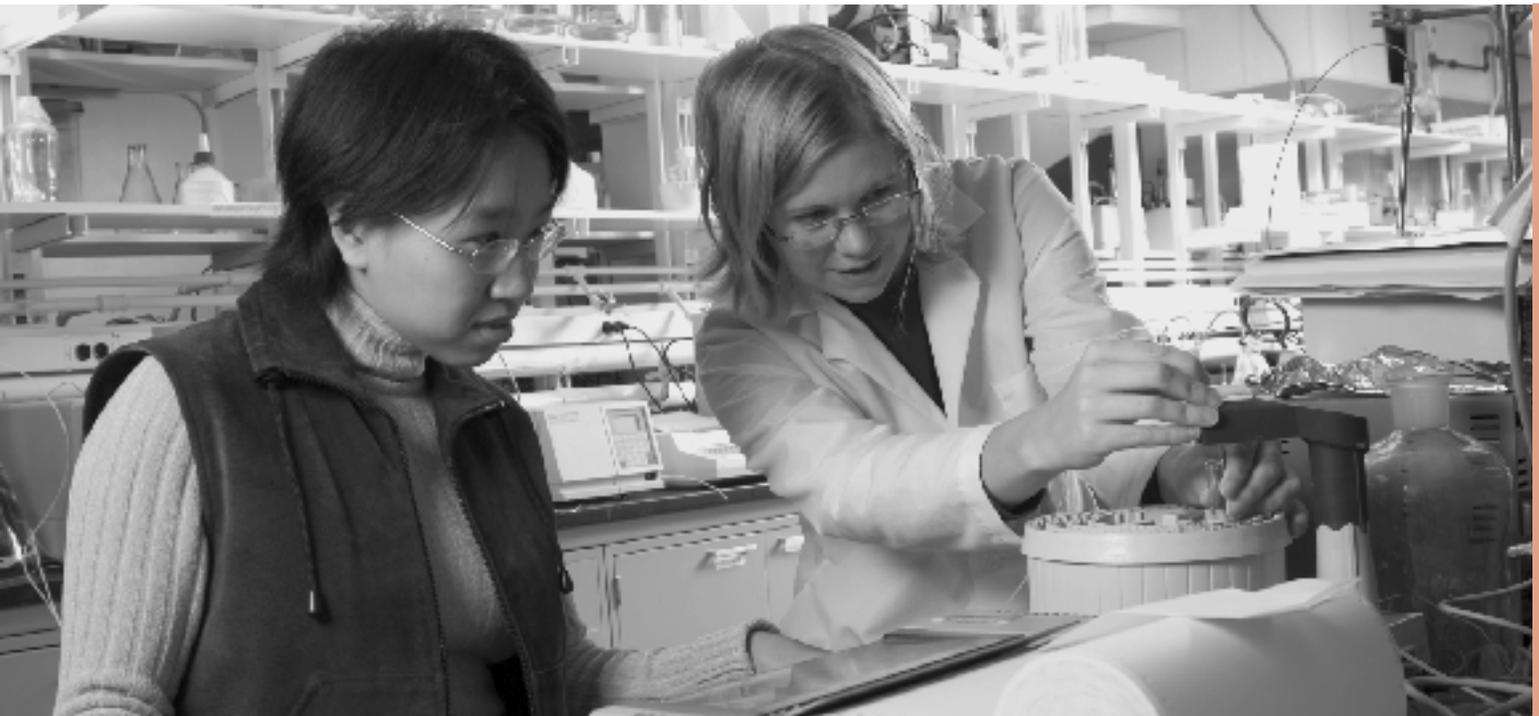


# WOMEN ENGINEERS

Newsletter for alumnae & friends of the Women in Engineering Program

## Creativity and Teamwork: The Heart of Engineering

by Beth Holloway, Director, Women in Engineering Program



**Creativity**—Engineering requires us to think outside the box, trying something completely new to find the best possible solution to a problem.

**W**hat is engineering? How would you define it if someone asked you? Have you thought about it recently? I think we engineers sometimes get so caught up in the details of our jobs that we overlook what engineering is really all about. And if we talk about engineering to young people, do we talk about it in a way that reflects the full

potential of what engineering is?

