ASABE Conferences and International Meetings
To receive more information about ASABE conferences and meetings, contact ASABE at 800-371-2723 or mcknight@asabe.org. For the complete list, see www.asabe.org/resource/asabevents.html.

2007

Jan. 21-24  International Conference on Agriculture, Food and Biological Engineering and Post Harvest Production Technology. Khon Kaen, Thailand.

Feb. 11-13  Joint Agricultural Equipment Technology Conference and Third International Conference on Crop Harvesting and Processing. Louisville, Kentucky, USA.

March 11-13  Fourth Conference on Watershed Management to Meet Water Quality Standards and Emerging TMDL. San Antonio, Texas, USA.

June 15-17  Biological Sensors: Critical Technologies for Future Biosystems Conference. Minneapolis, Minnesota, USA.

June 16-18  Sixth International Dairy Housing Conference. Minneapolis, Minnesota, USA.

June 17-20  ASABE Annual International Meeting. Minneapolis, Minnesota, USA.

Sept. 15-19  International Symposium on Air Quality and Waste Management for Agriculture. Broomfield, Colorado, USA.


2008

June 29-July 2  ASABE Annual International Meeting. Providence, Rhode Island, USA.

ASABE Section and Community Events
For more information, contact the person identified in each listing. For the complete list, see www.asabe.org/resource/community.html.

2006

Nov. 3  Minnesota Section. St. Croix Sensory, Lake Elmo, Minnesota, USA. Contact Chris Beach, 320-693-4195, christopher_beach@irco.com

Nov. 10  Kansas Section. Kansas Cosmosphere, Hutchinson, Kansas, USA. Contact Gary Clark, gac@ksu.edu.

Nov. 14  Quad Cities Section Fall Meeting. Viking Club, Moline, Illinois, USA. Contact Dennis Roe, RoeDennisM@JohnDeere.com.

2007

Jan. 23  Quad Cities Section Winter Meeting. Viking Club, Moline, Illinois, USA. Contact Dennis Roe, RoeDennisM@JohnDeere.com.

Feb. 14  California-Nevada Section. AgTAC Center, Tulare, California, USA. Coincides with the World Ag Expo/Tulare Farm Show, www.worldageexpo.com. Contact Victor Duraj, vduraj@ucdavis.edu or Carolyn Jones at carolyn.jones@ca.usda.gov.

March 27  Quad Cities Section Annual Meeting. Moline, Illinois, USA. Contact Dennis Roe, RoeDennisM@JohnDeere.com.

May 24  Puerto Rico Section Silver Jubilee. San Juan, Puerto Rico. Contact Megh Goyal, mgoyal@uprm.edu.

July 29-Aug. 1  NABEC Conference. Ohio Agricultural Research and Development Center, Wooster, Ohio.

ASABE Endorsed Events
For more information, contact the person identified in each listing. For the complete list, see www.asabe.org/resource/endorseevents.html.

2006

Nov. 9-11  5th International Conference of the Asian Federation for Information Technology in Agriculture. Bangalore, India. Sponsored by the Asian Federation for Information Technology in Agriculture. Contact afita2006@yahoo.com, www.insait.org.

Mark your calendars now for the next
Annual International Meeting
June 17-20, 2007
Minneapolis, Minnesota

Do you have an unusual career in the ag and bio engineering fields?

Does your work involve doing something unique or completely different than what you thought you'd be doing as an agricultural and biological engineer?

Resource is looking for those of you whose career path has taken an unusual twist, a path that you wouldn't ordinarily think of an agricultural and biological engineer doing. For instance, one of our members is involved in creating special effects for the rides at Universal Studios.

Please contact me if you would like to be considered for an upcoming feature story on the breadth and depth of agricultural and biological engineering to be featured in Inside ASABE.

Suzanne Howard, Inside ASABE Editor
2950 Niles Road
St. Joseph, MI 49085-9659, USA
269-428-6340  howard@asabe.org
SPECIAL ISSUE

Discover is the fourth edition of the popular magazine first published in 1998 to promote the agricultural, biological, and food systems engineering professions. This updated version describes what the people working in these fields do and how they do it. It will be used by colleges and universities to draw interest to their programs and forge a new generation to the profession that includes machinery, soil and water, structures, the environment, aquaculture, food and food processing, forestry, safety, information technology, and energy. A special thanks to all those who were willing to share their stories and those who will be distributing this special issue and its message to the youth of the world.

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Please note that pages 3-5 appear at the back of the magazine, following the Discover: Futures in agricultural, food, and biological engineering special section.

Additional copies of Discover can be purchased for $1.25 each in quantities of 10 or more. Less than 10 copies are $1.75 each. Contact ASABE order department, 269-428-6325.
Beginning in 2007, Resource will be published eight times per year; January 1, February 15, April 1, May 15, July 1, August 15, October 1, and November 15. The deadline for ad copy to be received at ASABE is four weeks before each issue’s publishing date.

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For more details on this service, contact Pam Bakken, ASABE Personnel Service, 2950 Niles Road, St. Joseph, MI 49085-9659, USA; 269-428-6337, fax 269-429-3852, bakken@asabe.org, or Personnel Service, 2950 Niles Road, St. Joseph, MI 49085-9659, USA; 269-428-6337, fax 269-429-3852, bakken@asabe.org, or visit www.asabe.org/resource/persads.html.

**DAIRY SYSTEMS MANAGEMENT FACULTY POSITION**

The University of Wisconsin-Madison Department of Dairy Science is seeking applicants for a 12 month tenure-track position in Dairy Systems Management at the assistant or associate professor level. This is a 70% Extension, 30% Research appointment. A Ph.D. in Dairy or Animal Science, Agricultural Economics, Agricultural Engineering or related field or a DVM with specialization in dairy production systems is required.

Application deadline is December 1, 2006 or until a qualified applicant is identified. For more information visit the UW-Madison Dairy Science website (www.wisc.edu/dysci) The University of Wisconsin-Madison is an Equal Opportunity and Affirmative Action Employer.

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A faculty rank position and Director of the OSU New Product Development Center (NPDC) at the non-tenure track level of Research Associate Professor or Research Professor is available beginning August 2006, or later, starting date negotiable. A full description of duties and qualifications can be found at www.npdc.okstate.edu. For a professional holding an appropriate doctorate with good product development and commercialization experience, this is a wonderful opportunity to build on our existing successful pilot NPDC. Applications accepted until the position is filled. Send letter of application, curriculum vitae, and list of five references to: Dr. Larry Hoberock, Faculty Search Committee Chair, New Product Development Center, 111 Engineering North, Oklahoma State University, Stillwater, OK 74078-0545. Women and minority applicants are strongly encouraged. OSU is an equal opportunity/affirmative action employer.

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This is a tenure-track position, part of team involved in a DOE funded project on the utilization of sugarcane biomass in a biorefinery. A Ph.D. in Chemical or Biological Engineering or a related discipline is required. Prefer experience in biomass processing. Should be suited to promotion within the Audubon Sugar Institute in order to become involved in time in all aspects of sugarcane processing. Salary commensurate with qualifications and experience. Excellent benefits and professional development options include optional retirement and insurance plans, university holidays and earned annual and sick leave. Application Deadline: 11/30/06 or until suitable applicant found. Send a letter of application, resume, university transcripts, and the names and addresses of three references to: Dr. Peter Rein, Head, Audubon Sugar Institute in order to become involved in time in all aspects of sugarcane processing. Salary commensurate with qualifications and experience. Excellent benefits and professional development options include optional retirement and insurance plans, university holidays and earned annual and sick leave. Application Deadline: 11/30/06 or until suitable applicant found. Send a letter of application, resume, university transcripts, and the names and addresses of three references to: Dr. Peter Rein, Head, Audubon Sugar Institute, LSU AgCenter, 3845 Hwy 75, St. Gabriel, LA 70776. For more info, visit www.lsuagcenter.com/audubon EOE.

**ASABE Career Center**

The ASABE Career Center – the most comprehensive career and recruiting site for the agricultural, biological, and food engineering industries – is now available for your use. The Career Center offers extensive résumé and position databases, powerful and user-friendly searching capabilities, which allow you to find the job or candidate you’re looking for!

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Multiple job openings for Assistant/Associate Professors and Lecturer Position
Department of Agricultural and Biosystems Engineering
Iowa State University

Position Title: Assistant/Associate Professor in Biomanufacturing/Bioproduction

Position Description: This position provides an opportunity for an individual to develop bioproduction and biomanufacturing systems to address the challenges of the emerging bioeconomy. Research responsibilities include developing an internationally recognized interdisciplinary research program in one or more of the following areas: 1) biorenewables handling, storage, processing, transport, and logistics; 2) human computer/machine interaction in bioproduction and manufacturing systems; 3) Quality management and sustainability in biorenewables production and manufacturing systems. Teaching responsibilities include undergraduate and graduate courses such as electronics, machinery systems, manufacturing processes and quality, and developing a graduate course in the area of research efforts. The successful candidate is expected to establish a solid publication record, secure competitive grants, and lead interdisciplinary research teams.

Position Title: Assistant/Associate Professor in Biosensors/Robotics

Position Description: Successful candidate will work to address the challenges of food safety and automation for the food/meat industries in the 21st century. Teaching responsibilities include undergraduate and graduate courses for technology and engineering students in areas such as electrical and electronics fundamentals, sensors, or food engineering, and developing a graduate course like meat engineering in the area of active research efforts. Research responsibilities include developing an internationally recognized interdisciplinary research program in cooperation with industry in areas such as: 1) Robotics/automation of meat processing, 2) biosensor development for food/meat safety. The successful candidate is expected to publish, secure competitive grants, and lead interdisciplinary teams from areas such as animal/meat science, mechanical and computer engineering, food science, and veterinary medicine. He/she will recruit and advise undergraduate and graduate students, fulfill committee assignments, and provide leadership for professional societies.

Position Title: Lecturer, Advanced Machinery Engineering

Position Description: This position provides an opportunity for an individual to train and interact with undergraduates by instructing undergraduate courses and laboratories, developing curriculum, and developing facilities in the advanced machinery engineering area in the Agricultural and Biosystems Engineering Department at Iowa State University.

Institution: Iowa State University offers an environment that is rich in opportunities for collaboration in its 99 university centers and institutes. Iowa State University is located in Ames, Iowa, a community of 50,000, recently ranked as one of the most livable small cities in the nation. The university enrolls more than 27,000 students in its eight colleges. The Agricultural and Biosystems Engineering department has 29 tenure-track faculty, 11 visiting scientists, and over 500 undergraduate and 80 graduate students. The department currently offers a BS program in agricultural engineering, agricultural systems technology, industrial technology, and MS and Ph.D. programs in both engineering and technology.

For further details on positions including qualifications and application process, please see full position announcements at www.iastatejobs.com.

Iowa State University is an Equal Opportunity Affirmative Action Employer. Committed to excellence through diversity, Iowa State University particularly invites applications from women, minorities, and other protected groups.
FACULTY POSITION - BIOPROCESS/SYSTEMS ENGINEERING

POSITION: Assistant Professor of Food, Agricultural, and Biological Engineering. 12-month, tenure-track faculty position; joint appointment in research (85%) and extension (15%). Location is OARDC/OSU Campus, Wooster, Ohio.

RESPONSIBILITIES: Primary responsibilities are to develop and conduct active and relevant research programs on energy and value-added bio-products from agro-based systems. Using system approaches to integrate resource recovery and biomass production in agro-systems is desirable. Outreach responsibilities are to develop extension programs on biomass processing and energy systems. The successful candidate is expected to develop and lead high quality productive research and outreach programs that will have state, regional, national and international impact. Research and outreach programs are expected to be collaborative with faculty and staff of related disciplines. Writing and obtaining grants from private and public sources is expected. The candidate will be expected to publish research results in high quality scientific journals and develop high quality extension publications and other educational aids. The candidate will be expected to develop a unique research program in his or her area of expertise, take advantage of Wooster and Columbus Campus resources and interact with colleagues working in related areas of greenhouse and nursery crop production systems, bioprocess engineering, and USDA/ARS colleagues in application technology area. The candidate will be expected to also collaborate with other disciplines (such as Animal Science, Plant Pathology, and Horticulture and Crop Science) and new program areas such as OBIC (Ohio Bioproducts Innovation Center) to provide engineering skills as they research bio-based energy conversion systems to convert biomass to new products. Advising graduate students and contributing to undergraduate and graduate teaching is expected.

QUALIFICATIONS: Minimum qualifications include a Ph.D. and an engineering degree in biosystems engineering, agricultural engineering, mechanical engineering, industrial systems engineering, biochemical engineering or equivalent engineering program. The candidate should have skills in energy analysis, process engineering, system design and modeling/optimization (operations research) of processes and systems. Design and analysis experiences related to bioprocessing technologies, bioresource and agricultural systems are desirable. Demonstrated ability to conduct research and publish high quality scientific papers and to work in interdisciplinary, interdepartmental research and extension teams is needed. Postdoctoral or industry experience is desirable. The candidate should have a Professional Engineers’ registration, or be P.E. eligible.

CLOSING DATE: Review of applications will begin November 1, 2006 and continue until a suitable candidate is selected.

APPLICATION MATERIALS: Letter of interest, curriculum vitae, transcripts, statement of extension and research accomplishments and interests, and names and contact information of three references.

CONTACT: Dr. Harold M. Keener, Professor and Associate Chair Food, Agricultural, and Biological Engineering 1680 Madison Avenue Wooster, OH 44691 e-mail: keener@osu.edu

THE OHIO STATE UNIVERSITY IS AN EQUAL OPPORTUNITY, AFFIRMATIVE ACTION EMPLOYER

FACULTY POSITION - CONSTRUCTION SYSTEMS MANAGEMENT

POSITION: Assistant Professor of Food, Agricultural, and Biological Engineering. 12-month, tenure-track faculty position; appointment in ACADEMIC PROGRAMS (100%). Location is The Ohio State University, Columbus Campus, Columbus, Ohio.

RESPONSIBILITIES: Teach (90% time) undergraduate and graduate Construction Systems Management (CSM) courses to students in the College of Food, Agricultural, and Environmental Sciences. CSM courses may include construction safety, methods and materials, surveying and graphics, estimating, scheduling, bidding, accounting and finance, project management, construction and personnel law and professional communication, documentation and development. In-service educational programs focus on project managers. Develop an externally funded research program (10% time) in one or more areas associated with construction system management that focuses on construction system management problems (and opportunities) related to commercial and residential construction systems. Collaborate with architects, engineers, project managers, general contractors, construction professionals, field engineers, business managers and others. Publish research results in high-quality scientific journals. The candidate will participate in department, college, and university functions, activities, and committees. Advising undergraduate and graduate students, supervising honors and intern students, and contributing to the overall instructional and research efforts in the Department are expected. The candidate will be responsible for advising the undergraduate Agricultural and Construction Systems Management student club and will provide leadership in coordinating and facilitating the Department’s Construction System Management Advisory Committee made up of national, regional and central Ohio construction professionals. The candidate will be expected to collaborate and interact with interdisciplinary programs, such as OSU’s Civil Engineering – Construction Management and other university-wide interdisciplinary programs. The candidate will be expected to ultimately participate in, the Builder’s Exchange (BX), Association of General Contractors (AGC), National Association of Home Builders (NAHB), American Council for Construction Education (ACCE), American Society of Agricultural and Biological Engineers (ASABE), and their related organizations.

