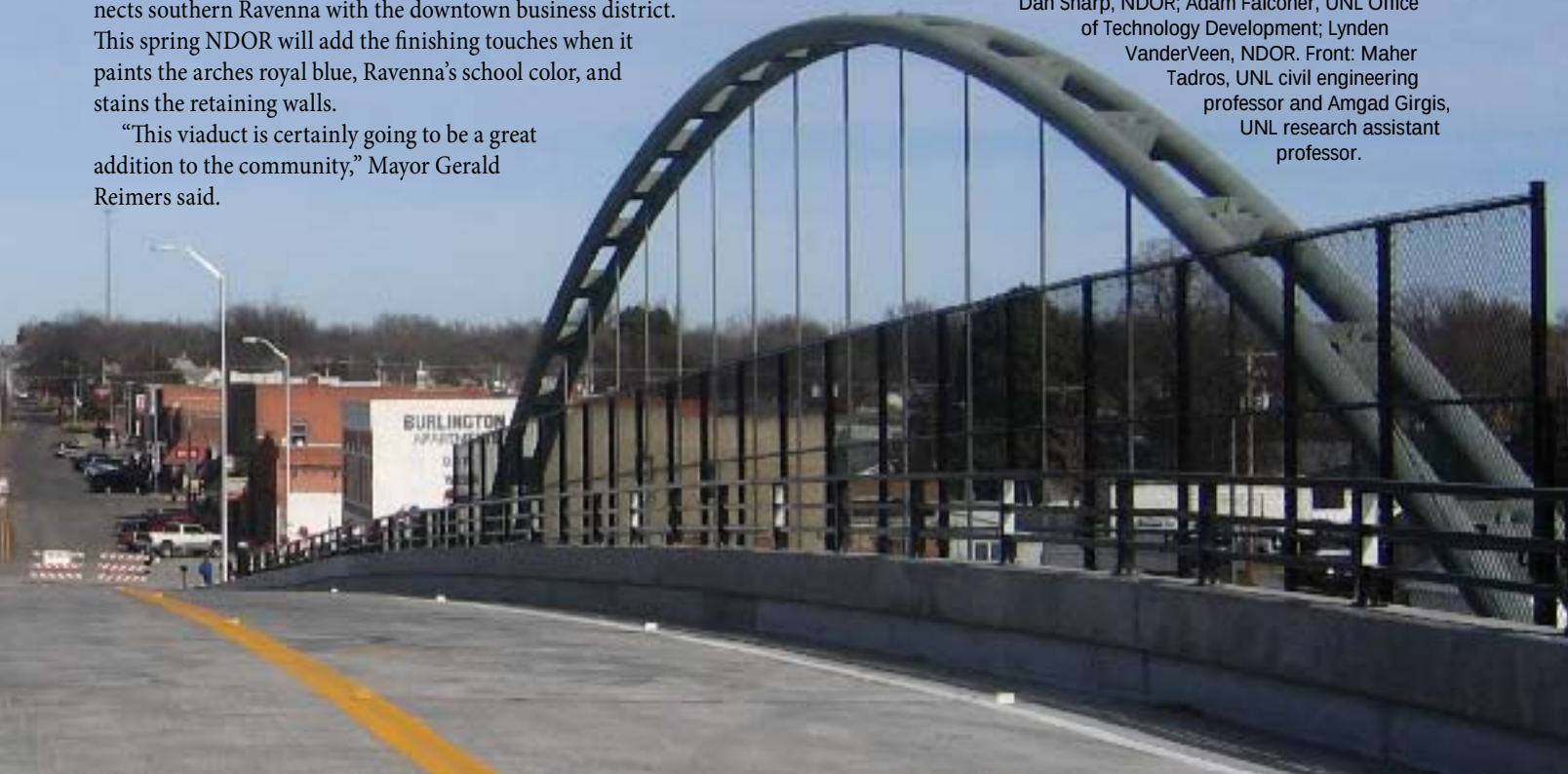
It also continues a 17-year partnership between UNL and NDOR. The design team included Tadros and civil engineering professors Christopher Tuan and Amgad Girgis from the College of Engineering and Freemon, Weber, designer David Fritz and assistant bridge engineer Dan Sharp from NDOR.

During the Ravenna bridge's dedication ceremony, Freemon joked that he and Tadros were "joined at the hip" after spending so much time together. That's fine with Tadros, who said he considers the NDOR Bridge Division the best in the country.

Freemon offers equal praise.

"He [Tadros] is probably the most outstanding engineer of concrete structures not in the state, not in the country, but in the world," he said.

■ Back: Lyman Freemon, Nebraska Department of Roads; Dan Sharp, NDOR; Adam Falconer, UNL Office of Technology Development; Lynden VanderVeen, NDOR. Front: Maher Tadros, UNL civil engineering professor and Amgad Girgis, UNL research assistant professor.



Five Men and a Machine Shop

by Ashley Washburn

When asked to list his clients, Jim McManis chuckles and says he has too many to name. Instead, McManis opens a filing cabinet and gestures toward a thick stack of neatly arranged folders that contain his clients' blueprints.

The Engineering and Science Research Support Facility (ESRSF), better known as "the machine shop," helps University of Nebraska–Lincoln faculty turn innovative ideas into reality. After creating design prototypes, professors from the College of Engineering and across campus hire the machine shop to manufacture life-size, working versions. The high-profile projects ESRSF manufactures for UNL have attracted other researchers' attention, and the shop is known internationally for manufacturing equipment for glaciology, ocean exploration, geosciences, space exploration and medical research.

"Tool makers, in general, have design knowledge," McManis said. "It's not the same professional background (as engineering), but it's a unique skill to be able to manufacture the tools that engineers have created."

McManis has been ESRSF's manager since 1986 when the college consolidated the engineering mechanics and mechanical engineering machine shops. In addition to McManis, ESRSF has four full-time technicians, each with a technical specialty. Mike Long is the shop's foreman and makes tools and instruments, welds and makes machinery. John Hudgens and Mark Stroup handle construction, machine fabrication and welding. Stroup also specializes in working with exotic materials and CNC machinings. Ron Auman maintains the machine shop's equipment and the college's lab equipment. The group has 71 combined years of experience at the shop.