I was asked recently to give a talk to high school students about the importance of creativity and teamwork in engineering. I asked a few engineers for their thoughts and got feedback mostly of the "good luck with that" variety. One engineer told me that engineering

was all about solving problems under an extremely aggressive time schedule. If that's the kind of image we engineers project about our own profession, is it any wonder that young women are not choosing to study engineering? And they aren't.

Enrollment figures for fall 2004

## Creativity and Teamwork: The Heart of Engineering *continued from cover*

show that only 16.3 percent of first-year engineering students nationwide were women—lower than it was in 1990. The peak was in 1996, when 19.9 percent of first-year engineering students nationwide were women, and the percentage has been falling ever since.

**So what did I say about the importance of creativity and teamwork in engineering? Read on...**

Engineering is a profession that requires creativity and teamwork. While some define engineering as applying math and science principles to solve problems, I would offer a different definition.

**I would say that engineering is the application of creativity and teamwork using math and science principles as tools to solve problems.** It may be a subtle difference, but I think it's an important one.

For example, have you ever heard the old saying, "If you do what you've always done, you'll get what you've always gotten"? In other words, if you never try something new, if you keep doing the same things, the results will never change. Now this can be a good thing, even in engineering. This is the goal of every manufacturing line that was ever set up! But when you have a problem you need to solve, doing things in the same way will never lead to a solution! In fact, I have heard that the definition of insanity is "doing the same thing and expecting a different result."

So what is trying something different? It's creativity! Sometimes it's trying something completely new—something that just came out of your brain and never existed before. And sometimes creativity is applying to your problem an idea that worked in a different application.

Where does creativity come from? Well, sometimes it's an idea that comes from the deep recesses of your brain. And sometimes it's an idea that comes from the deep recesses of someone else's brain. Most often, it's a part of something that comes from you and part of something that comes from someone else. And that's where teamwork comes in.

Everyone is different. These differences are shaped by a person's different life experiences—who she is, where she lives, what she's done in her life so far. These differences mean that everyone thinks about problems differently and processes information differently. And that's the part that leads to new and innovative ideas in a team environment!



**Teamwork**—By promoting a team environment, engineers can pool their expertise and perspectives to uncover new and innovative ideas.

Just think for a moment: If everyone thought like you and came up with the same ideas as you, there is really no benefit to working in teams. You will come up with the same solution together or alone. But by working in a team, you can combine ideas—taking the best parts of yours and the best parts of everyone else's—and create something that is better than what it would have been alone.

This is really what the engineering profession is all about—working in a team and combining ideas to create the best possible solution to the problem at hand. You will use the fundamentals of math and science to do this, and you will need your logic skills as well. But if those are the tools of engineers, the heart of engineering—what it is at its core—is rooted in creativity and teamwork!

# Purdue Launches Indiana High School Rube Goldberg Machine Contest

by Michelle Morris, SWE High School Rube Goldberg Contest Coordinator



The "Batman"-themed machine took top honors in the first Rube Goldberg competition for Indiana high school students.

The first Indiana High School Rube Goldberg Machine Contest started off with a bang! As hammers swung, bowling balls fell, and cans were crushed, the Purdue University Armory was filled with anticipation. Were the complex machines going to work? Would the task be completed? These questions were answered on February 18, 2006, by our six outstanding teams from high schools across Indiana.

The contest was named after Rube Goldberg, a Pulitzer Prize-winning artist who drew "inventions" that were a satire of technology in use. His drawings were complex and wacky, but somehow, using

ordinary household gadgets and simple machines, he brought together a logical progression that eventually completed its task.

Students from across the nation have been competing in Rube Goldberg Machine contests for many years. However, there was never a contest for high school students in Indiana. So Purdue's Society of Women Engineers student section, with the sponsorship of Johnson & Johnson, set out to remedy that.

The students' task was to select, drain, crush, and recycle an aluminum can. This task had to be

completed in a minimum of 20 steps and was carried out in various and creative ways. Pulleys, ramps, air compressors, and even action figures were used to complete the task.