QUALIFICATIONS: Minimum qualifications include: a Ph.D. in agricultural engineering, construction management, civil engineering, or closely related field. The candidate should have skills in construction system management, construction technologies, operations research and related experiences. Desired qualifications include: Demonstrated ability to teach and perform academic research and publish results in high-quality scientific journals; Experience with interdisciplinary, interdepartmental, and extension teams is desirable.

CLOSING DATE: Review of applications will begin January 1, 2007 and continue until a suitable candidate is selected.

APPLICATION MATERIALS: Letter of interest, curriculum vitae, transcripts, statement of extension and research accomplishments and interests, and names and contact information of three references.

CONTACT: Dr. Andy Ward, Professor Food, Agricultural and Biological Engineering Agri. Engr. Bldg., Room #2308 590 Woody Hayes Drive Columbus, OH 43210-1057
Inquiries can be made to ward.2@osu.edu.

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Soon, you must choose a major, decide on a career, and take the first steps toward your professional career. Whether you are undecided about your future or have already chosen a career in engineering, this magazine can help. The areas of agricultural, food, and biological engineering offer a variety of employment opportunities, some of which are featured in this issue. We also show you the different options available in these engineering fields as well as offer tips on how to get started. Not sure what you want to do with your life? Read this magazine for some great ideas.

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Discover: Futures in agricultural, food, and biological systems

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Finding the Dollars to Pursue Your Dreams

by Sue Mitrovich

With hard work and a bit of luck, Grace Danao has been able to garner scholarships and awards that have taken her far away from her childhood home of Manila, Philippines. In the early 1990s, Danao immigrated to the United States with her family and settled in Arcadia, Fla. At DeSoto County High, she excelled in math and science, so “majoring in engineering was just a natural fit.”

Danao went on to the University of Florida (UF) – “Go Gators!” – and majored in ag and bio engineering (ABE). She chose electives to specialize in food and bioprocess engineering.

“With my grades, SAT/ACT scores, and long list of high school extra-curriculars, I received a Florida Bright Future Academic Scholarship, awarded by the Florida Department of Education. For four undergraduate years, this and other scholarships paid for all of my tuition, fees, and costs of books and supplies.”

At UF, Danao started out as a chemical engineering major. But enrolled in an Introduction to Engineering course, and after an ag and bio engineering presentation, she switched to ABE.

“This major combines chemistry, physics, and mathematics – subjects I have always enjoyed – but also the complexity of biological systems, which makes things more challenging and exciting. Plus, I liked the idea of working with food and I thought, ‘I’ll always have a job. People have to eat!’ ”

Danao honed her leadership skills in and outside the classroom. “I took leadership roles in the UF ASABE Student Branch’s activities in the department, college, and the university. As a College of Engineering ambassador, I practiced my presentation skills in front of audiences and did my best in representing ABE.”

Taking these opportunities furthered her “appeal factor” for receiving future awards and academic funding, too.

“The National Science Foundation (NSF) Research Experience for Undergraduates (REU) Program in Virginia Tech’s Biological Systems Engineering Department was my bridge between undergrad and grad schools. Through that 10-week summer program I met several students from across the country. We lived and worked together and got along really well. To this day, most of us – my initial network in ASABE – keep in touch.”

Working hard that summer had its rewards when preparing for graduate school. Danao believes that having the REU experience on her résumé enhanced her chances of receiving an NSF Graduate Research Fellowship (GRF).

“I only knew one person with that highly competitive fellowship, and I did not have a 4.0 GPA! But one of my UF professors told me, ‘If you don’t apply, you know you’re not going to get that fellowship. If you just apply, you give yourself a chance. It’s plain and simple.’ So, armed with his advice, I wrote my application over a weekend and mailed it to Washington, D.C. just in time.

“My UF professors saw how hardworking I was, so their strong recommendation letters boosted my application even further. I was really shocked when I got that fellowship!”

Danao considered different grad schools, but decided on the University of Kentucky (UK) for a Master of Science degree and doctoral studies. “I was able to develop project ideas and write proposals to get those ideas funded. My advisor and I received a patent based on my research, and I taught an undergraduate course for two semesters. While I was in grad school, I participated in as many activities and committees as I could. I met individuals with whom I would collaborate in the future.”

Recognizing that much can be gained by going overseas, Danao planned a post-doctoral research project in Europe. “I naively thought it would be fun to have my own sabbatical before getting a real job. I scoured the Web for funding opportunities that would allow me to study biosensors outside the United States. In the end, I decided to apply for a travel grant and research fellowship through the NSF.”

Danao had years of experience asking for funding and can be tenacious about it. “My travel grant (continued on page 6)
Ryan Lefers found the dollars to study far away from his boyhood growing up on a dairy farm near Corsica, S.D. As an undergraduate agricultural engineering student at South Dakota State University (SDSU), Lefers traveled to Cairo, Egypt, on a scholarship from the National Security Education Program (NSEP), which was pennies short of covering all expenses.

“As a college student I got involved with extracurriculars from intramural sports to Navigators and Engineers Without Borders. Each group was a great way to make friends and develop relationships. In some ways, they were better than classes in widening one’s world. As well, I discovered a world of opportunities, like the NSEP scholarship.”

Lefers had traveled abroad once to use his growing engineering expertise to assist in a developing country with help-needed projects. Lefers had boarded a plane for Uzbekistan, a former Soviet republic located geographically on the northern Afghanistan border, the summer between his sophomore and junior years. Under the auspices of Resource Exchange International, his first trip off American soil was a journey to another place and time — “to a needy country that was only 11 years old, trying to establish an identity,” says Lefers. A man of faith and stamina, Lefers keyed into the organization’s humanitarian motto: “Building People to Build Their Nation.”

“It was nothing like home. The intense, desert heat was unlike any South Dakota summer. There, the Aral Sea is drying up, and two rivers were being diverted for irrigation. Health problems were rampant because of chemicals used by the Soviets that had absorbed into the sand and blown everywhere. I was very privileged to travel and gain a grasp of the environmental issues. deemed there is a critical language need – not French, Spanish, or Italian, but Arabic, Chinese, or Hindi, etc. The NSEP board determines the criteria and recommends critical areas that the scholarship program should address. More than 2,500 scholarships have been issued to date enabling U.S. students to study abroad and gain specialized knowledge of other cultures and advanced languages. The SDSU International Office on campus encouraged Lefers to apply, and he was eagerly accepted.

“I shopped around for studies at a Middle Eastern school and discovered that the Egyptian lifestyle and Arab world fascinated me. I requested that SDSU’s International Office arrange an exchange agreement with the American University of Cairo. The university’s population is 80 to 90 percent Muslim, and the official language of Islam is Arabic, a respected language I wanted to learn. I went with a friend, and we hunkered down as the first students from SDSU in an international program already in place there.”

Lefers immersed himself in an intense study of Arabic, environmental/biological coursework, and social issues related to engineering. Touring every weekend, he took in a natural energy farm, fished the Red Sea, climbed the Sinai Peninsula, saw the Valley of the Kings and Alexandria’s catacombs, and reveled in the culture and food. Cuisine was to his liking: Middle Eastern bread, rice, a healthy supply of vegetables, and his favorite, chicken schwarma — “a slow-roasted, amazingly flavorful meat.”

“It was a paid-in-full experience and the highlight of my education. I didn’t just learn about engineering — I learned a new perspective on engineering in a land where the problems are much different than those in the U.S. Midwest. My advice? Search for scholarships to expand your frame of reference, then get on the plane!” (continued on page 6)
proposal was initially rejected, but after a few rounds of e-mails and phone calls I modified the proposal, and they funded my request to visit two prospective sponsoring scientists – an engineer and a biophysicist – in England.”

With their help, she wrote a fellowship proposal to fund her entire project – stipend, relocation, travel, equipment, and supplies. Danao received an NSF International Research Fellowship (IRF) a few months before receiving her Ph.D.

Danao is currently working as a post-doctoral researcher at Cranfield University in Silsoe, Bedfordshire, England. Her project involves developing a biosensor array system for in situ breath monitoring. Breath monitoring is a non-invasive, safe, and easy approach to determining the general health status of humans and mammals. Her work will aid the development of non-invasive systems for analyzing biomarkers of disease, general health, and biosecurity.

Danao’s fellowship ends in May 2007. She plans on coming back to the United States, take a well-deserved holiday, and then join the ABE Department at the University of Illinois, Urbana-Champaign, as a faculty member.

“I am eagerly preparing for my new assignment, and I look forward to a challenging career. I hope my experiences have prepared me to develop a high-impact research program and teach and advise students well. I also hope to be a positive role model and encourage students to take those extra steps — as small as they may seem — to achieving their goals in the engineering profession.”

Any advice on inventive ways to get funding?

“I don’t know if my methods can be classified as innovative. After all, most of the time, the opportunities I have gotten came out of purely asking for something I wanted and working hard to make sure people’s investments of their time, effort, and money in me were not wasted. Thomas Jefferson once said, ‘I’m a great believer in luck, and I find the harder I work the more I have of it.’ Like most people, I work hard on things that I enjoy. So, the harder I work, the more I enjoy, and the luckier I get!”

LEFERS - continued from page 5

With a master’s degree recently pocketed and a résumé including foreign climbs, Lefers recently accepted a position with Wenck Associates, Inc., an employee-owned Minnesota corporation providing environmental engineering solutions with more than 100 engineers, scientists, and support staff at six offices in Minnesota and one office in North Dakota. Chances are, if Wenck wants to send him abroad, Lefers would eagerly board a plane to any foreign destination.
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When the Twin Towers in New York collapsed on Sept. 11, 2001, structural engineers were called in to assess the damage. Jerry Wille, president of Curry-Wille and Associates, says agricultural and biological engineers might have been a better choice to check the damage.

“Did anyone think of the electrical systems that were alive and shocking, or the sewer, or the gases that were leaking? It wasn’t the structural damage that was a major concern, but that’s what everyone thought. There were also the mechanical and electrical concerns,” says Wille. “Ag and biological engineers have all of those elements in their backgrounds. One individual understands not only structural aspects, but also heating, water flow, sewers, the biological contamination, — all that is in one individual and someone like that becomes a very valuable resource for catastrophic occurrences.

“The ag and bio engineering profession is very broad,” says Wille, “and that gives us a general sense of engineering principles in a lot of different areas. “We don’t think we do anything spectacular, but when you talk to other professional societies, people in foreign countries, and the general public on behalf of ASABE, you start to realize that they are in awe of our profession ... our breadth is surprising to them,” adds Wille.

Wille, who was president of ASABE in 2004-05, says that respect from both the general public and other professions in terms of an ag and biological engineer’s qualifications and ability stood out in his mind during his term.

“Agricultural and biological engineering is so broad based, and there are so many opportunities to do so many things and get into so many areas,” says Wille. “When students graduate from college, they don’t really realize what kind of tools they have in their tool chest. The engineering background is so strong that they can do anything. They just don’t know it.”

Wille received both his bachelor’s and master’s degree in agricultural engineering from Iowa State. He focused on structures and environment in his undergraduate work and the major emphasis in his master’s degree was on waste management.

After graduation, Wille took a job with Norval Curry, who was a consulting engineer. Upon receiving his professional licensure, Curry and Wille formed Curry-Wille and Associates.

The firm, located in downtown Ames, Iowa, employs 14 people and specializes in agricultural research facilities, livestock facilities, commercial facilities, master planning, and grain, seed, fertilizer, and chemical facilities. The firm also provides design services for building layout, structural, mechanical, electrical, site development, manure management, and failure investigation.

“What’s neat,” says Wille, “is being able to help a client create what they need, have a vision of what they want to get done, and collectively see that facility in your mind even before it’s built, even before it’s drawn on paper. You have a vision of what it all looks like, and then you help the contractor build that vision. Developing that vision gives a feeling of pride,” he adds.

“When students graduate from college … the engineering background is so strong that they can do anything. They just don’t know it.”

“The first project I ever worked on was a bull stud facility in Wisconsin. I had an opportunity to visit it for the first time long after it was built,” Wille says. “When I walked into that facility, I felt I had been there before. I knew which way to turn, which door knob to turn, which way the door would swing. I knew it ... that’s the kind of vision you create in your mind and put on paper when you design a project.”

Another important aspect of Wille’s work is evaluation of concrete facilities and structural grain elevators.

“The facility life of many earlier built grain elevators is wearing out,” says Wille. “Grain elevators, if properly constructed, would last 80 to 100 years. Unfortunately, initial ones were built when people didn’t have a sense of dynamic pressure in the grain, and grain was handled at 2,000 to 5,000 bushels an hour. Since then, there is more than 50,000 to 75,000 bushels an hour being handled, and the dynamic
pressures are much larger than in the slower rate, thus caus-
ing the elevators to be stressed to the point where the struc-
ure fails. The bin will burst open, frequently in a very explo-
usive nature, ripping from the top to the bottom,” Wille
explains.

Wille has been called in several times to secure an area
that has resulted from a dust explosion in a grain elevator.
“Grain dust explosions,” Wille says, “involve initially secur-
ing the site. It’s an interesting challenge. You try to save por-
tions and pieces but not have anyone get hurt.

“I remember one dust explosion where there was con-
crete hanging all over the place and ready to collapse on
someone. My job was to go out there and crawl around in
the debris, use a crane, and/or inspect the facility by heli-
copter. I evaluated the damage and orchestrated the removal
of those portions that were dangerous and unsecured. It
involved engineering with a wrecking ball,” explains Wille.
“It’s a lot of responsibility and power and a bit scary. But it
is also a tremendous rush!” he says excitedly.

Safety is always an issue when it comes to projects his
firm designs. Wille admits he is intolerant of mistakes.
“Mistakes mean litigation or that someone might get
hurt. It’s just a bad deal for everyone. I have zero tolerance
for mistakes,” Wille says emphatically.

With the safety aspect in mind, Wille says that the
uniqueness of the facility and its public nature are always
considerations when designing a project.
“We not only care about the animals we are designing a
facility for but also the people who will be using the facili-
ties. We envision what it would be like to go through the
facility in a wheelchair with no hearing or speech; all of
those things have an influence as we go through the plan-
ning process,” explains Wille.

Whether designing a livestock facility, a grain storage,
or any other type of facility a client may request, Wille says
the best part of his job is being the project manager.
“You have the ability to create,” he says. “A project
manager has the fun of putting together a program based on
needs.”

From designing the type of housing facility and includ-
ing areas such as ventilation, lighting, manure handling
systems, and utilities to the selection of door knobs
and hinges, Curry-Wille and Associates has the experience
and educational background as agricultural engineers to
“do it all.”

“I do the work I do, like other humble agricultural and
biological engineers, because it’s fun to do, not because of
the recognition,” says Wille. “I enjoy it!”

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Hearing about poor living conditions and a bleak future for abandoned children growing up in Chinese orphanages, Chelan Pedrow was inspired to spend the summer following her University of Idaho (UI) freshman year serving this disadvantaged population. Raising her own funds, she embarked on the great unknown of a third-world country half a world away. She found love-starved orphans, many with physical handicaps such as missing hands or extremities, clubfoot deformities, and underdeveloped limbs. She rocked, fed, and changed the diapers of approximately 50 infants a day while showing compassion and enormous love for their tender souls. Upon her return to UI, and knowing that she wanted to make a difference in damaged lives, she changed her major from English to biological systems engineering.