ESRSF undertakes about five major projects a year and handles up to 30 smaller repair and maintenance jobs daily. Working in an academic environment requires creativity and patience to complete projects that may take months, or even years, to complete, McManis said.

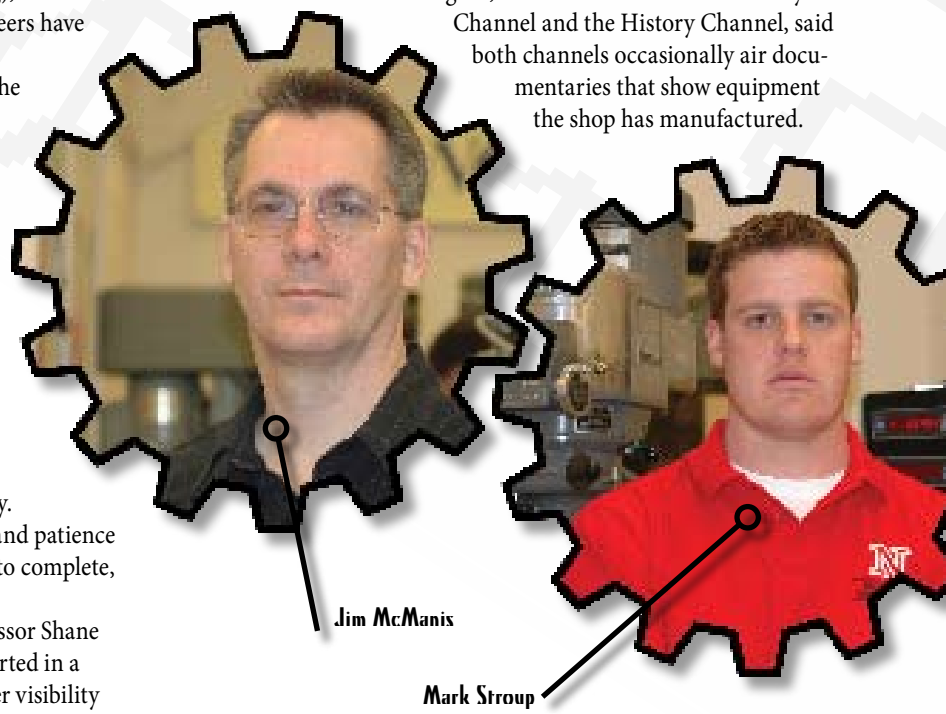
The shop is working with mechanical engineering professor Shane Farritor to build camera-carrying robots that could be inserted in a patient's body through tiny incisions, giving surgeons better visibility of an injury. ESRSF also has helped Farritor build prototypes of space exploration robots and robots that measure traffic and road conditions.

ESRSF has been involved with an increasing number of transportation projects in recent years. The first prototype of the SAFER (Steel and Foam Energy Reduction) barrier for racetracks was built in the shop. The barrier was designed to reduce the severity of crashes by absorbing energy, then distributing it evenly across the wall without forcing the car back into traffic.

For Stroup, a senior in construction management, building the SAFER barrier is one of the highlights of his five-year career with ESRSF. "I like being able to relate what I'm working on to the finished product," Stroup said. "It's neat to be able to say, 'Wow, I worked on that.'"

McManis said one of the greatest rewards of his job is learning about professors receiving grants or recognition because of technology they developed with ESRSF's help.

Hudgens, an avid viewer of the Discovery Channel and the History Channel, said both channels occasionally air documentaries that show equipment the shop has manufactured.



In addition to helping faculty, ESRSF assists with undergraduate labs and advises students. Farritor is one instructor who encourages his students to work with ESRSF technicians on their design projects. "The machine shop does a very good job of working with my students to teach them what can and can't be done, or how to do things better," Farritor said.

Auman, a 15-year technician, works alongside students in the MECH 487 lab and is valued for his ability to get older, finicky equipment to run smoothly. He admits that he enjoys showing students how to use equipment "the old-fashioned way."

"Most kids just want to do everything on the computer, but they still need to learn how to check the equipment and troubleshoot problems in case they ever work somewhere that doesn't have computers to control all the equipment," he said.

Hudgens helps students construct the cages and framework for the Mini Baja, an all-terrain vehicle that students build for an annual Society of Automotive Engineers competition. The cars must be durable, yet flexible enough to withstand a series of tests that includes acceleration, agility, a hill climb, a rock climb and endurance.

ESRSF established its national reputation in the early 1970s when the College of Engineering received a polar ice-coring grant from the National Science Foundation. The shop built a 5.2-inch drill that can penetrate 3,000 meters to retrieve an ice core in the glaciers of Antarctica. ESRSF spent two years designing and manufacturing the drill, which is still used today by the University of Wisconsin–Madison, the current grant holder.

Since then, Texas A&M University has hired ESRSF to design and build a drill to gather hydrate deposits in the Gulf of Mexico. The shop also has manufactured other units to gather geological and sediment samples from river, lake and ocean basins. An insurance company hired the machine shop to build a grain bin explosion simulator that the company uses for safety training exercises.

"We have experience that few others do in creating equipment that works in remote, extreme areas," McManis said.

The shop's clients include the University of Stockholm in Sweden, the Laboratory of Glaciology in France and Landsvirkjun, Iceland's national power company.