Some teams incorporated themes into both their presentations and their machines. A trumpet blared out the theme to "Indiana Jones" while snakes writhed in a snake pit. The "Batman" theme seemed to be the most impressive, however, since that team won the competition. "Holy double hammers, judges!" was exclaimed during their presentation, and the entire team exhibited enthusiasm beyond compare. Another team tried out an Olympic theme, hoping to cash in on the recent popularity of the games. Not only did they "go for the gold," but they also saw success in crushing their can.

The Purdue SWE section aimed to inspire unconventional problem solving and creativity in participants, as well as teamwork and presentation skills. These traits, crucial to engineers, are what we value in our members, so we hope to cultivate these traits early. We also hope female students will become exposed to the excitement of math and science and will choose to pursue engineering in the future.

So how do we sum up the Indiana High School Rube Goldberg Contest, in as uncomplicated a way as possible? It was a great success we hope will continue into the future!

# Focus on Students



## Kendra Erk, Senior, MSE

**WIEP: What's your major and year? When will you graduate?**

**Kendra Erk:** I'm a senior, graduating in May! My home is in Materials Science and Engineering, so I like to refer to myself as a materials scientist instead of materials engineer—less nerdy, perhaps?!

**WIEP: What are your plans for the future?**

**KE:** I have been awarded a National Science Foundation graduate fellowship and will be attending Northwestern University in the fall to pursue a PhD in materials science and engineering. Eventually I would like to work in a national lab on a variety of new materials/applications, and who knows, I may end up coming back to academia at some point as a professor. I would also like to live in a few exotic places, have beautiful flower gardens, and learn how to weld large sculptures. (My mom wants a giant metal cactus someday.)

**WIEP: Tell us about the activities you are involved in at Purdue.**

**KE:** I am involved in the Undergraduate Mentees & Mentors (M&M) Program through WIEP. I am also a member of the Purdue Metals Club and am active in jewelry making and metal smithing. Last semester I convinced my boyfriend to join the Ballroom

Dance Social Club. The rumba was my favorite! During my early years I was also active in SWE as a computer tutor, a volunteer at the Imagination Station interactive science museum in Lafayette, and involved in Purdue's Oral English Proficiency Program (language training for foreign graduate students).

**WIEP: Tell us about any honors or awards you've received.**

**KE:** I've been on the dean's list every semester at Purdue and have been awarded a WIEP Merit Award the past three years. Within the field of materials science, I was one of three nationally to receive the ASM Outstanding Scholar Award in 2004. Recently I placed second in the Undergraduate Student Speaking Contest at the 2005 Material Science and Technology Conference in Pittsburgh.

**WIEP: Tell us about your previous work/research experiences.**

**KE:** For the past three years I have immersed myself in the research going on in Purdue's materials engineering department. The summer following my sophomore year I investigated electrospun conductive polymers fibers with Dr. Jeffrey Youngblood. As a junior and senior I studied grain-boundary grooving of ceramic thermal barrier

coatings (TBCs) using atomic force microscopy with Dr. Rodney Trice. This work is currently being published by the *Journal of the American Ceramics Society*. This spring I am also working on voiding in lead-free solder with Dr. Carol Handwerker, Delphi Corporation in Kokomo, Indiana, and my MSE senior design group.

**WIEP: What has been your most interesting project so far (either at Purdue or at work)?**

**KE:** My work with TBCs and Dr. Trice has been wonderful! Besides becoming a highly skilled AFM user, I was the main author of our publication. That was a great experience, which gave my English and grammar skills a huge confidence boost. It was also fun (and a lot of work!) to complete such a major research project during my rather transitory time at Purdue. I am also the proud owner of the only women's-sized lab coat in the department (distinguished by its lack of side pockets)!

**WIEP: Why are you involved with the Women in Engineering Program and the Society of Women Engineers? Also tell us about what you do and how long you've been involved.**

**KE:** WIEP is a great way to meet all the women in every engineering discipline at Purdue. As a freshman

I found this essential to feeling connected in such a large university. I have also been heavily involved in the Undergraduate Mentees & Mentors Program. I was a mentee my freshman year and for the last three years I have been a member of the M&M Leadership Team and the M&M summer coordinator. M&M has given me a great perspective on handling all the options available to me as a woman engineer. My life no longer has to end when I have kids (a great fear of mine as a freshman). I have conquered so many challenges in college and life thus far that I now feel completely confident in deciding how I will handle my work and family life from here out.