Fast forward four years
As a biological systems engineering major, Pedrow was required to identify and solve an engineering problem for her capstone senior design project. She recalled the plight of a 6-year-old Chinese orphan who lost his parents and right leg above the knee in an automobile accident. Knowing of the lack of funds and medical care in third-world countries that is needed for replacing prosthetic limbs of growing children, she was inspired to design a prosthetic leg that would grow as a child grew.

Pedrow enlisted fellow biological systems engineering students, Jennifer Neibling and Matt Plaisted, to tackle the design problem. Many design iterations were made in deciding how to best achieve the desired growth. The ideas of hydraulics, magnetorheological fluids, and external growth devices were all considered, however many ideas did not suit the target patient – an active, rough-and-tough, 6-year-old child. The team project, sponsored by Hanger Orthotics, went through many trial-and-error processes until a working prototype was developed.

The innovative design was so unique that it earned an award for excellence at the 2005 UI Engineering Design Expo competition. The next step for the project is to develop a second prototype using the newest technology available.

Volunteering for a new humanitarian challenge
The design experience broadened Pedrow’s horizons to the greater need of amputees around the world whose lives are irrevocably changed by war. This need led to her next humanitarian effort, a volunteer project with Physicians for Peace, an international, humanitarian, nonprofit medical education organization.
dedicated to building peace and international friendships in developing nations with unmet medical needs and scarce resources. Taking early finals and missing her own graduation, Pedrow joined the American team in the project dubbed “Walking Free.”

Because it was too dangerous for the team to enter active war-torn areas of Iraq, the Royal Jordanian Medical Center was the site chosen for education and services. Each morning a charter bus picked up the American and Basra teams, transporting them a short distance to the military hospital. The hospital was well guarded by soldiers monitoring the flow of personnel entering the grounds. For safety reasons, the names of Iraqi patients and medical personnel could not be revealed.

Working with medical teams from Basra, Jordan, and the United States, along with the amputees, Pedrow’s compassion grew for the people and the task at hand. Word spread that the Americans were fitting limbs. Farmers from the fields, mothers with deformed children, rich and poor alike, approached the facility. No one was turned away.

During the 12-day clinic, skills were honed, prosthetics were fit to amputees, and physical therapists learned rehabilitation techniques as amputees were guided through their first steps. Pedrow became the go-to person, using her Arabic language studies to translate notes and language for American doctors and laminating resin prosthesis and creating sockets.

Each person had a story

One Iraqi soldier, who lost his foot in the Iraq/Iran war in 1988, managed to stay in the military, become a colonel, and now fights for Iraq’s democracy and freedom. Pedrow simply called him “Bear” in honor of his stature.

A boy of 11 lost his leg at a very young age and learned to motor on crutches faster than most people could walk. Receiving his new limb, he walked with the same remarkable skill.

“The fabrication of limbs is magical, but the feeling one gets when you watch a person walk on that limb is indescribable,” exclaims Pedrow, who received her first of three “marriage proposals” from the young man.

There were many stories and tears of pain and joy as each new limb was fitted and the recipients learned a new way of walking and living.

Future Steps

“I was able to see what is possible through the actions and encouragement of educators at the University of Idaho,” says Pedrow. “They recognized me as an individual, not a student ID number, and with relentless energy, they extracted the potential they saw.”

Pedrow explains that it was a bumpy road, but the adventure has been rewarding. She began graduate studies this fall at Georgia Tech in the Orthotics and Prosthetics program. Her goal is to work with U.S. military personnel and Middle Eastern civilians whose lives and limbs have been changed by war. With her international experience, she feels that her journey is just beginning with “Walking Free.” Along the way she plans to continue her study of the Arabic language, keep Jordanian and Iraqi contacts intact, and remind people that there are “positive steps” being taken in the Middle East.
One would not expect to find fresh vegetables growing in total darkness at -100°F. Yet at the new Amundsen-Scott South Pole Station that’s just what’s happening. Larger than the United States and covered in ice, on average two miles thick, Antarctica is a vast frozen continent and the South Pole marks its center. Six months of the year the South Pole is locked in darkness, and traffic to and from is impossible due to the extreme cold. Even so, since 1957 people have made the South Pole their home over the dark Austral winter.

This winter 64 people live and work at the South Pole inside the brand new Amundsen-Scott South Pole Station. Living alongside them within the station and inside a 2,800-cubic-foot growth chamber, are a variety of fresh vegetables – lettuce, tomatoes, cucumbers, peppers, cantaloupe – along with herbs and edible flowers. The University of Arizona’s Controlled Environment Agriculture Program (UA-CEAC) in combination with Sadler Machine Company, Tempe, Ariz., designed and constructed the new South Pole Food Growth Chamber (SPFGC). Its semi-robotic disposition includes its automated hydroponic nutrient injection, a climate-controlled environment, atmospheric carbon dioxide enrichment, and remote monitoring and adjustment capability via Internet Web cameras and an ARGUS Controls computer control system. Supplying it with light are 13 water-cooled, high intensity discharge lamps designed for NASA. This state-of-the-art growth chamber, called the “greenhouse” by station personnel, provides fresh salads every day for lunch and dinner and cantaloupe for breakfast when the melons are ripe and available. In addition to the fresh fruit and vegetables, the chamber provides a green space where bright light and high humidity can be experienced by the crew.

Although the greenhouse, like the sauna, gym, and TV lounge, makes the frozen life more livable, Patterson finds his thoughts often turn toward home in North America. “Three short months lie between me and leaving Antarctica for the last time. I’ll take with me the memory of joining the 300 Club – a club one joins by running around the axis of our planet at -100°F just prior to relaxing in a sauna set at 200°F. I will remember assisting scientists, during my off hours, with the repair and conversion of an old communications satellite dish to a SETI radio telescope capable of scanning the southern hemisphere for evidence of extraterrestrial life. I won’t forget the many volunteers who, with their consistent help in the greenhouse, made me feel like Tom Sawyer painting the fence. Nor will I forget the days when it was too cold for machines to work outside and so, in their place, all 64 of us made a line in the snow and moved the week’s food from cold storage to the kitchen in a bucket brigade fashion,” says Patterson.

The remote location, hazardous environment, and isolation are just a few of the similarities between the current South Pole station and any lunar or Mars bases built in the future. Such bases will require ecological life-support systems, and the South Pole Food Growth Chamber has the potential to explore some of the logistics associated with the way station crew members benefit from and manage such systems.

As a grad student at the UA Agriculture and Biosystems Engineering Department and the current winter operator of the growth chamber, Patterson says the focus of his thesis (ecological life support systems for space applications) will include data collected during his stay in “one of the most hostile environments on earth, while growing vegetables for some of the coolest people on our planet — for sure, an awesome experience!”

Others may soon have this opportunity, as an internship program has been developed within the CEAC at UA. Studying controlled environment agriculture (CEA) can take you to distant places … extremely distant and different places!
Nicholas Johnson, a Minnesotan born and raised in Long Prairie on a small hobby farm, was interested in engineering as early as the seventh grade. “Initially, I thought I might grow up to be a carpenter. I was good in math and had an aptitude for building things, but even then others knew that engineering would definitely be my niche.”

Johnson chose to attend North Dakota State University (NDSU) — “a small campus with much to offer,” he says. After classes and study hours took the biggest bite out of a college day, life was crammed with other activities. He played volleyball, basketball, co-chaired homecoming activities, clerked the library circulation desk, and was actively involved in the ASABE student branch.

Throughout four undergraduate years, Johnson never had any doubts about pursuing his career aspiration. Even when the dean of engineering warned that only one in two students make it through the program, Johnson had no second thoughts.

“Once you get through the general classes, it gets very interesting … very intriguing. Looking back, I think Machine Design was my most beneficial course. I still use the concepts learned and pull the textbook off my shelf at least once a week at work. There is light at the end of the classroom tunnel: nearly 100 percent of those in NDSU’s agricultural and biosystems engineering program have a job related to their major within one year of graduation.”

“Never underestimate the résumé … Patience and perseverance pay off …”

When the Vice President of Engineering for Blount International’s Forestry and Industrial Equipment Division (FIED) contacted NDSU’s agricultural department chair casting for candidates for prime job openings, Johnson set a future goal. He enrolled in a cover-letter/résumé writing class to hone his job-search skills — and “how I look on paper” — to put his best foot forward and, hopefully, in Blount’s door.

“Never underestimate the résumé! I had a phone interview and was invited for an on-site look-see. I was encouraged, because I had driven my classes toward hydraulics and mechanical structure.”

Patience and perseverance pay off. Today, Johnson’s career is project-driven with “fatigue life” and “finite element analysis” being a few of his key, workday words. Employed within Blount’s FIED, Johnson can explain in excited detail the intricacies of feller-bunchers (equipment that, as the name implies, fells large trees and bunches them).

Settled in Owatonna, Minn., Johnson focuses his creative engineering and number-crunching skills on timber harvesting and processing equipment.

“It’s suited for full-tree or cut-to-length logging with an eye on environmental impact. The goal is always to leave smaller footprints in the woods,” he says. “And that’s a big order considering the size of our equipment, easily weighing 40,000 to 80,000 pounds. They are easy to maneuver, however, as they are controlled by pilot-operated hydraulics.”

At the end of the day, when Johnson leaves his desk and drawing board, he tackles hands-on projects on his recently purchased home. He puts around on nearby golf courses, too. And living near a river provides him with relaxing after-twilight hours, sitting on a sand bar, catfishing.

“It’s so peaceful to get on the river around 9 p.m., pull out the monster hooks, and wait. You get a hit, the line goes, and there’s a 50-pounder waiting to have his picture taken!” Johnson snaps a digital memory, releases, and sends the fish on its way. Patience and perseverance pay off.

And that’s his advice to those seeking a niche, a dream, a position with a good company: patience and perseverance.

“Be persistent in building a résumé with solid coursework and some extracurriculars. Get an internship — even if it’s just for a summer — to get that all-important on-the-job training on your résumé. Then, set a goal. You’ve got to like what you do and who you’re working with.”

Johnson, at this career juncture, has set two five-year goals for himself: “to get my PE and an MBA.” No doubt he’ll achieve these objectives. Because patience and perseverance — Johnson knows the drill — pay off.
FOREIGN STUDY
completes an education, packs cultural rewards
by Sue Mitrovich

"Bento box lunch, anyone?"

In the autumn last year, University of Arizona (UA) grad Nadia Sabeh was given the opportunity to study at the National Institute for Rural Engineering (NIRE) in Tsukuba Science City, Japan. Collaborating with the University of Arizona, she was invited to use NIRE’s wind tunnel facility for experiments in greenhouse cooling in a semi-arid climate.

Sabeh lived and worked in Tsukuba Science City (about 40 miles north of Tokyo) from September to December, experiencing the end of Japan’s hot and humid season, the colors of fall leaves, and the freezing temperatures of an approaching winter – very unlike her familiar West Coast home. Over a three-month stay, Sabeh conducted a series of experiments in the largest agriculture-based wind tunnel in the world, adding to her formal education. But she received an equally – if not more important – informal education in Japanese culture. Sabeh absorbed the work ethic, tried new and interesting foods, learned the customs, and took in local lore and traditions.

“The Japanese live up to their hardworking reputation. They often work 12-plus-hour days, ‘go in’ on the weekends, and once, all ‘the NIRE slaves’ stayed on task until 11 p.m. on a Friday. Incredulously, I found laboring long hours surprisingly inspirational, working in tandem with highly motivated and focused people who are also fun-loving and take camaraderie to heart,” recalls Sabeh.

“What I loved about the Japanese work style is that everyone is quick to help. As soon as I posed a question or requested something, co-workers inevitably put down what they were doing or turned away from their computers and directed full attention toward me. At first, I thought it was because I was new or a foreigner, but I realized that courtesy and attentiveness is provided to everyone. And I quickly learned that it was also expected of me!

“A Japanese custom I came to enjoy was the ritual of everyone eating lunch together — and rarely an interruptive phone call during the mealtime hour. Around noon everyone in the office gathered at a central table to eat a made-at-home or bento box lunch (ordered that morning and delivered for 350 yen or about $3.25). The bento box had nine items: a main dish (usually fish or pork), pickled radish, seaweed, salad of some variety, a large serving of rice, miso soup, something sweet (my favorite, the honeyed sweet potatoes), and two side dishes (noodles, vegetables, tofu, cabbage, or the stems of a plant that even my Japanese colleagues didn’t know). We usually had sliced pears for dessert, even though I was more than satisfied halfway through the meal. Everyone else chewed on and on, eating with ease.

“Although I speak no Japanese (“Nee-hon-go”) and people in Japan speak varying degrees of English (“Ei-go”), communication in my studies was not a problem. I found that most people were just shy about speaking English. In school they are taught, primarily, reading and writing — quite the opposite in America, where our first lessons are in conversation.

“Tsukuba Science City was a great place to study as an international researcher. It is laden with research institutions and is home to JAXA (Japan’s equivalent of NASA). At the international guest housing complex, I was the only American, but there were plenty of other international researchers — mainly from China (mostly women) and Egypt (mostly men),

(continued on page 16)
Having reaped rich educational and cultural experiences from short, “south of the border” two-week stints and two trans-Atlantic excursion-semesters, Jeremy Hanzlik is a strong advocate of student exchange programs.

“It will never be easier to travel and learn than when you’re a student,” he urges. “And it will never be cheaper!”

Hanzlik, a Texas A&M alum, had his suitcase packed and passport ready when the first opportunity presented itself.

Through a local branch of ASABE, Hanzlik teamed with other Mexico-bound travelers not just once, but for three springtime departures. “The student exchanges in Guanajuato were awesome,” reminisces Hanzlik.

Nestled in the mountains of the Sierra de Guanajuato is the picturesque city of Guanajuato, home to a university which specializes in ag engineering and carries the same tongue-twisting name. To navigate the city, you have to go on foot. It’s crisscrossed by hundreds of callejones (alleyways), the most famous being Callejón del Beso (Alley of the Kiss). Local romantic legend has it that this callejón is so narrow that lovers, each standing on a balcony of either side of the alley, can reach across and exchange a kiss. The alleyway also is part of the route of popular traditional callejoneadas, student choral groups who stroll at night, strumming guitars and serenading the local populace.

“For two weeks in May, A&M students moved in with Mexican families and soaked in the culture through symphonies and theatres. We all experienced crash courses in Spanish. On the academic front, we took in various outstanding technical tours, from Green Giant and Dannon Yogurt food processing centers to CASE and Ford New Holland heavy equipment manufacturing plants. If you weren’t sure about the future possibilities with an ag engineering degree when you arrived, you were certain of the vast variety of opportunities when you left.”

Hanzlik returned again and again having acquired an enthusiasm for “touring studies” and friendships forged with host families. He went back twice for more culture, infused with technical sightseeing, then on his own for a host family’s daughter’s wedding. “But not to me,” he smiles.

Signing on for three months in Paris to study engineering with travel-along A&M faculty proved exciting as well. Paris was home base for the semester, but Hanzlik and fellow students were on the move while in Europe.

“We visited an awesome nuclear power plant on the border between Germany and Switzerland, toured lush vineyards, and came back in the evenings to dorms at a Parisian University not far from the Louvre and the Paris Opera House. About 70 students went, and good friendships developed. Each one of us discovered something valuable in our foreign surroundings and within ourselves. From French engineering practices to crêpe cuisine, how sweet can it get?”

Boarding Lufthansa for Germany was the final leg of touring destinations throughout college exchange studies. Hanzlik signed on to travel as a teaching assistant for a professor/nuclear engineer. Students stayed at an education/culture exchange institute. Classrooms, office space, and living quarters were provided.