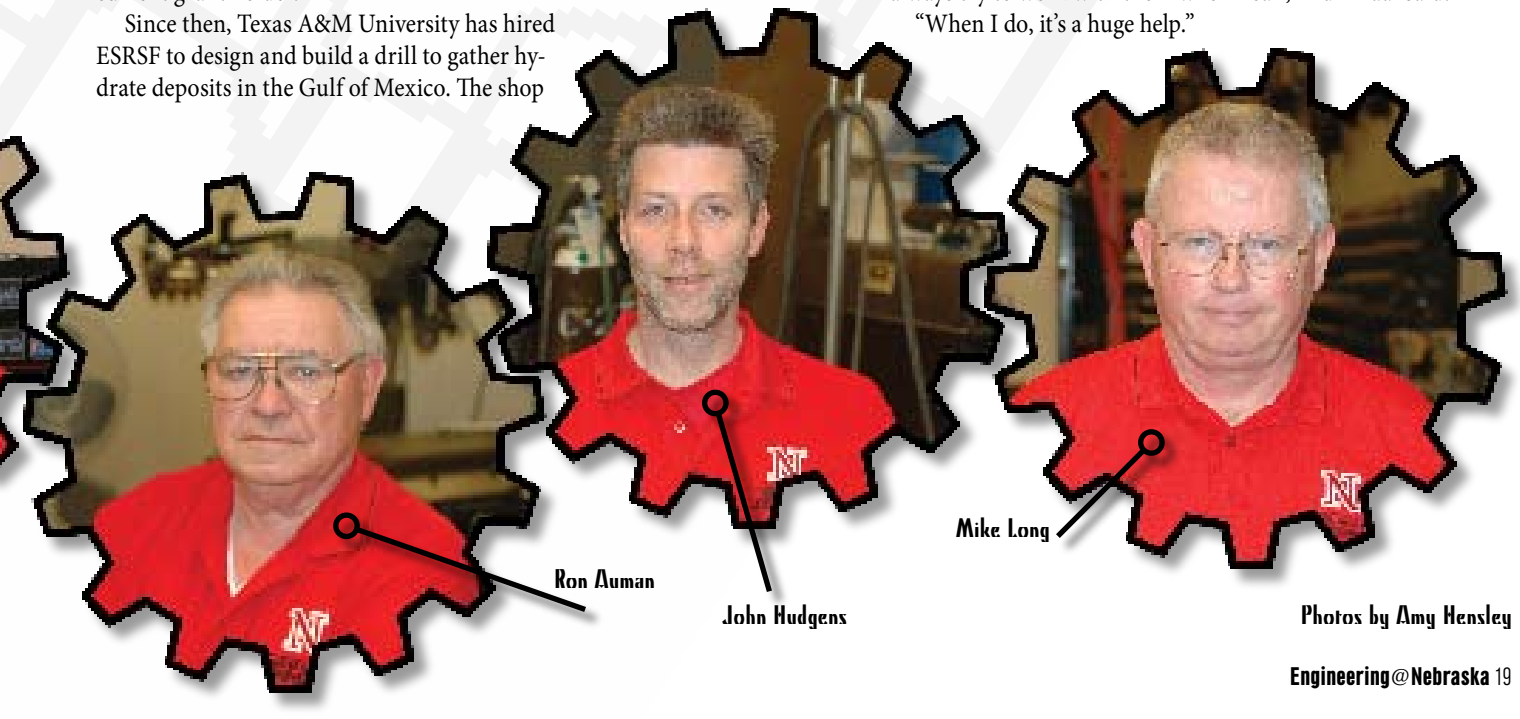
The nature of ESRSF's work leaves no room for mistakes, and employee training must be worked into tight production deadlines. While pursuing a master's degree in educational psychology, McManis researched adult learning behaviors in manufacturing environments. Now he develops training programs for ESRSF and private companies.

With such diversity in projects and clientele, each day presents new challenges, the technicians said. Sometimes, a client knows what he or she wants to accomplish, but doesn't know how to design it. Or worse, an idea that looked good on paper is difficult, if not impossible, to create.

"Good tool makers can foresee potential problems and communicate those to the engineer," McManis said. "Anyone can draw anything on a computer now. But is it produceable?"

It's the technicians' expertise, plus ESRSF's ability to affordably manufacture high-precision implements, that keeps clients like civil engineering professor David Admiraal returning.

"I always try to work with them when I can," Admiraal said. "When I do, it's a huge help."



Photos by Amy Hensley

In a rural town 80 miles west of Omaha, pulling a sled behind a three-wheeler is the closest thing to a traditional winter sport. Nobody would mistake the rolling hills north of town—even when covered with ice and snow—as an Olympics training center.

Yet one of Shelby's native sons, engineering graduate student Curt Tomasevicz, became a member of the U.S. Olympic Bobsled Team after only two years of formal training in the sport. He was the lone Nebraskan at the 2006 Olympics in Torino, Italy.

From the Gridiron to G-forces

by Ashley Washburn

Like generations of men before him, Tomasevicz, 25, spent his teen years playing eight-man football under the harsh glow of florescent stadium lights at Shelby High School. He was one of the lucky ones who had enough talent to play football at what many Nebraskans consider the ultimate level.

College was a blur of going to classes, lifting weights and surviving the Cornhuskers' preseason training camps. As his senior season ended and graduation neared, Tomasevicz realized he wasn't ready to let go. He enjoyed the thrill of competition too much. A finalist for the 2002 Lifter of the Year Award, Tomasevicz also didn't want to lose the strength he'd gained from years of training.

During a routine workout in the spring of 2004, former University of Nebraska–Lincoln track and field athlete Amanda Moreley overheard Tomasevicz discussing his future with one of the Huskers' strength and conditioning coaches. You should try out for the Olympic bobsledding team, Moreley told him.

Tomasevicz recalled watching the 1998 Winter Olympics with his friends. He joked about how easy it would be to make the Olympic team pushing a sled. Six years later, Tomasevicz found himself asking Moreley, who was training for the women's bobsled team, for her coach's phone number.

Tomasevicz and Moreley spent the summer preparing for September tryouts in Calgary. Coaches spent one week evaluating Tomasevicz's skills in sprinting, weightlifting and the vertical jump. After Tomasevicz proved that he met the conditioning requirements, coaches tested how fast he could run on ice and push the sled.

Bobsled drivers spend years training for their position, but most of the athletes who push the sled down the first 10 to 15 yards of the course are former track and field athletes. Driver Steve Holcomb selected Tomasevicz from a pool of 30 athletes to be one of his push men.

Tomasevicz took his first run on an official bobsled course a few weeks after his tryout. "You watch bobsledding on TV and you think you know what to expect, but it's more violent than it looks," he said. "It's rough and shakes you up because the G-forces are so strong. All the guys told me horror stories (about crashing)."

The total weight of a four-man sled, plus the crew, cannot exceed

Photo courtesy of UNL Athletic Department.

■ Curt Tomasevicz and teammates at the Olympics in Torino, Italy.

Photo courtesy of Curt Tomasevicz.

1,386 pounds. A sled's average speed during a race ranges from 80 to 90 mph.

At 6'1" and 220 pounds, Tomasevicz knew he could withstand the physical demands of bobsledding, but he was hesitant to postpone classes for two years. He was pursuing a master's degree in electrical engineering and was in the midst of writing his thesis and completing an independent study project.

After the tryouts, he briefly returned to Nebraska and sought advice from his adviser, Sohrab Asgarpoor, an associate professor of electrical engineering.

Being a little awestruck by the Olympic games and recognizing Tomasevicz's potential, Asgarpoor told his pupil to go.

"When he asked me if he should do it, I told him it was the chance of a lifetime," Asgarpoor said.

Tomasevicz entered 14 bobsledding competitions between November 2004 and February 2005. His team's best finish was fourth place at an international competition in Igls, Austria.

He fit studying between training and traveling to Europe for competition. "I lugged books everywhere we traveled," Tomasevicz said. "After four to six hours of practice, you don't want to crack open a book, but you don't have a choice. You have to finish it and not put it off."

That's a lesson he learned playing football. His ability to carefully balance school and sports helped him make the 2003 Academic All-Big 12 team.

Tomasevicz is writing his master's thesis on the impact of distributive generation on the reliability of power systems. His diligence doesn't surprise Asgarpoor, who describes Tomasevicz as mature and dedicated. "Anything you want a student to be, Curt is," Asgarpoor said.

Unlike most Olympics sports, the bobsled team doesn't hold official tryouts to determine who to send to the Games. The drivers are team captains and pick their teammates. Usually, Tomasevicz said, drivers choose their teammates from the previous season.

"I had a good idea I'd be going," Tomasevicz said. "But the night we found out, there were 15 of us in a room and they announced which nine were going. We felt bad for the guys that didn't make it, so there wasn't much celebrating right away. When I started getting a bunch of e-mails congratulating me, that's when it started to sink in."

His team, USA-2, placed sixth. Their total time was 3:41.36, just .53 seconds shy of medal contention. Tomasevicz said competing at the Olympics was an incredible experience, despite not winning a medal. Some of the highlights included attending the opening ceremonies and appearing in a skit with comedian Tom Green on The Tonight Show with Jay Leno.

You watch and think you know what to expect, but bobsledding is more violent than you think.
—Curt Tomasevicz

He'll continue training for the 2006-07 season, but school is Tomasevicz's focus for now. He said he wants to graduate in December, "even though there's not a big need for electrical engineering in bobsledding."

Tomasevicz may train for the 2010 Olympics in Vancouver. "I was leaning toward not doing it again, but after being there it's hard not to want to do it again," he said.

If he does, Shelby's 690 residents will rally behind him again. The town held benefits to raise money for his training costs, and before the Olympics, someone designed a billboard in his honor. His elementary school declared the day of his race red, white and blue day. Even his Olympics diary appears on the town's official Web site.

"At first, I think my community thought it was just one of my adventures," Tomasevicz said. "But once people started seeing me on TV, they jumped on board and gave me their full support."

Maybe among those hometown fans is another young boy who goes sledding north of town, dreaming of the Olympics.

The Industry Standard

New Charles Durham School fosters collaboration between industries. By Ashley Washburn

From David Allen's perspective, the University of Nebraska is the ideal host for a top program in architectural and construction engineering.

Nebraska is the construction industry's hub. Several of the nation's construction giants, such as Peter Kiewit Sons' Inc., and Henningson, Durham and Richardson (HDR) Inc., have headquarters in Nebraska and recruit the most talented engineers to work for their companies, Allen said.

Someone needs to train the next generation of industry giants, and Allen believes the new Charles Durham School of Architectural Engineering and Construction will.

Three existing programs comprise the Durham school, named in honor of HDR's original chairman and CEO. The school includes the architectural engineering program housed in the Peter Kiewit Institute in Omaha and the construction management and construction engineering programs in Lincoln and Omaha.

"We have a strong commitment to answer the needs of the state of Nebraska," Allen said. "The construction industry in this state is one of the mainstays of our community."

Gren Yuill, architectural engineering professor and the school's interim director, said he expects better cooperation and uniformity under the new structure. Among other changes, both campuses will offer the same classes for construction management and construction engineering. Students in the three disciplines are encouraged to collaborate on design projects, a standard industry practice.

When each campus offered its own construction program, "students saw them as two routes to the same type of job," Yuill said. "We believe we can do a better job by cooperating instead of competing with each other."

Planning for the school began in 2002. Allen assembled a team of College of Engineering faculty to research how to structure the programs and gain support from university administration. The Board of Regents approved the new school in December 2003.

Industry leaders bought into the idea as well. In August 2005, Charles Durham and the Durham Foundation donated a major gift to the school. While the amount of the gift remains confidential, it is expected to provide perpetual program support through scholarships, endowed professorships, graduate fellowships and other enhancements. Donations to the school, including Durham's gift, total $23 million. The University of Nebraska Foundation hopes to raise $30 million.

Allen said the endowment is the largest for any school of its kind. Both Allen and Yuill said the school's financial resources, size and industry partnerships would attract the faculty and students needed to make the Durham school one of the elite programs in the country. The school is the largest of its kind, with nearly 30 faculty members and more than 650 students.