“We spent three months headquartered in Koenigswinger, a fairy-tale castle community on the outskirts of Bonn but traveled extensively, visiting science and engineering museums, which are littered throughout the country. In fact, there’s a wonderful museum in Bonn dedicated simply to the history of mathematics. But the neighborhood beer hall – run by a Spanish family who adopted wayfaring Texans – was an even bigger attraction.”

Being an explorer by nature, Hanzlik traveled through the field of biology and changed his itinerary. He became more interested in creative endeavors than laboratory work, received a bachelor of science in environmental science and another in agricultural engineering, then a master’s degree in the latter, all from A&M. Raised in a suburb of Houston, a city of international commerce driven by oil, medicine, and engineering, Hanzlik considers himself a student of the world … and his workplace reflects today’s global concerns. “TCB – Turner, Collie, and Braden, part of AECOM – is a great place to be” (continued on page 16)
employed. As a graduate engineer in the Natural Resources Planning Unit, I am involved in environmental planning – water supply, biological and eco condition studies. We also do wetlands delineation and mitigation projects. For example, if the DOT wants to pave over wetland areas, we develop mitigation plans. One interesting environmental project was a 5,200-acre jungle/river training range for the Navy Seals.

“At A&M, I started to pursue a pilot’s license. Flying is an expensive hobby,” admits Hanzlik, “but travel is in my blood — probably because of the adventures and learning experiences I had while abroad. Once a year, I want to be airborne. Since graduating I’ve got passport stamps from Italy, Ireland, and Costa Rica. That last trip … it was to visit a friend I met in an ag program … while traveling somewhere else, of course!”

but also from Indonesia, Thailand, India, Kenya, England, France, Australia, and Mexico. It was an education in itself to meet and interact with people from numerous cultures with differing perspectives on life and research.”

Sabeh was able to do some traveling in Japan. Between wind tunnel experiments, she presented her dissertation research at Tokyo University, Chiba University, and at the Agricultural Structures and Environment Seminar. She took the train to Tokyo several times and learned how to match Kanji characters to find her routes. In Tokyo, Sabeh visited a friend, a Ph.D. student from Chiba, who had studied greenhouse projects at UA for 10 months. They became friends, and Sabeh took him out to local clubs and restaurants as well as tourist attractions. With roles now reversed, his family expressed: “You took care of Shingo in Arizona, and now we are taking care of you in Japan.” Not only did his parents give her a room of her own with bed and TV and home-cooked food whenever she visited Tokyo, a few times they went “restauranting” for dinner. Basashi (raw horse) and raw whale meat were ordered.

“I also traveled to Niigata Prefecture (a prefecture is like a U.S. state) to visit the Yukiguni Maitake Co. Inside the facility, I was not allowed to take pictures except for one photo of the robot forklift that played music while lifting trays of mushroom containers!

“Upon returning home, I felt a part of me had become Japanese! In fact, my only counter-culture shock occurred in the Narita airport. While waiting for a delayed flight, a group of loud Americans mingled. I hoped no one would associate me with them and that I exuded a Japanese camouflage.

“All in all, my months in Japan were incredible. The trip provided me with a lifetime of memories, an abundance of Japanese friends and colleagues, and of course, some data for my dissertation. I have a newfound appreciation for fish, salty and pickled foods, and a love for sho-chu (better than sake). Perhaps best of all, I stepped out of my standardized American educational box, expanded the horizons of my formal knowledge base, and discovered how much we have to learn from others — formally and informally — and the world beyond our doorstep.”
In the spring, seven students from Kansas State University (KSU) and one from the University of Nebraska left the Midwest plains for China. Two KSU bio/ag engineering profs, both natives of China, led the group. For each student-traveler, it was a journey of “firsts”: riding a plane for over half a day, eating with only chopsticks for two weeks, and being “foreigners.” This was perhaps a first for ASABE: possibly the first group of Society undergrads to travel to China.

These eight adventurers were part of 170,000-plus American college students who studied overseas this year – about one percent of all enrolled. International study is hot and estimated to grow by 10 percent a year. According to the Commission on the Abraham Lincoln Study Abroad Fellowship Program, almost half of all incoming freshmen indicate interest in matriculating on foreign soil.

Programs vary but are usually highly rewarding. Study trips guided by profs may last a couple weeks to a month. Some students move in with host families for a semester. Others opt to enroll directly in a foreign university for a year, then transfer credits home.

**Advice for wayfarers**

- Add up the price tags: program costs, transportation, inoculations, “hidden” costs.
- Understand the culture will be different and determine to be a gracious visitor.
- Scour handbooks and Web sites about your destination(s).
- Talk with other students who have studied/traveled abroad.
- Ask questions: Type of housing? What if problems develop with roommates or host families? Your responsibilities? If an emergency, then what?
- Compile two folders of copies (one to take, one to leave at home): social security and credit card numbers, passport (including bar code), visas, prescriptions (generic forms of meds), contact numbers, health and travel insurance information.
A potato chip is just a chip. Right? Wrong! Just ask ASABE member Keith Tinsey, an agricultural and biological engineer who enjoys a close working relationship with potatoes. And not just ANY potatoes, but potatoes that Frito Lay turns into crispy, irresistible potato chips!

Tinsey is the storage/engineering manager for Walther Farms, a 10,000-plus acre potato agribusiness based in Three Rivers, Mich. With farms in Mexico, Florida, Indiana, and Michigan, 99 percent of Walther Farms’ business is growing potatoes for Frito-Lay, Inc. to be processed into potato chips.

Tinsey’s career has come full circle from growing up on a farm to his undergraduate work at Michigan State University (MSU), where he received an ag engineering degree in 1989. MSU was his first and only choice for college.

“My dad graduated from MSU with a degree in ag mechanics,” Tinsey says. “Green was in the blood,” he adds laughingly. “There was no question that I’d be going anywhere else.”

While pursuing his undergraduate degree, Tinsey worked on a potato storage research project. Not only did that experience get him to thinking about potatoes in a different way, but it also gave him the chance to apply what he had learned in his engineering classes. In addition, it also provided him an opportunity to use computer controls and technology for potato storage ventilation.

“That was where I gained first-hand knowledge in computing,” Tinsey adds. “We were trying to store potatoes longer with new computer technology.”

Tinsey then pursued a master’s degree in agricultural and biological engineering at North Carolina State University (NCSU), where he minored in electrical and computer engineering. His advisor, ASABE member Roger Rohrbach, challenged him in the areas of machines and technology. One of his graduate projects was to design a machine to automate the pruning of grape vines. According to Tinsey, it was a high-tech application of computers in agriculture.

Following grad school, Tinsey made contact with J-Star Industries at a job fair held during an ASABE winter meeting and soon began working for the Fort Atkinson, Wis., farmstead equipment manufacturer. Wanting to move closer to his roots and more into automation, he landed a job with Techmark, Inc. in Lansing, Mich., designing and installing computer systems for agricultural ventilation. “I went back to the high-tech world in agriculture,” Tinsey says.

After five years at Techmark, Tinsey felt he needed a change and accepted a position as standards director for ASABE.

“I enjoyed being an integral part of the Society,” says Tinsey, “working together with ASABE’s awesome staff to help further the profession, and providing help to other engineers was a great opportunity.”

An opportunity at MSU lured him back to East Lansing where he became director of the Michigan Agricultural Electric Council and taught senior design classes in biosystems engineering. Looming on the horizon, however, was an opportunity at Walther Farms, a company Tinsey had previously done consulting work for while employed by Techmark. When an opening became available for a storage/engineering manager, Tinsey found the challenge too difficult to resist. He discovered his love for farming and his work at Techmark had provided a great set-up for what he would be doing for Walther Farms.

His background in ag and biological engineering, as well as electrical and computer engineering, all come together in his current position. His responsibilities include making sure the potatoes in storage are held in good quality until they are needed for processing, which sometimes can be up to nine months.

“And we check the biological condition of the potato by measuring the sucrose and glucose content. Too much glucose will cause potato chips to fry brown.

Keith Tinsey is the storage/engineering manager for an agribusiness that grows potatoes for Frito-Lay, Inc.
So, armed with as much information as possible, decisions can be made to enhance quality by altering the storage environment.

Another aspect of his work is trying to minimize bruising during sorting, washing, grading, and loading into the semi trucks that take the potatoes to the Frito Lay plants. Tinsey is also in frequent contact with the Frito Lay processing plants across the Midwest and eastern United States to see how well the potatoes are converting into potato chips. In addition, he periodically visits the plants which helps smooth the way in solving any issues that may arise.

“We ship potatoes to Frito Lay 365 days per year and there are bound to be issues that need to be addressed,” says Tinsey. “Some plants desire specific types of potatoes, i.e. high specific gravity, larger/smaller size, or specific varieties that process differently depending upon the desired end product.”

“I’m ... a jack of all trades ... As an agricultural and biological engineer, I have a basic understanding of many agricultural systems.”

In addition to construction of new storages and updating anything that needs repair or improvement in the storages, Tinsey can find himself driving truck at harvest, assisting in hydraulic and electrical repairs, and figuring out how to save energy.

“I’m like a jack of all trades,” Tinsey says. “I can help wherever needed as long as the potatoes in storage are taken care of first!”

The biggest change Tinsey has seen in his career is the application of computer technology. “Computers can do many things more repetitively, consistently, and accurately than humans,” says Tinsey. “If you had to do it yourself, you couldn’t do it as well as what is demanded.”

Tinsey is glad he went into the profession of agricultural engineering. “I wanted to be a farmer, but asthma and allergies prevented that. So, I did the next best thing and combined engineering and farming.”

“Teamwork, communication and computer skills, as well as engineering skills, are all important in the work I do,” Tinsey says. “As an agricultural and biological engineer, I have a basic understanding of many agricultural systems. It’s a perfect fit for a farm. I know about the biological side, the electrical side, and the mechanical side. Applying all of my personal skills and engineering skills is fun and challenging. Plus, I’m applying engineering, not just doing one piece of engineering but doing a lot of it,” he adds.

Now, he says, he takes a different look at potatoes. He finds himself in the grocery store buying multiple bags of chips just so that he can compare quality.

“A chip is not just a chip,” he quips.
L ynda Cabrales, who grew up in the inner city of Chicago, thought milk came from a store. Not until she attended a summer program in high school did she realize milk came from cows!

“That summer program in food science opened up my eyes to agriculture,” says Cabrales, an ASABE member. “I realized there were more than cows, plows, and sows in ag engineering. There was processing and eating and people interacting, so much to it, that when I caught a glimpse, I felt there was definitely a place for me.”

Good in math and science, and a National Hispanic Scholar, Cabrales says she liked the idea that agricultural engineering was an applied profession.

“It was something I felt I could do, work with, relate to, even though I didn’t have an ag background,” Cabrales states.

She realized that the food and bioprocessing area appealed to her. When searching out colleges, she found the people and the program at the University of Illinois (UI) welcoming, open, and “it just seemed to fit,” she says.

“I stuck with a good thing and held on with both hands,” she says laughingly.

Cabrales earned her bachelor’s, master’s, and doctoral degrees, all in ag engineering from UI.

“I would not be where I am if not for the opportunities of the ag engineering department, the program, the professors, and the college. It changed my life,” Cabrales says.

“They saw me doing something and being someone that I couldn’t see myself doing or being,” she says. “They had faith in my capability and a vision of myself bigger than anything I could imagine.”

Cabrales is a process engineer at Kraft Foods in their Madison, Wis., Research and Development Department. Her work supports the Oscar Mayer brand, Lunchables®, hot dogs, deli plates, meat processing, bacon, sausage, etc.

She says she loves to “come in and play with stuff.” She works on processes, products, equipment, and gets to test them and see how things work. When the testing is completed, she organizes the results and provides feedback to the company as to whether the technology, process, or equipment has a use, or if it is too limiting and why.

Cabrales says Kraft Foods is a great fit for her.

“It’s a great company, the biggest food company in the United States,” she says. “They also have some real cool toys I can play with,” she laughs. “I’m an engineer, so those are the kinds of things you think about. There is so much I could work on. If I get bored or don’t like something, there is somewhere else in the company I can go,” she adds.

Having grown up in a family that experienced financial hardships, Cabrales says they may not have had meat on the table, but they always had enough to eat. Education was valued above all else in her family, she says, and her parents saw to it that their kids attended private schools.

She remembers getting the opportunity to see her father at work at Brach’s Candy Co. in Chicago.

“He worked two eight-hour shifts to support us,” says Cabrales. “I got to see what my dad did for eight of those hours a day ... it was back-breaking work. It broke my heart,” she says emotionally. “At that point, I knew whatever opportunity I was going to get, that I was going to hold on with both hands. I knew there weren’t many opportunities in the world if you didn’t have an education,” she adds.

“I was going to make it, but how was the question.”

She advises others not to give up. “Look for your place wherever it may be. Believe in yourself because other people believe in you. Take advantage of whatever opportunity you have, whether it is big or small. And take it one day at a time,” she says.

“I never thought I would be here with a Ph.D in agricultural engineering. I think to myself, ‘Oh my God, who is that?’ There is so much you can do with this degree, so many options.

“I really love what I do, and I get paid to do it! The fact that I’m getting a very good salary to do something that I enjoy makes me realize that all the time and energy I spent in school is worth it. There isn’t any greater satisfaction than that!”

“I feel so fulfilled as to where I’ve been. I feel like every step I’ve taken has paid off,” says Cabrales. “Right now I’m basking in the sunshine, and I honestly feel like the world is my oyster. I have so many opportunities.

“Ag engineering will always be near and dear to my heart,” she says with total conviction.
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Internships give insight into corporate environs

by Sue Mitrovich

Justin Green passionately endorses the “internship experience.” A satisfied, enthusiastic alumnus of North Dakota State University (NDSU), Green remembers his college days as “one of the best experiences I’ve ever had. It wasn’t so much the time spent in classes, but the involvement with campus organizations and especially the internships that grew my real-world view.”

A Canadian/American dual citizen, Green was born north of the border but was raised south of the line in North Dakota where his extended family ran a purebred Angus cattle operation. His father wrote for the *Angus Journal* out of Lethbridge, Alberta, before settling down to life in the vast lane of pasture and prairie. All-things-Angus seem to be innate in generations of Greens.

“The grandkids learned a lot about the business, tagging along as seed stock was sold to producers and packing plants. We learned through traveling and meeting people, visiting farms and ranches.”

With a familial bent toward the cattle business and agriculture in general, undergraduate Green joined NDSU’s professional ag fraternity, the Saddle and Sirloin Club (a student organization promoting ag awareness through petting zoos to livestock shows) and an ASABE student branch.

The summer after Green’s sophomore year and into the fall of his first semester as a junior, he worked at Ingersoll-Rand’s Bobcat plant in Bismarck, N.D. As a mechanical-design-engineering intern, Green soaked in Bobcat’s progressive work environment and gained his first taste of a large company’s day-to-day operations.

Bobcat is an innovator in the field of compact equipment and shines in design, development, and marketing.

“It’s a terrific place to work,” says Green. “Bobcat does a great job with internships, and the company builds a likely pool of candidates for post-graduation jobs. There I learned what a good corporate culture is all about.”

Green took a second stint as an intern, with American Crystal Sugar Company (ACSC) in Moorhead, Minn. “It was another solid interning experience,” recounts Green. As a food-processing intern, he oversaw small projects within the bustling beet sugar industry.