The college is updating each program's curriculum. Previously, construction management classes were held in Lincoln, and classes for the discontinued construction engineering technology program were held in Omaha. Now students will take the same construction management or construction engineering classes on both campuses. Allen said the college is looking into distance education options, such as the Internet-based access grid, to offer new courses.

Jim Goedert, program director of construction engineering, said the change was long overdue. "Students ought to be able to go through a year at Lincoln and a year at Omaha seamlessly," he said.

The architectural engineering program remains in Omaha and will not offer classes in Lincoln.

Collaboration among students is a key component of the revamped curriculum. Students are encouraged to use the design-build approach, in which a single team of architects and builders design and construct a building rather than having each entry work separately.

Tim Wentz, interim program director of construction management, said fostering a team environment was one of the goals for the Durham School.

"We wanted the school to be a reflection of our industry," said Wentz, who led the task force. "Students will have an advantage in the workforce because they're coming out of an environment like that."

Goedert and Clarence Waters, program director of architectural engineering, said they also envision research partnerships in sustainable construction and building information modeling.

"We always have been connected with local industry in architectural engineering," Waters said. "This will propel all the programs to be more connected to industry worldwide."

Significant changes could take place at the graduate level. UNL administrators are considering the college's proposals to offer master of science and Ph.D. degrees in construction and a master of science degree in architectural engineering.

Yuill said the effect of stronger academic programs and significant financial resources could not be understated. The combination should increase research opportunities for existing faculty and attract highly qualified new faculty, he said.

The college's search for a permanent school director is underway. The three program directors will continue overseeing faculty promotion and tenure.

Allen said the school's success would be measured on how it performs against the top programs in architectural and construction engineering. He said two of those programs are the Del E. Webb School of Construction at Arizona State University and the M.E. Rinker School of Building Construction at the University of Florida.

"As part of our plans to be No. 1, we are focusing on research opportunities for our faculty that will develop new and vital intellectual property for the construction industry," he said.

The school's structure and new curriculum mark a major change for the college, but many faculty members said they are excited about the school's potential.

"It has the possibility of putting the state of Nebraska on the map not only nationally, but internationally, in construction," Wentz said. "It's a rare opportunity."

Racing Against the Clock

Students in ASC competition have just 18 hours to put together a management plan for a major construction project.

by Constance Walter

When you think of Nebraska City, you might think Arbor Day; after all, this scenic town is the home of the National Arbor Day Foundation and Arbor Day Farms, the home of Arbor Day Founder J. Morton Sterling. But it is also the home of the North Central Associated Schools of Construction Region IV Conference.

Every year, more than 200 construction students from 11 universities converge in Nebraska City and hunker down in Lied Lodge in a competition that tests their skills in management, communication and presentation.

"The competition embraces the true nature of a construction manager," said Chuck Berryman, associate professor of construction management and director of ASC Region IV. "They deal with time restraints, budgets, team building, scheduling, codes, resource allocations, legal matters, etc. Students experience the 'real-life' adventures of a construction manager in action."

Students compete in four areas of construction: Commercial, Heavy Civil, Design/Build and Residential. They create a mock company based on industry standards and use real plans and specifications provided by several national corporations. The teams have 18 hours to find a solution. Students are literally shut into their hotel rooms—nicknamed war rooms—while they solve the problem and create a presentation. Everything they need, from food and beverages to computers and printers, is right there with them. Every available surface is used, including beds, chests of drawers and tables.

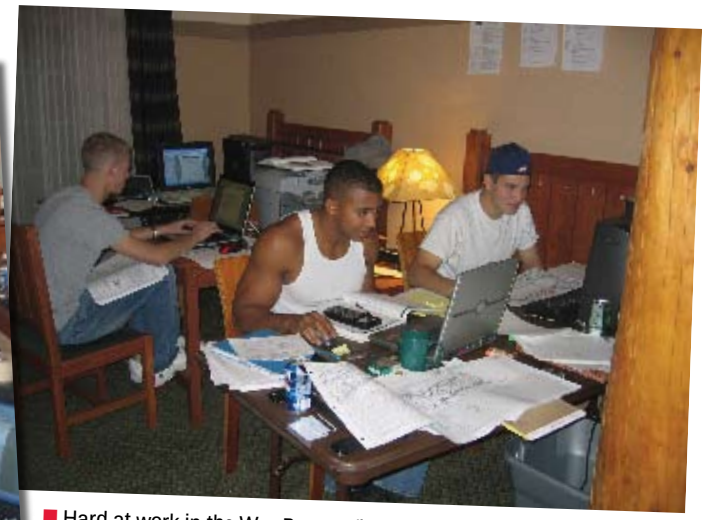
"I tell everyone I learned more in 18 hours than I did in one whole semester," said Nicole Karr, a junior in construction management. Karr's team placed second in Residential and went to the National Association of Home Builders national competition.

Students spend several hours preparing for the competition in the weeks prior to the conference. They put together a pre-qualification packet, research possible solutions to a potential problem statement and prepare construction software. However, they do not know which problem statement they will receive at the competition.

"Preparation is everything," Karr said. "Once there, you are not allowed Internet access, outside help, or even to leave your room!"

Derek Schmitz, a senior in construction systems, agreed that preparation was key. "We discussed different aspects of the proposal we were creating and talked about how we wanted to solve possible problems that could arise during the competition," Schmitz said. His team also met with industry professionals to learn about what goes into a construction project.

Faculty serve as coaches for the teams and work with them prior to the competition. Ron Haggin, associate professor of construction engineering, coached his first team this year but has been a strong supporter of the competition for years. "The goal of the competition is to help students develop concepts and ideas about the industry," he said. "Our role as coaches is to give guidance, encourage enthusiasm, help them find opportunities to learn and improve self-esteem."



Hard at work in the War Rooms: (left photo) Adam Hoebelheinrich and Dan Barrett, (above) Bret Alber, Charles Bolden and Andrew Braun.

Once at the conference, coaches are not allowed to help the students. The competition begins at 6 a.m. and ends at midnight. Students must turn in six printed copies of their proposal by midnight or risk losing points. Schmitz, whose Design Build team took second place, knows first-hand what that means. "We had the proposal done two hours before the deadline, but we turned it in late because the printers didn't print fast enough," he said. "Next time we'll bring more printers."

Once the project is completed, students must present their solutions to a panel of judges, which is made up of industry professionals. Berryman said the presentation was a large component of the scoring because once students enter the workforce, they will be required to articulate their ideas and proposals. Judges also look at how the proposal was put together (did it include all the components, was it organized well, etc.) and pay particular attention to how students answer the judges' questions.

Students who attend these competitions are more prepared to meet the challenges of a construction management career, Berryman said. It also makes them more attractive to potential employers. "Companies come to these competitions to recruit students because they know the benefits and outcomes of these competitions and see the quality of the students attending," he said.

For students, it's an opportunity to bond with classmates and develop leadership skills. "It was a lot of work and somewhat stressful at times," said Schmitz. "But it was also fun and brought out a feeling of school pride."

University of Nebraska–Lincoln students teams placed well in the ASC Region IV Conference.

Commercial Building—First Place
Dan Barrett
Adam Hoebelheinrich
Brandon Limoges
Troy Bridgford
Jordan Hoffart
Chris Myers
Charles Berryman, Construction Management, Coach

Residential Building—Second Place
Jared Argo
Nicole Kadyszewski
Mike Poultan
Bill Jansen
Nicole Karr
Ryan Robertshaw
Charles Berryman, CM, Coach

Design/Build—Second Place
Eric Newton
Nick Seeba
Isaiah Sicheneder
Derek Schmitz
Jerry Seier
Josh Thinnes
Keith Pedersen, Construction Systems, Coach

Heavy Civil—Third Place
Matthew Alvarado
Andy Callaway
Brian Shunk
Stephen Ashmore
Sarah Doll
Dr. James Goedert, CS, Coach

■ (top photo) Toni Watts, Chad Neukirch and Bret Alber, (above) Tim Ratliff and Jeff Eggeling.

The Residential team, which was coached by Charles Berryman and placed second at the ASC regional competition, went on to compete in the National Association of Home Builders International Convention in Florida. More than 1,400 students from 70 construction education programs attended the convention. The UNL team received awards in nearly every category.

AWARDS
Student Chapter: Outstanding Student Chapter ($1,250), NAHB Past Presidents/National Housing Endowment Matching Funds Award

Chuck Berryman: NAHB Outstanding Educator Award

Nicole Karr: Centex Homes/National Housing Endowment Build Your Future Scholarship

Ryan Robertshaw: NAHB Outstanding Student Award

Erin Royal: Women's Council/National Housing Endowment Strategies for Success Scholarship

Alum Takes His Career Beyond Borders

When Jim Hawkins began working with Caterpillar almost 20 years ago, he had no idea he'd end up working on the other side of the world. He was perfectly content just to work for a company that had "all the best toys in the world's biggest sandbox."

He didn't know that sandbox covered places such as Belgium, Geneva and Paris, but he's certainly glad it does. "Working with Caterpillar has given me the opportunity to extend my career in ways I never imagined," Hawkins said. "That's why I joined the company."

Initially, Hawkins designed construction and mining machines then moved on to marketing, where he wrote functional specifications for machines. Although he calls it the "dark side," Hawkins is grateful he made the change because it got him closer to the customer. "My product knowledge helped them be successful," he said. "And that's a measure of our success."

A 1986 graduate of mechanical engineering, Hawkins first moved overseas in 1992. The first stop was Belgium, where he and his family stayed for four years (both children were born there) then returned to America. In 1999 he moved to Geneva, working with cement and quarry industries in Europe, Africa and the Middle East, then it was off to Paris in 2002. "It's been a fun career so far," he said.

But he didn't always feel that way. When he arrived in Europe, things felt "very alien." He and his wife saw Europe as a bit backward and very different. But as they integrated into the culture and work practices, they began to appreciate much of European culture. "There is this perception that Europeans are lazy," Hawkins said, "but that's not true. They work very hard, play very hard and take vacations very seriously." For example, he said, an American manager works while on vacation. But Europeans completely segregate their work and personal life. "When they are working, they work hard. And they work long hours." But when on vacation, they forget about work. "I found that to be a good thing."

Hawkins and his family recently returned to the United States and live in Minneapolis. His children, who spent most of their lives overseas, experienced culture shock. A soft-spoken man, Hawkins explained it this way:

"In Europe there is a greater focus on the family." Children attend school and focus on academics—there are no sports, no extra activities. You won't find many soccer moms running children from one practice to another. Children come home from school, do about three hours of homework and spend time with family. In addition, students get periods of time off from school, during which they might go skiing or participate in some other activity—with family.

"I don't know how we'll be able to do that in the United States," he said. "We're recognizing that we have to do things differently."

Hawkins said his time in the College of Engineering helped him "tremendously" in his career. "An engineering education gives you the analytical framework to solve problems." And those skills, he said, are applicable to working in business. He was impressed by the quality of the faculty. "They were extremely intelligent, motivated and willing to help," he said. "I had a lot of fun. My only regret is not taking university more seriously. Knowing what I know today, I would have done things differently."

In what way?

"I would have gotten an advanced degree," he said. He explained that in Europe, entry-level engineers are more educated and more mature, largely because most European countries had mandatory military service so people entered the work force later. They also have a better worldview. Most Americans are "U.S.-centric," he said. But to compete globally, Hawkins said, students need to think globally. That's why he urges students to participate in international engineering education programs.

"The world has shrunk and the competition for jobs is intense," he said. "It's important for students to expand their experiences and learn more." And with more and more jobs moving overseas, students must have a better understanding of other cultures if they hope to compete.

"I would encourage students to think hard about where they want to be in 10 years. It may change the way they look at college. That worldview is important and they need to figure out what they want so they can make the most of their education."