ACSC’s principal activity is to process and market sugar, sugar beet pulp, seed, and molasses. “ACSC has a cooperative structure; farmer-producers own the company. Like Bobcat, the workplace again proved to be a life-learning experience.”

As graduation neared, Green interviewed for jobs with an on-the-job understanding of two important corners of ag engineering’s corporate world. “It was a spectacular job market, and I was very fortunate,” he says humbly. “I had four or five offers, but signed on with Hormel Foods at their flagship Austin, Minn., plant as a maintenance engineer, and I’m so glad I did.” Lessons learned during internships helped him make the choice.

As a maintenance engineer, Green had direct supervision of one area of the 1,089,000-square-foot plant — equivalent to about 23 football fields — which houses the latest state-of-the-art technology in processing equipment and produces the world-renowned luncheon meat, SPAM®.

“Among other things, my day included repairs, capital budgets, and project planning. Since food processing plants are generally three-shift operations, I began by meeting with the previous shift’s engineer to review the work he accomplished and to determine what needed to be continued into my shift. I would have a sense as to how much manpower we would need to devote to certain projects as well as what schedules and forecasts needed to be drawn up. Maintenance engineering is responsible for reactive as well as proactive maintenance on slicing, cooking, mixing, grinding, and smokehouse equipment as well as installation of new equipment.”

Named by *Forbes* for six years running as one of “The 400 Big Companies in America,” Green is more than satisfied that he works for Hormel Foods. Currently in corporate engineering, Green says “the promote-from-within culture in Austin is

Justin Green takes a break amidst the pipes and machinery of an ammonia refrigeration system over which he has watchcare. “It’s a huge industrial air conditioner!” says Green.
Hector Matthys, an associate engineer with Caterpillar, headquartered in Peoria, Ill., also graduated from NDSU. Like Green, he was raised on farmland, though in southwestern Minnesota. As a young man working in the fields operating equipment, Matthys sat aloft a tractor seat contemplating why the machinery “worked the way it did and how it could work better.”

Also an advocate of internships, Matthys had three interning stints during his undergraduate years, all directly related to his core curriculum. Two were focused on machine design; the third explored a potential interest in manufacturing of components.

First, at Bobcat in Bismarck, Matthys focused on compact excavator design — from new product design to new product introduction.

“Located close to their test facility, I got terrific exposure to the wide spectrum of efforts that go into one piece of machinery before it hits the market,” says Matthys. “That internship gave me a first look at the many facets of engineering roles from design to manufacturing. I started to get an appreciation for how many little things need to be done right to produce a good product.”

During his junior year, Matthys tackled a second internship in Peoria, Ill., in Caterpillar’s Track Roller Frame Design, his current work group.

“I dealt in-depth with Pro-Engineer, a 3D-design software. The amount of things I learned in robust modeling practices was terrific. Just as a foundation is needed when building a house, proper use of this software builds a foundation for 3D models of machines. The resulting models contain the information needed to manufacture every component that goes into very complex machines. One of the machines I have worked on at Caterpillar has more than 150,000 pieces!”

Matthys’s last on-the-job internship was at Phoenix International, Fargo, N.D., where the design and manufacture of highly “ruggedized” electronic components and systems is day-to-day fare. Industries that rely on agricultural, on-highway, heavy construction, industrial control, and material handling equipment often rely on Phoenix for its strong technological focus and extensive engineering design capacities. With more than 200 engineers engaged in dozens of project, Matthys was kept very busy documenting new processes.

“I knew this was probably not the future for me, but it was a good opportunity to verify just that, to learn and gain perspective within a type of position that I’d likely interact with in the days ahead.”

Today, Matthys is back in Peoria. This can be largely attributed to his internship, as the exposure from that experience provided a “foot in the door” and a chance to demonstrate his capabilities.

Building on the foundation of his previous experience as a student intern, Matthys is gainfully employed with a world-leading manufacturer of construction and mining equipment.

“I anticipated and knew a little about what the job would be like, but also knew what life in Peoria was like as well. And it’s great — no hours of gridlock on the Chicago Loop but close enough to the Windy City and St. Louis as well.

“I do a variety of things each day: design modeling, reviewing design with manufacturing engineers, assisting with the development of test plans, developing prototype build plans, attending or leading meetings to develop corporate initiatives that are design-related, trying to get a standardized program to do one type of analysis … it’s a 3-D life!

“Caterpillar is very employee-focused. The benefits just can’t be taken for granted. This is where I want to be, and my internship was the beginning of my workplace future.”
Since the time she was very small, ASABE member Malia Appleford was always concerned with the state of other people, animals, and the environment. “I used to get in trouble for giving my allowance to other people,” she laughs. “And when I saw ads to adopt a child, I would cry.”

That compassion has led Appleford to a career as an agricultural engineer. She is currently working on her doctoral degree in agricultural and biological engineering at the University of Illinois (UI). But her path to that major took a couple of twists and turns.

She initially majored in biochemistry and art history at Colorado College, near her hometown of Lakewood, Colo. She then pursued a master’s degree in art history. But her passion in wanting to make changes in the world and in sustainable agriculture caused her to completely switch disciplines. She graduated in 2005 with a master’s degree in ag engineering.

“I’m attracted to agriculture because it is very systems oriented; nothing exists in a vacuum,” says Appleford. “I like the idea of biology coming into it. Ag engineering is different than most other engineering disciplines. It is close to environmental engineering. You design systems to take care of and clean up the environment. The opportunity is really exciting,” she adds.

She says her art history background has only added to her abilities as an engineer. “We, as engineers, design for humanity. We make solutions for humans. It is really important to have an understanding of the arts, history, and social sciences and how humans behave in order to make good designs that will work with the way humans work,” Appleford explains. “I’m a much better communicator and much more analytical in my thinking.”

When UI initiated a chapter for Engineers Without Borders, Appleford didn’t hesitate to sign up. One of her professors from Colorado College, Bernard Amadei, was the founder of the organization, so Appleford was familiar with the program.

“So much of the world is impoverished. Why not design projects for people who could really benefit?” Appleford asks. The UI chapter had the opportunity to work with three villages in Orissa, one of the poorest states in India, says Appleford. The villagers had requested electricity so that women could run spice grinders and then sell the ground spices at market. In 2004, she and four others went to India for a site survey.

“We wanted to get an idea what the culture and environment was like, what kinds of people would be running the program, and what they wanted the electricity for,” says Appleford. “We tried to get as many questions answered as possible.”

With that information, they came back to the university and worked on a design. In the summer of 2005, six students went back to India and spent two months implementing the design. The project includes using solar lanterns to run lights, as the people there are superstitious if lights are kept on all night. In December, a group will go back for follow-up to see how well the project is doing, if everything is still working, or if anything needs to be fixed or added.

Appleford says the people in India are really nice and wonderful. But she found the level of poverty shocking. “Little children were begging for money and food all the time,” she says.

Women still do the vast majority of work in India, she says. The men grow a one-season crop of monsoon rice while the women make additional money by selling the rice and spices they have ground.

Solving problems is what Appleford enjoys most about being an agricultural engineer. “The idea that I can look at a problem, try to come up with extraordinary and creative ways of figuring out a solution, and then see something improved is very satisfying to me,” she admits.

Appleford would like students to look at agricultural engineering as a profession that is amazing and really cool. “Don’t be afraid of engineering. Lots of people see it as being hard, but keep in mind what the goal is, which is really to improve things and make improvements for humanity and for the world,” says Appleford.

“What could be more satisfying than that?”

Learn more about Engineers Without Borders at www.ewb-usa.org.
Having access to locations and places that 99 percent of the world will never be able to see is what Ken Householder says is the best part of his job as an agricultural engineer with the USDA’s Natural Resource Conservation Service (NRCS) in Tulelake, Calif.

One of those areas, he says, is a huge oasis with spring water and lots of wildlife in the middle of a 1,200-acre private ranch.

“I have a key to the gate of some of the most amazing natural sites,” remarks Householder.

Householder prepares standards and specifications for conservation practices for the governmental agency, with a special emphasis on irrigation and range management. He is involved with conservation planning both for individual and private landowners, as well as ranchers.

Once a landowner contacts Householder, he sets up an interview with him or her to talk about the hopes, desires, and dreams for the piece of ground. He also finds out what kind of operation the land is to be used for, whether it is for crops or ranging. Householder then takes a tour of the property, taking pictures and making notes of the condition of the vegetation, soil, water, air, plants, animals, and human interaction. He also uses global positioning systems data to document things such as overgrazing and erosion.

“I try to get the whole picture and identify what is going on with that property,” says Householder.

He then comes up with a conservation plan using the technology gathered along with his ag engineering skills. Once the plan is completed, it is signed by the landowner, the local conservation agency, and the NRCS.

“Helping the private landowners practice good conservation is the greatest thing for me.”

Having a passion for the environment wasn’t initially in Householder’s plan when he entered college at the University of Minnesota. Wanting to be a pilot, he decided to study aerospace engineering. That all changed, he says, when he took a Native American philosophy class.

“I began to think about human interaction with the world in general. I came to the conclusion that agriculture was the most profound interaction with the planet ... and the most screwed up,” he says.

After taking that class, he decided to change his major to agricultural engineering with an environmental emphasis.

He also had the opportunity to work with ASABE member Dr. Gary Sands, an ag extension engineer in the ag engineering department at the University.

“That was an invaluable experience,” says Householder.

“It gave me the opportunity to see what the work is like and what an ag engineer actually does.”

Householder estimates that he has been involved in the conservation practices of 45,000 acres of land since employed by the NRCS in 2002.

The newest technology that he uses in his work is geographical information systems. It presents the land in easy-to-understand, graphical, color pictures.

“The farmers and ranchers are most impressed with this new technology. The engineering information is mumbo jumbo to them, but they are impressed with color maps of their farm,” laughs Householder.

And what does Householder see for future land use?

“The urbanization and destruction of prime agricultural land in the United States is the largest challenge we will face in the future,” says Householder.

“Really, really good prime land is going into housing, pavement, roofs, patios, and pools. It’s the least valuable from an environmental perspective. Agricultural and ranch land is the best land with good environmental processes coming out of that land,” he says emphatically. “What’s the impact of that going to be 20 years down the road? We’ll be spending a lot more money on food than we are now, which is not going to help our standard of living.

“Helping the private landowners practice good conservation is the greatest thing for me,” Householder states.

“The foundation starts with agriculture. Without agriculture, there couldn’t be anything else. We have to eat first!”
Structures & Environment Engineering

These engineers have an extensive background in analysis, design, and use of biological products as construction materials. They design safe, economical structures including greenhouses and animal housing; storage structures for grain, fruits, and other food products; and waste handling and storage facilities. Construction is also important.

In the environment area, engineers design systems and equipment to provide environmental control for animal, plant, processing, and storage facilities. Professional engineers design ventilating systems and specify equipment that heats, cools, lights, reduces harmful emissions, and controls conditions in and around facilities. The facilities include specialized plant growth chambers, laboratory animal facilities, commercial greenhouses, animal production facilities, cotton gins, grain elevators, and food processing plants. Engineers interested in the structures and environment areas also design waste handling and storage facilities.

Career opportunities can involve design, operation, performance evaluation, and sales.

Food & Process Engineering

Food and process engineers work on the boundary of where biology meets engineering. They combine design expertise with economical methods of large-scale manufacturing to develop processing methods needed by industry. They are experts in food pasteurization, sterilization, freezing, and dehydration as well as packaging, transportation, and storage of perishable agricultural products. These engineers also use microbiological processes to produce fermented foods, fuels, biochemicals, and pharmaceuticals, and to treat municipal, industrial, and agricultural wastes.

Increasing concerns about food safety and environmental protection are creating a growing demand for food and process engineers. Major employers include the food processing industry and related supplier industries such as: food machinery, instrumentation and control; packaging, ingredient and material suppliers; firms that design and build food processing plants; consulting firms, government agencies at federal, state, and local levels; and pharmaceutical and health-care firms.

Energy

People use energy to pump water, heat homes, and power the cars and other devices that provide them with a high standard of living and comfort. Energy comes in many forms including electricity, gasoline, diesel fuel, hot water, and hot air. However, dangerous substances, such as carbon dioxide and chemicals, are often released when producing or using energy. These waste products cause air and water pollution and may contribute to global warming.

Many biological and agricultural specialists and engineers are discovering alternative energy sources such as plants, methane, vegetable oil, wind, and solar power. They study and test energy options they hope will someday help maintain modern conveniences while reducing adverse effects on the environment.

These specialists also seek ways to conserve energy, to reduce costs, and improve the environment. Alternative energy uses and energy conservation will pose ongoing challenges for the future.

Forest Engineering

Forest engineering applies physical, biological, and engineering sciences to solving problems in natural resources and environment, forest production systems, and related manufacturing industries. Engineering skills and expertise are needed to address problems related to equipment design and manufacturing; forest access systems design and construction; machine/soil interaction and erosion control; forest operations analysis and improvement; decision modeling; and wood product design and manufacturing. Forest engineers are involved in a full range of activities in natural resource management and forest production systems.
Environmental Quality Engineering

The demand for engineering graduates with coursework, background, and experience in environmental quality has never been greater. Society is demanding that everyone do a better job of protecting and improving the environment. Soil and water engineers understand the scientific interaction of plants, animals, and humans with natural resources including soil and water in the atmosphere, on the earth’s surface, and underground. They seek ways to control soil erosion and study the environmental effects of sediment on water quality. They design, build, operate, and maintain drainage and irrigation systems and water control structures for reservoirs, floodways, and channels. They monitor drainage and irrigation water quality and design equipment for applying fertilizers and pesticides.

Soil and water engineers are experts in agricultural hydrology principles such as controlling drainage. They must also understand the mechanics of water and wind erosion and work with crop water requirements, design and operation of irrigation systems, and channel design.

Aquacultural Engineering

Aquaculture is raising aquatic animals such as fish and shellfish to sell as food and for other uses. Popular species produced include oysters, mussels, salmon, trout, carp, shrimp, prawns, edible fish, and shellfish, along with ornamental and bait fish. Agricultural/ aquacultural engineers concentrate on increasing production while decreasing costs and environmental impact. They seek ways to reduce pollution from aquaculture discharges, reduce excess water use, and improve pond and indoor fish rearing systems. They also work with aquatic animal harvesting, sorting, and processing.

Agricultural and biological engineers specializing in water quality, biotechnology, power and machinery, natural resources, food, environment, and sanitation are suited for careers in this expanding field. Aquaculture is an area that will continue to grow as natural fish supplies decline.

Power & Machinery Engineering

Modern agricultural machines must be mechanically sound and biologically sensitive. Computers are also becoming standard equipment. These machines are designed and tested by engineers educated in a power and machinery curriculum.

Power and machinery graduates are commonly employed by farm and industrial equipment manufacturers but also qualify for positions outside the farm equipment industry. Many have found engineering employment with automobile and other non-farm equipment companies. Today, farm equipment manufacturers need more engineers than are graduating from universities. The designers are needed to keep up with a growing demand for innovative, high-tech equipment.

Soil & Water Engineering

Soil and water engineers understand the scientific interaction of plants, animals, and humans with natural resources including soil and water in the atmosphere, on the earth’s surface, and underground. They seek ways to control soil erosion and study the environmental effects of sediment on water quality. They design, build, operate, and maintain drainage and irrigation systems and water control structures for reservoirs, floodways, and channels. They monitor drainage and irrigation water quality and design equipment for applying fertilizers and pesticides.

Soil and water engineers are experts in agricultural hydrology principles such as controlling drainage. They must also understand the mechanics of water and wind erosion and work with crop water requirements, design and operation of irrigation systems, and channel design.

Biological Engineering

Biological systems can consist of cells in tissue culture, plant systems, humans, animals, or groups of animals. Biological engineering areas include: biomaterials, biomechanics, biological systems modeling, bioinstrumentation/imaging, implant design, food and fiber processing, energy, sustainable systems design, and mass transfer in bioenvironments.

Biological engineering graduates pursue careers in fields such as medicine, biomedical engineering, environmental engineering, natural resources, agriculture, and related areas.

Information & Electrical Technologies Engineering

Developments in information and electrical technologies provide the agricultural community with opportunities for increased efficiency and improved reliability, safety, and productivity. Information and electrical technologies use electrical systems and controls for the farmstead, dairy, and related areas by integrating computers and electronics with agriculture.

Combining computers, sensors, and controls with mechanical systems leads to automated and robotic systems. In modern agriculture, all engineering touches on one or more aspects of information and electrical technologies in developing agricultural systems.
Recognizing that our lives would be impossible without water, the United Nations established international World Water Day on March 22, 1992. The main areas covered by the U.N. proclamation are water for health, biodiversity and environment, agriculture, and energy.

At the University of Idaho (UI), a student team was searching for a capstone design project, a requirement of senior engineering students. They were inspired by the clear and clean waters of Idaho that are lacking in impoverished and drought-laden third world countries addressed in the U.N. proclamation.

Looking at possibilities, Eric Morris of Seattle, Wash., entered the picture and challenged the UI team to address the problem of safe drinking water being sparse in third world countries, particularly in East Africa.

Morris, a Boeing retiree, travels to Kenya annually, working with people living in the slums and/or are nomadic. According to Morris, infants are the hardest hit by the lack of pure drinking water, with a mortality rate of approximately 7 percent in this group alone.

The UI student design team took on the challenge of designing a biofilter that would be able to remove all contaminants, both biological and other natural particulates, without the use of electrical power. The filter construction also had to be adapted to local materials and fit into the culture of the users. The problem was multifaceted, and a solution required expertise in many areas.

ASABE member Cami Johnson and Michelle LeBaron, biological systems engineering students, researched bacteria and viruses common in Africa’s water. With the help of Tom Hess, professor in biological and agricultural engineering, the team identified ways to test for these bacteria to verify the filter design.

“I have always maintained that if you want to save more lives, become an environmental engineer rather than an M.D.,” Hess remarks, adding that a major avenue to a healthy population is healthy drinking water.

The UI College of Engineering stresses inter-disciplinary education, and the biological systems engineering students teamed with Nate Cropper, Jenn Miller, and Sam Creason, mechanical engineering students. The mechanical engineering students, under the direction of mechanical engineering professor, Don Elger, took on the task of designing the physical apparatus that needed to be inexpensive, could filter water for small groups or families, and be easily carried by nomadic groups.

The team named themselves “Clearwater Idaho Aid,” in part because they recognized the tremendous humanitarian need in this desperate part of the world. Brainstorming, they came up with many ideas and, finally, one prototype design.

After many laboratory tests, the group realized the next step was on-site testing, and Miller was designated as the person to travel to Africa under the guidance of the more experienced Morris.

“The duo first tested the filter with the Maasai tribe in the slums of Tanzania. Arriving at the water source, Miller could see that the water conditions were much worse than the team had anticipated. The tribal members shared the same water supply with their cattle, often at the same time. Whether it is a river, a pond, or often times, just a mud puddle, contaminates are deadly to human life, particularly to children whose immune systems cannot fight off life-threatening, water-borne diseases.

As problems arose in the purity of the filtered water, a quick e-mail was sent back to the team at UI. The biological members of the team set about tweaking and testing the ingredients in the filtering process and sent adjustments back to Africa.

“We had to explore the vegetation of East Africa to find the right species and quantity to remove the clouded turbid-
“The turbidity of the water,” says LeBaron. “We had to depend on Jenn’s eyes to relay the conditions of the water source.”

A main ingredient adjustment called for the increase of crushed Moringa seeds, which are available locally in Kenya. Adding additional time for the seeds to set in the test water reduced the turbidity of the liquid to a fraction.

The filtered water now appeared crystal clear, and the tribal elders declared that the process was magic! However, appearance alone can be deceptive. After testing for disease-carrying, micro-biotic “bugs,” the water was deemed drinkable. At this point the elders and other tribal members were eager to be involved in the process that would bring new life and health to this small segment of Africa.

The filter prototype was left with the Simba Maasai Outreach Organization in Africa, and Miller returned to the UI with first-hand experience and new ideas of how the team could further refine and re-design the unit.

So innovative was the team’s approach that they won two awards for excellence at the 2006 Engineering Design Expo, an event that gives a public stage for engineering seniors to show their design projects.

The team members graduated in May, and LeBaron will continue on at the UI as a graduate student in biological and agricultural engineering. The rest of the team will be working in industry or attending other graduate programs. However, LeBaron and some of the industry-bound members plan to become mentors to next year’s design team, who will be developing a second-phase water filter that will incorporate native materials from other parts of clean-water-starved Africa.

Jenn Miller, the eyes and ears of the cap-stone team in Eastern Africa, introduces members of the Maasai tribe to the idea of using crushed Moringa seeds found locally, to aid in the purification process of contaminated water seen in the background.
Imagine giving a business presentation in a language that you barely knew a year earlier! That’s exactly what ASABE member Shannon Brockmann says was her biggest accomplishment while on an 18-month overseas work assignment at a John Deere combine and forage harvester plant in Zweibruecken, Germany.

“Trying to learn and understand a new language is challenging,” says Brockmann. Formerly the product safety and compliance coordinator for the Worldwide Combine Product Development Center, Brockmann says the company provided an intensive two-week language course before going overseas. “It’s frustrating sometimes. I try to speak the language as much as I can. I can’t be effective if I can’t understand completely; it makes it difficult to make a good decision,” she says. However she quickly adds that if something is critical, her colleagues switch to English, which most engineering people can speak at some level.

She earned her bachelor’s and master’s degrees at Iowa State, where she also met her husband, William, an ag engineering graduate. They married in November 2002. Also employed by John Deere, he is the team leader for current combines.

With a farm background from Austin, Minn., Brockmann said she was always interested in agriculture. “I wanted to focus on the environmental area. I was particularly interested in water resources, an area I concentrated on in my master’s degree,” she says.

She and her husband had made it known to John Deere management that they would like to do some sort of international assignment. Surprisingly, she says, an opportunity came up for two positions in Germany at a Deere plant that fit both of their skills and backgrounds.

The couple attended a cultural training class provided by Deere before leaving for Germany. Deere also provided the Brockmanns a house in a small village and a vehicle for their stay.

“It’s absolutely different living in another country versus visiting it,” says Brockmann. “You learn how people think and operate from something as small as going grocery shopping to how a factory operates.”

Brockmann says the German people have been really great and accepting of them. The way the German people view life, she says, is to take time to relax and spend time with family. On Sundays, she adds, everything is shut down except restaurants and gas stations.

The work structure in Germany is quite different than that in the United States, notes Brockmann. Employees typically work a 35-hour work week with the exception of higher management employees.

Travel is a side adventure for the couple. “We have traveled to 17 countries and have plans to visit five more,” Brockmann says enthusiastically. “We recently learned snowboarding and also enjoy downhill skiing and scuba diving.” They are planning a trip to Egypt in the near future.

Brockmann says each country and each small region in those countries is very unique with its own culture and heritage, which is celebrated. In Germany, she says, each region has its own dialect and people still speak some of their own language. She explains that it shows how diverse Europe is and how countries want to maintain their historic culture.

Brockmann appreciates that diversity as chair of the ASABE Committee for International Standards. Standards development is an important aspect of her current job as standards coordinator at Deere. “If we don’t have international standards leading the way and making things standard across the world and Europe, we’re going to have some trade barriers and real problems,” says Brockmann. “One way to avoid that is to have worldwide standards.”

Brockmann says taking an overseas assignment will definitely benefit her and her husband’s career. “We have worked in and understand how another culture operates,” Brockmann says. “By working at the Deere factory in Germany, we have developed relationships there. When we go back to the States, and questions or problems arise, we have established relationships in Germany that will allow us to work on issues or problems together.”

“It’s definitely been a challenge moving to another country. But we’ve grown from it,” states Brockmann. “We would definitely consider another opportunity to come back!”

Product safety and engineering standards are the two areas Brockmann is responsible for in her position. She interacts with design teams, conducts safety reviews, advises engineers on current standards, and makes sure products comply with those standards. Her role, she says, is to make the products safe for Deere’s customers.

“That’s what it comes down to … we’re doing our best to make sure the product we send out the door is a safe one,” states Brockmann.
France with a Technological Twist

Dave Lehman, a senior manufacturing engineer for Bobcat in North Dakota, had the opportunity to spend two years in Nantes, France, a major Atlantic seaport. Bobcat had previously purchased a manufacturing plant in nearby Pont-Château and was looking for a manufacturing engineer to assist that facility in adopting U.S. operating methods. The French plant makes telescopic handlers.

To provide a seamless transition, Bobcat provided cultural training, relocation assistance, and a driver for Lehman, who would experience his first overseas trip.

Having no background in any foreign language, Bobcat also hired a tutor for Lehman when he arrived in France.

“I was picking up enough to get by,” says Lehman. “A lot of meetings were in French. It’s amazing how physically drained you can get from a meeting when everyone is speaking a language foreign to you and you’re trying to grasp everything being said. At some point, I was finally able to speak it well enough to get a point across,” he adds.

“The food was a bit difficult to get used to at first, especially when I didn’t speak the language,” Lehman says. “I’d have a menu and point at something without necessarily knowing what it was.”

When asked if he was ever surprised by what he ordered when the food was served, he laughs.

“I ordered things like escargot, fish with the head and skin still on, shrimp with the head on it, and a fish broth that smelled like old fish. It was horrible,” he laughs.

“The countryside was surreal,” says Lehman. “The area and a majority of the buildings are older but with a modern twist technology-wise. They also have big department stores and electronics.”

For the first few weeks after arriving in the country, Lehman stayed in a hotel on the ocean. Shortly thereafter, he moved to a château outside of Nantes, which was about 45 minutes from his work.

“The château was built in 1405 with servants’ quarters. It was basically a long rectangular building, which at one time had been split lengthwise with one side for animals, the other side for people,” says Lehman. “When the château was redone, the servants’ quarters were turned into studio apartments, complete with a fireplace, terracotta tile floors, and whitewashed walls.”

Lehman says the people in France are not as outgoing as in the United States.

“They are strong willed,” remarks Lehman. “They have certain customs. For instance, when they go in to work, they shake everyone’s hand. If we went out for lunch with friends, the guys and women would greet friends with a hand shake or a kiss on the cheek depending on how well they knew them. It was surprisingly easy to get used to,” he comments.

Lehman says the business culture is quite a bit different than in the deadline-driven United States.

“In France, it’s more like a cadence. They don’t necessarily look at deadlines as much as they want things done right and to make sure all the i’s are dotted and the t’s crossed. There’s little emphasis on deadlines. Meetings always started 10 to 15 minutes late,” states Lehman.

Lehman says the average work week in France is five, seven-hour days. He adds that the majority of manufacturing businesses shut down for the month of August.

Lehman received his bachelor’s degree in 2000 in ag and biosystems engineering at North Dakota State University. Having grown up with a farm and ranch background in North Dakota, Lehman felt the major would be a good fit. He is currently pursuing a master’s of business administration degree in Bismarck, N.D.

He had opportunities to take advantage of several internship co-ops while earning his degree, one at Bobcat.

“I hadn’t had a lot of experience and had never been in a factory prior to the co-op. Once I worked there, it reaffirmed that what I was doing fit and that it was what I wanted to do,” Lehman adds.

A few days after graduation, Lehman began working as a manufacturing engineer at the Bobcat facility in Bismarck.

“Dave Lehman took time to enjoy the sights in France while on a two-year assignment for Bobcat.”

Lehman says his first overseas assignment was a good experience overall.

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Lehman strongly recommends that students take a foreign language.

“It’s so important if you want to work internationally. There’s getting to be so much globalization,” says Lehman.

He would like to go back to France someday, whether for work or vacation. The factory has put in its first moving assembly line, which was designed and built in the United States and shipped to France. He left to go back home weeks before it was installed and would now like to see the finished result.

Lehman says his first overseas assignment was a good experience overall.

“Standing in France, looking off the balcony at the ocean, it is just unbelievably surreal. Quite a bit different from what I ever thought I’d be doing!”
Argentina Beckons

Jody Roades didn’t have much time to think about his assignment in Rosario, Argentina. As an applications engineer for Wag Corp., he was told at 10 a.m. one morning he’d be going to Argentina. He was on a flight at 5 p.m. that same day. He spent four months there putting combine grain yield mapping systems on combines built in Argentina.

Roades, who honed his Spanish along the way, says Argentina is a well-educated country. In most locations, he says, you can find someone who speaks English or is linked with someone fluent in English.

The soil in Argentina is similar to the Midwest he says. They grow soybeans, corn, grains – those type of crops.

He remarks how industrious the people are there. “They don’t have access to parks and services we have in the United States,” he says. “They make stuff and make do with things we wouldn’t in the States. For instance, they fix broken VCRs rather than just throw them away as people in the states do. They are very efficient people,” he states.

Roades says there are a lot of small farms near Rosario. The land owners usually hire people to do the work, he says, whereas in North America, farm land is rented from the owner and the farmer takes the risk.

Rosario, the third largest city in the province of Santa Fe, Argentina, has a mixed influence of German and Italian in its Spanish culture, says Roades. He adds that the food was very Italian.

“There was a lot of beef, barbecue, grilled meats, and lots of pasta,” he laughs. “I actually lost weight because I was eating more healthy. It was very much like European foods and portions.”

Roades was impressed with Argentina, the whole structure of the country, and the way things were done. He especially enjoyed the family atmosphere and the camaraderie.

“Every weekend, I would go to somebody’s house for something, even kid’s birthday parties,” Roades says. “Everyone sat down to meals. I liked the closeness of family and friends together, talking to everyone, and the strong friendship bonds.”

Roades graduated from Texas A&M with a bachelor’s degree in aerospace engineering in 1997 and a master’s degree in agricultural engineering in 2001. He is currently working toward his master’s of business administration degree.

He grew up with a mechanical background in a mechanically orientated family. His father was a pilot, and Roades liked the equipment, liked seeing why things worked the way they did. He thought he’d grow up and be an aircraft mechanic. It seemed a good fit to major in aerospace engineering until he began working part time with ASABE member Dr. Stephen Searcy in the ag engineering department.

“I liked the work, liked working with the technology. As my dad was a crop-duster pilot, I grew up around farming and agriculture and had worked on some of the farms in the area. I enjoyed the high tech combined with farming,” Roades explains.

Roades decided to major in agricultural engineering for his master’s degree. Upon graduation, he went to work for Wag Corp. doing application engineering for precision ag equipment.

He is now employed by the John Deere Seeding Group as a test engineer where he is involved with planter and seeding products. He assists with development, finds fixes for service issues, and tests for continuous improvements on the products. Working with design engineers, he looks at the risks and conducts tests with different pieces of machines, from risk assessment all the way through the testing.

Roades enjoys the diversity of tasks including working in the office with other engineers on test planning, through the executive testing with field technicians, and the challenges associated with those tasks.