—Constance Walter

Photo by Tom Slocum

Online Programs for Engineering Professionals Increase

The College of Engineering at the University of Nebraska–Lincoln is revving up its distance education. Professionals can now earn a construction management certificate or a master's in engineering with a concentration in engineering management—without stepping on campus.

Like on-campus courses, UNL faculty lead online classes. Through Blackboard™ Course Management Software and the Internet, students gain access to course lectures, discussion boards and their instructors. This anytime-anywhere learning environment allows students to work full-time while preparing for career advancement.

As the latest online option for the College of Engineering, the construction management certificate program was developed as an undergraduate option for construction professionals. "This certificate program gives construction professionals an opportunity to prepare for management-level positions, even when they don't have time to take classes on campus," said Tim Wentz, associate professor and interim chair of construction management.

Mark Harmon and Tim Wentz

Courtesy Photo

Through a series of five, accelerated 10-week classes, students gain the skills needed to minimize risk at construction sites. Course topics include basic law principals, project safety, estimating and scheduling, ethics and construction productivity. Students may take a few courses or complete the certificate program.

The master of engineering with a concentration in engineering management is a professional practice-oriented advanced degree combining the latest in engineering principles with solid administration and management practice. This nonthesis program allows students to learn in an accelerated format, completing the degree in about 36 months.

Designed for professionals already working in the engineering field, the program covers such topics as organizational structures and development, statistics analysis, risk analysis, economic analysis, project management, process analysis techniques, evaluation procedures, and business theories and practices. Faculty encourage students to use the workplace to apply the principles and theories learned in the classroom. Students in the program also have the option of gaining Six Sigma certification based on real-world application of their knowledge.

Sherrill Ferguson, a 2005 graduate of the program and employee of 3M, decided to pursue a master's degree to create future opportunities for herself. "I work for a very technically driven company and a graduate program in a technical area was necessary for me to advance and broaden my career opportunities," she said.

Individuals should have at least one degree in engineering or significant engineering practice and a degree in a related field plus two years of engineering work experience. Additional academic prerequisites may apply. The courses are delivered online in accelerated 10-week periods and taught by faculty in the College of Engineering and College of Business Administration.

The two online programs are coordinated in conjunction with the Office of Extended Education & Outreach. EE&O helps university academic units develop and deliver various masters, doctoral, certificate and specialization programs to students around the world. Additionally, EE&O coordinates the College Independent Study and Independent Study High School programs. Find out more about distance education at UNL at http://extended.unl.edu/

For more information about the Construction Management and Master of Engineering online programs, visit http://www.nuengr.unl.edu.

—Tricia Akerlund and Tina Stokes

Bright Lights

The UNL College of Engineering will host the 11th Annual Bright Lights Engineering Summer Camp June 26-30, 2006. The camp is held for students grades 6-8 where the students explore all areas of engineering and work in teams with engineering-based problems and activities. Children of alumni and friends are welcome, however, housing will not be available.

For more information, please visit the Bright Lights website: www.brightlights.org

Courtesy Photo

Class Notes

- James L. Young, BSIE, '78, recently joined the Westman, Champlin and Kelly, P.A., an intellectual property law firm in Minneapolis. Young practices general and intellectual property law with an emphasis on patent and trademark prosecution and client counseling. He is a past president of the Minnesota Intellectual Property Law Association and is a frequent author and lecturer on intellectual property topics. He is a member of the Minnesota and Nebraska state bars and is registered to practice before the United States Patent and Trademark Office and the Canadian Intellectual Property Office. Young also received a Juris Doctorate, '81, with distinction from the University of Nebraska. Young can be reached at:
  Westman, Champlin and Kelly, P.A.
  Suite 1400 International Centre
  900 Second Ave. South
  Minneapolis, MN 55402-3319
- John O'Reilly, '82 BSME and lifetime alumni member, and his family moved to the San Diego area (Carlsbad). O'Reilly does global business development for Schneider Electric/Square D, and is leading Schneider's growing partnership with IBM. He can be reached at john_oreilly@sbcglobal.net.
- Jeff Zvolanek, BSIE '86, recently began building a plant near Cortland, for a start-up company that manufactures a line of air filtration and dust collection equipment (designed by Zvolanek). The packaged air cleaners are manufactured using recycled, high-density polyethylene plastic cabinet housings. Zvolanek is the owner of Industrial Maid LLC, and co-owner of Last Hand Gaming LLC, WZG LLC, and AZTech Land Holdings LLC, in Las Vegas. He lives in Lincoln, with his wife, Kay.
- Denise Schultze, BSME '99, MSME 2001, was selected by the Society of Women Engineers to represent the organization as part of the 2006 New Faces of Engineering. Schultze, a lifetime member of the Alumni Association, is a photolithography process engineer for Intel Corporation in Rio Rancho, N.M. She and her husband, Jeremy, BS CBA, 2000, have a son, Darrion, 2, and an infant daughter.

Denise was featured on the National Engineers Week Foundation Web site, www.eweek.org, in February.

- Mark Duey, BS CIVE '99 works in Santa Rita, Honduras, as a Peace Corps Volunteer. A water and sanitation engineer, Duey is responsible for designs, budgets and supervision of potable water and sanitation projects in rural communities in the northern region. He works with El Convento Community members, government and local officials to identify funding sources for the projects, which have included USAID and the Interamerican Development Bank.
- Bingguang Li, Ph.D., IMSE '02, will begin his role as assistant professor of supply chain management and quantitative methods at the Harry F. Byrd Jr. School of Business, Shenandoah University, Virginia in August. He currently is an assistant professor in the College of Business at Albany State University in Albany, Ga., and is the designated Certified Financial Risk Manager (FRM). Li thanks his professors Michael Riley and Paul Savory for all their support with his career. You can e-mail Bingguang Li at: bingguang@yahoo.com.