His advice for students? “Never give up, never surrender. It’s going to be tough, but so very rewarding!”

Jody Roades (foreground) worked on a farm in Northern Argentina which was large enough to have its own crop-dusting service.
Dear Young Professional:

We are pleased to extend a formal offer for your employment as an engineer.

- Compensation Director

This invitation for gainful employment is the culmination of a young professional's existence to this point. Maybe your interest as an agricultural and biological engineer began with the smell of the home farm, seeing that brightly colored tractor in a parade, wondering how that white stuff really gets into Twinkies, or maybe you just wanted to grow cilantro on Mars. No matter where your interest began, your career may take you any number of directions. Career planning will help you choose the path of your career, and, if done properly, will take you on a rewarding journey. The following ideas may help you get from the stuffy interview room to the comfortable rocking chair of retirement.

Career Path

Will you become a CEO, or do you prefer to design the latest, breaking technology? This is a question you may need to be prepared to answer some day. Do you want to manage co-workers, or would you prefer to run lab experiments? The answers to these questions may determine your personal career goals. Keep in mind that not everyone becomes a CEO or department head, nor do you typically get to choose. Early career experiences and opportunities can set the stage for your career. If you turn down a certain position, you may have just turned down your CEO bonus. As opportunities are presented, keep a positive attitude and keep in mind that you were given the task of choosing your career path.

Career Interests

If you have not had a chance to intern or gain experience in your area of employment, you should find out what you want to do in five or even 10 years. Most large companies rotate young engineers into different roles to determine what the employee enjoys and where that employee will fit in the company. This opportunity may get your head spinning, but it offers the chance to explore your likes and dislikes. If you do not have the opportunity to rotate positions, try informational interviewing. Find a colleague that works in an area of your interest and arrange an interview to discuss the various aspects of their work. The interview can help determine if this is a path for you and may eventually turn into an employment opportunity.

Attitude

Do you enjoy your job? If you do not, you need to determine why. There may be times when you are given a job (or a so-called “opportunity”) that you wish did not exist. You may have been in this position to gain experience or to see your response to the challenge. Every opportunity has something to teach you. Be open-minded with new assignments, and see what you can take away to make it a great opportunity. If you feel that your assignment is not leading your career in the right direction, talk to your boss. A career plan makes it possible to have a constructive conversation about your goals instead of just complaining to your boss about your current assignment. Your boss may even help you along your path or suggest some revisions based on his experience.

Training

Now that you have a career path and plan in place, you need the tools to get there. Maybe you need a graduate degree. Will you need a professional license? There are many opportunities for continuing education, both traditionally and via distance-learning programs, that you can take. With all the different offerings, you will need to determine if you will pursue an advanced engineering degree or maybe a law or business degree. If you are working at a university or for the government, you need industry experience? This is a great opportunity to use your network of contacts to get the experience you need. If you do not like the idea of having homework again, an ASABE continuing professional development course could help. Training will help you increase the tools in your engineering toolbox.

Networking

Take the first step — become a member of the American Society of Agricultural and Biological Engineers (ASABE). ASABE meetings at all levels are great networking opportunities. Meetings are your chance to talk to multiple people outside of the work environment about your interests. Professional ASABE gatherings give you a large sample of professionals in your interest area. Try to meet at least one new person in your area of interest when attending meetings or professional gatherings. You may meet your next brainstorming partner or your future employer.

Another great networking opportunity is the ASABE mentoring program. Choosing a mentor gives you one great contact along with their entire network.

ASABE also offers special communities such as the Young Professional Community (YPC). YPC is a group of young agricultural and biological engineers who may know what you are experiencing. Look for YPC activities at ASABE meetings to see how they can help your future!
I was born and raised in Modesto, Calif., located in the Central Valley, famous for agriculture and the Gallo Winery among other things. My parents were teachers; my mom taught second grade and my dad taught biology, so I’ve always had an interest in education and science. Mechanically minded, I liked to build things and had Legos® and other types of building sets growing up. Never Barbies! (I once received an electronics set for Christmas, and I used it to build an alarm system for my bedroom.) I was also inspired by my biology and chemistry teachers in high school (both women) who showed me that women can have great careers in science.

My alma mater is the University of California Davis (UCD). In undergraduate and graduate school, I majored in biological systems engineering. I had read about the bio and ag engineering program in the UCD catalog and thought, “That major sounds right for me – mixing biology and engineering. How perfect!”

A few stand-out opportunities came my way. As an undergraduate I worked as the peer advisor for the course I enjoyed as an undergrad, Properties of Materials in Biological Systems. Since I had taken the course, I had a unique perspective and enjoyed working with each new class of undergraduates. The course offered insight into a variety of engineering topics and how they related to food processes, anatomy, design, and ergonomics. I think, only after having taken such a course, can one really appreciate how much engineering is involved in biological systems.

What led me to a major and eventually a career in environmental engineering was my interest in how things work, my love of science – especially biology, and my concern for the environment. On a whim, I attended a career fair at UCD. Not a big fan, as I hadn’t had much success at past fairs, I almost passed it by. But I was with a friend so decided to print some résumés and tag along. After all, I was finishing my thesis and about to receive a graduate degree; I needed to start looking for a job!

While in graduate school, I worked with two professors and ASABE members – David Slaughter and Jim Thompson – and another graduate student, Steve Potts, on the development of a chemical assay to detect mold in fresh and processed tomatoes. Our work eventually led to two U.S. patents, something I never imagined when I started the research project.

For three years I served as a teaching assistant for a course I enjoyed as an undergrad, Properties of Materials in Biological Systems. Since I had taken the course, I had a unique perspective and enjoyed working with each new class of undergraduates. The course offered insight into a variety of engineering topics and how they related to food processes, anatomy, design, and ergonomics. I think, only after having taken such a course, can one really appreciate how much engineering is involved in biological systems.

There were only a few booths that had companies interested in biological/environmental engineers; most were interested in biological/environmental engineers; most were
recruiting computer science, mechanical, or electrical engineers. The U.S. Army Corps of Engineers had a large booth though, so I stopped and read the brochures. I talked with Roger Henderson (who is now my boss!) about the opportunities and the variety that the Corps could offer. After chatting with a few other companies, I left. I sent a thank-you e-mail to all the company representatives I had spoken with that day, including Mr. Henderson. The next day, he phoned and wanted an interview ... and the rest is history. I've been with the Corps for almost five years.

Working primarily on military projects involving ordnance removal, I’ve spent time on projects near Beale Air Force Base and at the former Fort Ord in Monterey as well as a wide range of projects in Arizona, Utah, Oklahoma, Texas, and New Mexico for former and active military installations. I’ve also worked on some civil engineering projects such as the design of a water treatment plant for a small northern California community.

Recently, my focus has been the National Park Service: helping them develop and update their Spill Prevention Containment and Countermeasures Plans for petroleum-based fuel tanks. A few weeks ago, I spent time in the Sequoia/Kings Canyon National Park and saw almost every inch of the park. Guided by the park’s safety manager, while driving around checking out fuel tanks, we saw a bear, deer, and the amazing, giant Sequoias. It’s almost hard to call it “work”!

It’s probably accurate to say that there are more men involved in my field, but I work with a fair number of female engineers. The field is competitive and challenging, but that’s what makes it fun and keeps me energized. I’ve never felt ostracized or different because I’m a female, even 

I give women the same advice I give to anyone interested in engineering: be passionate about what you’re doing! Take the time to get involved ... you never know where it might lead.

if I’m the only female on a project team. I offer a unique perspective, and I’m very results-oriented. People tell me I’m fun to be around, and I hope that’s true!

I give women the same advice I give to anyone interested in engineering: be passionate about what you’re doing! Take the time to get involved, because you never know where it might lead. I never thought I’d design a tractor, let alone drive in a tractor pull, but it gave me valuable experience that I use today, and I made great friends! I never thought I’d be a part of a patent, but the process and research involved taught me about organization, data analysis, project management, and perseverance.

It’s all important down the road, no matter your gender!
What do theme parks, cemeteries, city parks, golf courses, roadways, housing developments, sports fields, and fountains all have in common? Water and agricultural engineer Robert Beccard.

Beccard is president of Aqua Engineering, Inc., in Fort Collins, Colo. He heads the irrigation consulting firm, which specializes in water feature engineering and water-conserving irrigation system design and management.

Beccard grew up as a city kid in Lincoln, Neb., and enjoyed spending summers on his cousin’s farm in the eastern part of the state. He knew he always wanted to be an engineer, but acknowledges he didn’t know much about irrigation. He received a bachelor’s degree from the University of Nebraska and a master’s degree from Colorado State University, both in agricultural engineering.

He joined Aqua Engineering in 1981 when the company’s founder, Stephen Smith, was looking for an agricultural engineer with a background in center pivots. The position also offered an opportunity to work briefly in Saudia Arabia. Wanting to stay in Fort Collins, Beccard took the job. Beccard says the experience in Saudia Arabia was an unique opportunity. The three-month stay was his first overseas trip. During that time he helped install 78 center pivot irrigation systems on a Saudi farm. That first overseas journey would just be the start of many more to come. As the company grew, irrigation systems were designed for a number of different projects including Disney’s Magic Kingdom in Paris.

“We did the whole irrigation system for that,” Beccard says. “I spent three months living in Paris doing field work on the project. During the construction phase, I managed the project solving problems as they came up and facilitating design changes that needed to be made to meet the needs of Disney as well as for water conservation.” That opportunity led to Aqua Engineering designing irrigation systems for Hong Kong Disney and Blizzard Beach in Walt Disney World in Florida.

“It’s hard to put into words how gratifying it was to have the opportunity to be involved in building a Magic Kingdom,” says Beccard.

Beccard admits that Disney is a demanding client. “The creative process, in some ways, doesn’t stop until the project is built ... you’re continually doing changes. That isn’t bad, but it’s sometimes frustrating. You think you have something done, and then it gets changed.”

The majority of the company’s work involves landscape irrigation. But the firm also does agriculture irrigation pump system design as well as water feature mechanical designs such as fountains that showcase the feel, movement, and sound of water.

Beccard says 50 percent of landscape projects use an alternative water source, so water quality is a big design consideration. “We don’t design waste water systems,” says Beccard. “We do use effluent water and understand the water quality issues related to using an alternative water source.”

An area many people may not consider when it comes to irrigation design is cemeteries. “About 1,500 veterans are dying every day. Many veterans’ cemeteries are expanding to meet that need,” says Beccard. “These sites are maintained into perpetuity. We utilize the most efficient irrigating system possible that also provides green turf.”

Beccard admits the profession is challenging. “There are a variety of projects and concerns we face daily,” he says. “Sometimes we have to come up with really unique irrigation engineering solutions.”

Beccard says his work has its own rewards. “… We have to come up with really unique irrigation engineering solutions.”

“Seeing what I created being built and knowing that I achieved my goals for an efficient water system that supports a very esthetically pleasing situation or that someone enjoys is very satisfying,” says Beccard. “When I see a golf course or a park where people are playing and how well the turf looks, or a spray ground where kids can go and water squirts out of the ground, or a soccer game being played on a ball field where we designed an irrigation system ... seeing it enjoyed and knowing you were a part of it is very rewarding.

“What makes my job fun is the variety of things we do from irrigation design to pumping systems, from landscape to agriculture. It’s still fun and challenging 25 years later!”
University of Nebraska–Lincoln

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The path to medical school is not always an easy one. For Brandon Bryce and Diana DeRosa, undergraduate degrees in biosystems engineering at the University of Arizona has landed them both right where they want to be on that path.

Brandon Bryce is starting his second year of a four-year program at Penn State Medical School in Hershey, Penn. Although medical school was always a possibility in the back of Bryce’s mind, he wanted to explore another profession.

“My original plan was to go to medical school,” Bryce says, “but I chose biosystems engineering because I thought I could get a good job if medical school didn’t work out. I was still able to take most of the prerequisites for medical school through that program. I didn’t explore too many other options, but because of the biosystems engineering major, I was able to make a better decision for medical school,” adds Bryce.

He had no problem getting into medical school upon graduation. In fact, he received three acceptances from various schools, Penn State being one of them.

“Penn State Medical School has a good reputation. I was able to talk to other students who had gone to school there and get personal recommendations. It was a good location, a rural area, much like where I grew up in Arizona,” says Bryce.

Bryce says his biosystems engineering degree helped prepare him to study for the work load he would have in medical school.

“It helped me to think logically, to be able to think through problems with a desire to understand how things work,” he remarks.

One of the experiences during his undergraduate years that reinforced his desire to go to medical school was an opportunity to participate in a six-week internship.

“It was a little difficult to find an internship that coincided with what I wanted to do,” states Bryce. “I probably should have participated in an engineering internship in case I became an engineer, but I was still thinking about going to medical school.”

Bryce learned about a hands-on internship at a heart hospital from former biosystems engineering students who had been through the six-week program.

“It was an incredible experience. I actually still recall some of the things I learned there,” Bryce says. “I was able to scrub in on surgeries and follow the doctor around the clinic as well. It provided exposure to the medical field and helped me realize if medicine was for me or not,” adds Bryce.

While still in high school and thinking about medical school in his future career plans, Bryce was concerned that it might be too much school. But two years after he graduated, he made the decision to go for it.

“I decided I should challenge myself and not be limited by the time it would take to complete medical school,” Bryce states.

His biosystems engineering background and minor in mechanical engineering have come in handy in medical school.

“We were doing a rotation in cardiology,” says Bryce. “When the teachers started talking about different pressures and how valves work in the heart, it came fairly easy to me. It’s all a mechanical system,” he says.

Bryce is considering going into orthopedics someday, but is going to explore other options. “I want to make sure there’s not something I’d enjoy more or have the aptitude for,” he adds.

He advises high school students to do something they really want to do.

“Medical school is a huge sacrifice. You spend some of your prime years in a classroom,” says Bryce. “But it’s something I really want to do, otherwise it wouldn’t be worth it!”

Married with a three-year-old daughter, Bryce credits his wife with being supportive while he pursues his education. When not in the classroom, he enjoys spending time with his family. He also manages to squeeze in some fly fishing. When asked how he
is able to handle school, family, and kids, Bryce offers this advice.

“I try to look at it all in perspective. It does get to be a lot when the teachers pile a lot of things on you to learn. One of the biggest things is expectations, whether from myself or from medical school,” states Bryce. “I won’t get there today or tomorrow, but I will learn things today that will help me tomorrow. I need to keep that in mind. My classmates are all going through the same things. Sometimes I think I’m in it all by myself, but once you realize it is just part of the process, and people do graduate, you start to feel you’ll be ok,” advises Bryce.

Diana DeRosa is taking a slightly different path to becoming a doctor. A military daughter, DeRosa and her family moved to Tucson, Ariz., when she was 10 years old. She participated in summer camps at the University of Arizona (UA) and loved living in a college town. When it came time to go to college, she says, UA offered her a full scholarship based on her high school grades and SAT scores.

DeRosa checked out various departments at the university before deciding upon the biosystems engineering department. The amount of technology really interested her in the engineering department, especially biotechnology.

She had always thought about medical school, but during college she found out that she really liked research. She decided to undertake two degrees in biosystems engineering and also biochemistry and molecular biophysics.

“The two majors went together very well,” says DeRosa. “I was taking a lot of pre-med classes, but I also wanted more depth in the biological sciences.”

During her undergraduate years, DeRosa participated in various research internships. An internship with the National Nanotechnology Infrastructure Network at the University of California, Santa Barbara, was the point when she says she got very interested in research.

“Everything I did turned out perfectly. I got really jazzed about it,” she says.

DeRosa says she loves the barebones of research, like the work she did in ASABE member Dr. Mark Riley’s lab in the Ag and Biosystems Engineering Department at UA. She loves getting a problem and going to resources to figure out how to solve it.

She says an opportunity to conduct research at Rice University in Houston, Texas, was when she definitely knew she wanted to go into medicine.

“Going to Rice was a good idea,” she says. “I learned that it was really what I wanted to do. The technology fascinates me,” she adds.

DeRosa conducted a lot of research during her undergraduate years, but she also found time to participate in extra-curricular activities as well. In addition to starting a running club at UA, she participated in ASABE, the Society for Women Engineers, Alpha Epilson, and Tau Beta Pi. DeRosa was also the fund-raising chair for the ASABE 1/4-Scale tractor team.

“I found out how difficult it is to be fund-raising chair,” laughs DeRosa. “I learned how to be creative, make designs, deal with financial pressures and client preferences, and how to sell my ideas.

She says that experience has helped her in research as well as engineering.

“You have to rely on your own creativity, your own thoughts. You need to get other people to believe in you. It’s a bit more difficult being in science or engineering, as many projects are funded by clients. However, it’s easier if you do things that you know will benefit other people.”

Upon graduation, DeRosa decided to pursue an M.D./Ph.D dual program. The program offers students the opportunity to earn the M.D. and the Ph.D. degrees in an integrated six- to eight-year program of study.

She applied to various medical schools which offered the unique program. Her first choice was the University of Texas (UT), Houston, but she was put on a waiting list. The school takes 400 applications a year for the program. They interview 40, and only four students get accepted. She was accepted at other universities, but DeRosa got the opportunity to go to the school of her choice when she got pulled off the UT waiting list. She received a program fellowship, which covers tuitions and fees and provides a stipend. She began the program in May of 2006.

DeRosa feels the M.D./Ph.D program opens more doors and career paths in research. She says it offers translational research that creates physician scientists with a good bedside manner who can take the technology developed into a clinical setting and then translates that technology into research for a specific disease.

Discovered Futures in Agricultural, Food, and Biological Engineering
Swimming and fishing in Maryland’s Chesapeake Bay during growing up years, Kristen Hughes acquired early on a keen appreciation for clean water. The local headlines in her hometown of Severna Park often carried doom-and-gloom forecasts when it came to area environmental problems.

“I realized in college that there were no silver-bullet solutions in anyone’s holster,” Hughes says, “and I was intrigued by the complexities of non-point source pollution issues in the Bay and elsewhere around the world.”

As an undergraduate at the University of Maryland (UM), Hughes was fascinated by the varied and intricate interactions between the environment and people. “It was clear to me that farmers and municipalities faced tremendous challenges in providing food and services to people while protecting air and water quality at the same time.” However, what made the greatest undergrad impact — the “ah-ha” moment of a lifetime for Hughes — was a journey to Egypt. During an intensely ambitious two-week, for-credit class abroad, leanings toward applying for medical school disappeared as she encountered gut-wrenching statistics on the status of children’s health throughout the Middle Eastern country. She learned that one Egyptian child out of every five suffers from debilitating, sometimes fatal, gastrointestinal illnesses because of contaminated water supply.

Becoming very ill in Cairo — “the sickest I’ve ever been in my life” — was the pivot point. Hughes found her “true north,” convinced that she needed to pursue solving an environmental problem rather than just putting the proverbial band-aid on it. Figuring out how to clean water either on farms or in countries where financial resources are limited became her crusade.

“I came home and knew very clearly what I wanted to do … how very precious fresh water resources are.”

Hughes completed two bachelor’s degrees, one in biological resource engineering and another in natural resources management, and a master’s in marine and estuarine environmental science at UM. She traveled trans-Atlantic to finish yet another master’s in engineering science at the National University of Ireland just outside of Dublin. Her second thesis evaluated Ireland’s phosphorous index and can be used as a risk assessment tool for nutrient pollution to pinpoint “red flags in the landscape scenario,” she says. It can be utilized by both farmers and land-use planners to identify areas that are at high-risk for phosphorus loss to surface waters.

After all that schooling, Hughes was ready to start working with farmers. She signed on with Sustainable Conservation in San Francisco, Calif., a nonprofit company that “partners with business, agriculture, and government leaders to find practical ways that the private sector can protect clean air, clean water, and healthy ecosystems,” as their Web site states. “Because the environment is everyone’s business.”

“The transition from school to work was wonderful … working regular hours rather than doing thesis work and engaging in a vigorous corporate culture rather than working and writing 60 to 70 hours a week. This nonprofit company really takes care of people, does fantastic collaborative work with industry, tackles big problems, and asks the big questions … I love my job!”

Hughes’ company résumé indicates that her experience is “in the remediation of point and non-point source pollution at both field- and watershed-scales, using nutrient management, risk assessment, soil amendments, and ecologically engineered treatment systems.” She has “developed innovative approaches for the use of industrial by-products as environmentally beneficial soil amendments — a win-win situation for both industry and farmers interested in improved water quality in the Chesapeake Bay.”

As far as Hughes is concerned, “There is nothing better than working for people you respect and doing a job that energizes you and results in positive change in people’s lives.”
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Purdue University is an equal access/equal opportunity institution
Biological engineering is behind many of the innovations in the world, including those in the medical arena. Josh Lovekamp knows that firsthand.

A biological engineering graduate with a bachelor’s degree from the University of Georgia and a master’s and doctoral degree in bioengineering from Clemson University, Lovekamp specializes in the medical device business.

Lovekamp, who grew up in Augusta, Ga., always had an interest in both medicine and engineering. He decided to combine those two interests when he majored in biological engineering with a medical emphasis.

Lovekamp is a product specialist in the medical products division of W. L. Gore and Associates, located in Flagstaff, Ariz. The company consists of four divisions: fabrics (makers of GORE-TEX®), electrical, industrial, and medical.

Lovekamp says his biological engineering education provided him with a very well-rounded background and laid the groundwork for his current career and the type of work he is doing now with cardiovascular medical devices.

“My education was very diverse, and I learned a lot of different things,” says Lovekamp. “It has made it possible for me to understand the engineering behind the medical devices that are developed and how they apply to a patient.”

His interest in the cardiovascular field began in graduate school when he conducted research on bioprosthetic heart valves made from pig tissue. That interest has continued in his recent work with aortic stent grafts at Gore.

Lovekamp’s position in the medical products division consists of working together with a team of people having varied backgrounds. His job runs the gamut, he says, depending on the project and the phase of that project. He works with the regulatory, manufacturing, sales, marketing, training, and research and development aspects of a medical product. As a project specialist, Lovekamp is the one person that follows the project from start to finish.

Lovekamp is responsible for the safety and efficacy of the devices he is working with, whether they are in early product development or are already in use commercially. He makes sure that the devices are both safe and work the way they are intended, allowing patients to receive the best possible treatment for their condition.

Lovekamp’s position puts him in contact with numerous physicians, both in the United States and abroad. This contact occurs both in the field while observing device implantations, as well as during medical conferences and consultant visits.

“My involvement with physicians helps to identify a need for a potential future device and obtain a clinical background regarding the disease,” says Lovekamp. “I then work with engineers to come up with solutions, and I take those back to the physician”

“Communication is vital, both written and spoken. You need to be outgoing and have common sense … I work with engineers to come up with solutions, and I take those back to the physician”

He says his biggest satisfaction is the difference a device can make in a patient’s life and knowing the products are very high quality.

“I know they will benefit a lot of people in the long run,” Lovekamp states.

From engineering to the medical field, Lovekamp’s work is making a difference in the lives of patients worldwide.
The ABCs of getting into a college engineering program of your choice

Academics DO Count
A strong academic record usually counts for more than SATs or ACTs. Students need at least a B+ average for admission to selective schools. Scoring in the upper 1200s to 1300s on your SATs will certainly help your chances. Some schools may also require SAT II subject tests in science and math. ACT scores in the upper 20s are helpful.

Be Sure to Take Plenty of Science and Math
Most engineering schools require at least four years of math, including pre-calculus. Engineering schools also look for those students who have three years of science, including physics and chemistry.

Commitment to Extracurricular Activities
Students who can demonstrate a serious commitment to engineering will look favorable to the admissions office. Join science or engineering clubs and participate in school competitions. Take an internship during summer vacation at a company that hires engineers.

Do Your Homework When Selecting Schools
Look for places that match your academic goals, as well as meet your social needs. Go online and check out what each school has to offer. Talk to any engineers you might know and find out where they went to school.

A Good Personal Essay Can Make a Difference
Although not every school requires an essay, it can be important at those that do. This is your chance to tell the admissions board something about yourself. Talk about something personal rather than writing about a general topic. At a competitive school, it can be the one aspect that sets you apart from other applicants.

Find People to Write Letters of Recommendation
References can be critical at most schools and should come from people who know you well. Recommendations from your science and math teachers are a must. Summer programs or internships in which you’ve participated can also provide references.

Go Visit Schools That Interest You
Try to schedule interviews with someone in the admissions office and the engineering department before you go. These visits demonstrate your interest and can make the difference to the admissions process.
Agricultural and biological engineers often work in research and development, production, sales, or management. Overall, engineering job opportunities are expected to be good through 2014, according to the U.S. Department of Labor.

Projected employment growth and career opportunities vary by engineering job specialty. For example, the employment of agricultural engineers is expected to increase about as fast as the average, while environmental engineering is expected to increase faster than the average, for all occupations.

The growing interest in worldwide standardization of agricultural equipment should result in increased employment of agricultural and biological engineers. Increasing demand for agricultural products, the need to feed a growing population, more efficient agricultural production, conservation of natural resources, ensuring the safety of the food supply, applying to agriculture the advances brought about by biotechnology, and meeting environmental regulations will all spur demand for agricultural, biological, and food systems engineering graduates.

According to the Bureau of Labor Statistics, engineers held 1.4 million jobs with 555,000 found in manufacturing industries. Another 378,000 positions are in the professional, scientific, and technical services sector, primarily in engineering, architectural, and related services and in scientific research and development services. Many engineers also work in the construction and transportation, telecommunications, and utilities industries. Federal, State, and local governments employ approximately 194,000 engineers.

About 41,000 engineers are self-employed, many as consultants.

Engineering graduates traditionally have received higher starting salaries than graduates in other fields. Earnings depend on education, engineering specialty, licensure status, experience, job function, type of employer, and geographic location.

Engineers with bachelor’s degrees and less than one year of experience earn an average of $46,059 a year, according to a 2005 report by the National Society of Professional Engineers (NSPE). Those with one to two years of experience earn $48,451 a year.

Licensed engineers with less than one year of experience make an average salary of $51,383 while those licensed with one to two years of experience have starting salaries averaging $55,878.

Engineering continues to be a viable and in-demand profession, and engineering graduates can expect good starting salaries and job opportunities well into the future, according to the NSPE.
Round Out Your Future with ASABE

What’s your dream? Feeding the world? Preserving the environment? ASABE can help you make it happen.

What is ASABE?
The American Society of Agricultural and Biological Engineers (ASABE) is an international educational and scientific organization whose members are involved with or interested in engineering and technology for agricultural, food, and biological systems. With members in more than 100 countries, the Society offers every member a world of opportunities. And it’s a great place to be a student member.

Imagine attending an international meeting where world-renowned researchers are announcing the results of their work, research applications are being discussed, industry standards are being developed, and lively debates about the earth’s natural resources are taking place. As a student ASABE member, you would be welcome at any of these sessions. And that’s only the beginning.

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✔ Eligibility for awards, scholarships, and competitions.
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✔ ASABE Career Center offering you extensive résumé and position databases as well as powerful and user-friendly searching capabilities. A wonderful tool to help you find the job you’re looking for.
✔ Access to a fully searchable database of nearly 50,000 pages of technical material related to agricultural technology and engineering. ASABE student members access it for an annual dues rate of just $20.
✔ Reduced registration for ASABE conferences and international meetings. Students at ASABE’s annual international meetings attend career planning seminars, student mixers, and more. Students are also welcome to participate in virtually all of the professionals’ activities including technical sessions and tours.
✔ Eligibility to compete in ASABE’s annual 1/4-Scale Tractor Student Design Competition.

Don’t forget the ASABE Student Branches

Most of the universities listed on pages 46-49 have ASABE Student Branches. These clubs provide an excellent opportunity to meet, work, and have fun with other like-minded students. The branches organize technical tours to local industries, develop their own fund-raising events, host cookouts and receptions for alumni and faculty, form athletic teams, take trips, compete as a team in ASABE international competitions, and get together to have fun.

Sound like a lot?
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Visit our Web site where you’ll find a wealth of information about the Society and student membership and can link to the home pages of ASABE’s student branches.
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An invitation to join ASABE ...  
... the Society for engineering in agricultural, food, and biological systems.

Why should I become a student member?

Develop your professional identity.  
Start now to develop the professional contacts, leadership skills, and visibility needed to establish professional credentials.

Find employment opportunities.  
Job openings are published in Resource magazine and listed online at www.asabe.org through the ASABE Career Center. As a student member, you join a network of thousands of professionals working in industry, academia, and government.

Contribute to your profession.  
Your participation as a student member allows you to impact the future of engineering for agricultural, food, and biological systems. ASABE cannot effectively represent you, or others, without your participation.

Participate in ASABE's Online Mentoring Program.  
Having a mentor, who is established in his/her career, provides you with first-hand experience as to what to expect in the work world after graduation. The benefit of a mentor can give you practical career advice on the day-to-day issues you will face in the workplace.

Who is eligible for student membership?

To become a Student Member, you must be an undergraduate or graduate student with an interest in agricultural, food, or biological systems engineering or related technologies. Students residing in Canada become members of both the American (ASABE) and the Canadian (CSBE) Societies.

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Resource: Engineering & Technology for a Sustainable World.  
This magazine reports on technologies affecting engineering for agricultural, food, and biological industries today and tomorrow. Available electronically unless hard copy is requested.

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A newsletter within Resource magazine which details activities, meetings, awards, and opinions. It will help you learn more about your colleagues in the professional network of ASABE.

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ASABE student dues are $20.00 (for all, or part, of the school year). Benefits begin with payment of dues.

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American Society of Agricultural and Biological Engineers
Student Membership Application

I submit the following for  ☐ Membership  ☐ Reinstatement  Anticipated graduation date: _______ month _______ year

<table>
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<th>FIRST NAME</th>
<th>MIDDLE INITIAL</th>
<th>LAST NAME</th>
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SCHOOL BRANCH NAME:  
Female  BIRTHDATE:  ☐ Male  ☐

HOME ADDRESS
HOME PHONE
CITY, STATE OR PROVINCE, ZIP OR POSTAL CODE:  COUNTRY

MAJOR  DEGREE PURSUED

NAME OF COLLEGE OR UNIVERSITY

DEPARTMENT ADDRESS

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☐ Please check box if you prefer hard copy delivery of Resource magazine.

PRINCIPAL TECHNICAL INTEREST
(circle one in each column)

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STUDENT DUES: $ 20.00

Optional Purchases:

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<tr>
<td>Transactions (2006 Subscription)</td>
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<td>Applied Engineering (2006 Subscription)</td>
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<td>ASAE Standards (2004 edition)</td>
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<td>Journal of Agr. Safety &amp; Health (2006 Subscription)</td>
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