Friends we will miss

- Leon H. Becker of Fort Worth, Texas, died June 17. Becker, who received his BS in Electrical Engineering in 1949, worked for Howell Instruments in Fort Worth, Texas, and was president of the export division. He is survived by his wife, Elaine.

Let us know what's happening!

Send a note with your name, department, graduation year, and what's new!

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Upcoming College Events

Apr 17-21	E-Week
Apr 20	Technology Expo
Apr 21	E-Week Open House
Apr 21	Admitted Student Reception
May 6	Commencement
June 25-30	Academy of Excellence, PKI
June 26-30	Bright Lights
Sept 16	Women Interested in Engineering
Sept 22	Engineering Red Letter Day
Oct 3-5	Fall Career Fair
TBA	Alumni Golf Outing; contact Ann Koopmann at 402-472-3181

Bringing History to Life

Lori Eagle Claw Straatmann is a court baroness, from the Barony of Mag Mor, of the Kingdom of Calontir. She has a coronet, beautiful handmade clothing, beaded headdresses and embroidered mittens. She cooks over an open fire, sells her wares at festivals and, as part of the Calontir Drum Corps, leads troops into battle.

No, this is not fantasy fiction. It's real life. Well, sort of.

Straatmann, the student records and curriculum specialist for the dean's office, is a member of the Society for Creative Anachronism, a nonprofit educational organization dedicated to researching and recreating pre-17th century European history (600-1600 CE). Each member of the Society adopts a "persona" they have created through meticulous research and has a creative specialty. Everything from clothing, to kitchen utensils to weapons to kilns, is recreated from historical records.

"We try to make everything as authentic as possible," Straatmann said.

At any given SCA event, you might see a 7th century Viking warrior working alongside a 16th century German weaver who is married to 10th century Russian rock carver. That's where the anachronism comes in.

Straatmann got involved with the Society 12 years ago while an art student at the University of Northern Iowa as a way to network with other students and teachers. She didn't know what to think during the first meeting. "These people were nuts and I loved them," Straatmann said. "I had no idea what was going on, but I joined immediately."

And now, she's a court baroness. She used to be a territorial baroness, appointed by the King and Queen of Calontir to rule over Mag Mor, but she stepped down when her tenure was up. And she doesn't miss it. "I'm what you'd call a Baroness Lite," she said with a big smile. "I still get to wear the coronet, but don't have all the responsibilities."

An accomplished sculptor who specializes in clay pottery, Straatmann's persona is a 12th century Russian lady who creates "functional kitchen pottery." Her husband, Michael, is a 16th century Russian blacksmith. ("He doesn't mind the age difference," she says.) The couple participates in several events each year. And they always include son Nels, 5, a fierce Viking who makes "wonderful pinch pots and loves wearing his 'fancy clothes'."

Straatmann designs costumes—without a pattern—throws a variety of pots and other clay items, continues to research her era and practices her drum. Michael Straatmann, stacks manager at Love Library, works at his forge designing tools and weapons, and is the advisor for the UNL student chapter of the SCA. "This really is a lifestyle," Lori Straatmann said.

Events range from one to 13 days and benefit members of the group. "It's not the same as a Renaissance Festival," she said. "We don't do it for money or entertainment, we do

it for ourselves." Sometimes the Society holds special competitions that revolve around a theme. For example, an arts and sciences competition that had a Viking theme would require a new piece that fits the theme—perhaps something that required using Runes.

The SCA also hosts some public events; for example, the Renaissance Festival at James Arthur Vineyards near Raymond, held each May. The group brings in merchants, holds competitions and provides entertainment. But always the focus is on education.

Events lasting more than a day are typically called camping events. SCA members stay in tents, build a fire pit or even put up kilns or forges. "We basically live as if we're on a military campaign," Straatmann said. At these events, members teach classes, host tournaments or go to war.

One such event is the Crown Tournament, which is held every six months, and determines who will be the next King and Queen. Combatants wear armor and battle with specially made weapons. The last one standing is named king and receives his crown at the next coronation. "This is a full-contact sport," Straatmann said, and sometimes people get hurt. Like her husband, who came away from his battle on the Arizona battlefield with nothing but cracked ribs and battle tales. "He's not really the warrior type," she explained. "You really have to have military prowess to become a king." Queen candidates also are chosen through battle—some choose a champion to fight for them, others fight their own battles.

There are 19 kingdoms in the world. Calontir, which stands for Heartland, comprises Iowa, Nebraska, Kansas, Missouri and Fayetteville, Ark. (some of the founders of the kingdom moved to Arkansas, but wanted to remain part of Calontir).

At times these kingdoms choose allies and go to war. The troops wear armor and carry weapons. Although that may sound dangerous, it really isn't. The weapons are made with rattan and closed cell foam. And spears are wrapped in duct tape (although pre-17th century warriors didn't actually have duct tape, Straatmann said, practice weapons were made of wood and wrapped in a shiny substance). So no one really gets killed in battles.

Then how do you know who wins?

"You get war points," Straatmann explained. But the points don't matter. "We do it for fun. And the good thing is, if you kill someone, they can get up and have a beer with you later."

—Constance Walter

A Glimpse into a Lifestyle.
1. Straatmann as "Vasilla Krasnaia," a 12th century Russian noble
2. Metal wrist cuffs, part of a Russian woman's accoutrement
3. Detail of the "kokoschnik" (hat) worn by Russian women for fancy dress
4. Handmade shoes
5. Drumming on the sidelines of a battle
6. Costuming, fiber arts and pottery made by Lori
7. Learning how to Naalbind, a viking-age fiber art technology
8. Straatmann and her husband getting ready for royal court
9. Battle scene from the desert fields of Estrella (Phoenix)
Photos by Amy Hensley and courtesy of Lori Straatman.

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Photo by David Sockrider

Discover Engineering Days

Junior civil engineering major Brett Lauritsen (left) and international programs coordinator Marilena Carvalho (center) help students construct a tower from newspapers at Discover Engineering Days. The event includes hands-on activities that challenge middle school students to use their math, science and creative thinking skills.

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