**WIEP: Why did you choose Purdue for your engineering degree? Do you still think it was the right choice?**

**KE:** In all honesty, Purdue was the least-expensive engineering school

ranked in the top 10 while I was in high school. This looked great to my parents! I really enjoyed the campus, the students, and the surrounding area during my first visit and have been happy here. Purdue is a great place to work hard and stay focused—meaning it is a bit isolated, but there is a lot to explore in the area, and Chicago is only a few hours away.

**WIEP: What are some of your fondest memories of your times at Purdue?**

**KE:** I really enjoyed the football games as a freshman. One summer I lived in a local church for free with a hippie from Portland, Oregon, in exchange for doing some cleaning and mowing. Never again will I have my own bell tower complete with bats.



Kendra visits Millennium Park during a trip to Chicago.

**WIEP: What do you do in your “free” time?**

**KE:** I like to play outside (bike, hike, play tennis, ski) and greatly enjoy spending time inside the jewelry lab. I also enjoy traveling and taking impromptu trips to Chicago to see plays and concerts.

## Lindsay Walthall, MS Student, ME

**WIEP: What’s your major and who is your advisor? When will you graduate?**

**Lindsay Walthall:** I’m a master’s student in Mechanical Engineering currently working in the Mechanical Engineering Tribology Lab (METL) for Professor Farshid Sadeghi. My thesis project is modeling and parametric studies of hydrostatic-hydrodynamic air-lubricated bearings. I plan to graduate in May 2006.

**WIEP: What are your career plans?**

**LW:** After graduation I will be moving to St. Paul, Minnesota, to begin my career with 3M as a

project engineer. I want to use my mechanical engineering education and gain practical experience and business understanding of the corporate world. I would like to explore future opportunities and move into a leadership position.

**WIEP: Tell us about the activities you are involved in at Purdue.**

**LW:** I am on the Women in Engineering Graduate Mentoring Leadership Team (LT). The program has given me many opportunities to interact and network with other graduate students, faculty members, and industry leaders. Through the leadership team, I



Lindsay (center) prepares to go for a strike.

have further developed my leadership skills and served as a mentor to my peers. I am also secretary for the student chapter of American Society for Engineering Education (ASEE). ASEE provides programs to enhance professional opportunities for engineering faculty members and promotes activities that support increased student enrollment in engineering.

**Focus on students** *continued from Page 5*

At Purdue I am involved with the Society of Women Engineers, American Society of Mechanical Engineers (ASME), Women in Engineering Programs and Advocates Network (WEPAN), and Official Mechanical Engineering Graduate Association (OMEGA). I am also a member of Tau Beta Pi, Omicron Delta Kappa, Phi Kappa Phi, Golden Key International, Ohio Society of Professional Engineers, and IEEE.

**WIEP: Tell us about any honors or awards you've received.**

**LW:** I was awarded the Wadsworth Graduate Mentoring Program Award. This award is sponsored by Emily Wadsworth, founder of the graduate mentoring program at Purdue, to recognize female graduate leaders.

**WIEP: Tell us about your previous work experiences.**

**LW:** Prior to coming to Purdue, I worked at Trimble Navigation as an engineering co-op. I rotated responsibilities, working in both manufacturing and design. While in manufacturing I served as the main contact for assembly areas, created visual work instructions, prepared lines for quality audits, developed new product qualification test procedures, and designed

assembly processes and tooling for emerging assembly areas. My engineering rotation allowed me to design parts and assemblies using Pro/Engineer and perform Finite Element Analysis using Pro/Mechanica. I was also able to prototype and test my designs.

While doing my undergraduate work at Wright State University I was president of the Union Activities Board, vice president of student government, and treasurer of the Residential Community Association. I also worked three years as a community advisor in the residence halls.

**WIEP: What has been your most interesting project so far (either at Purdue or at work)?**

**LW:** The research I'm doing for my thesis. I am writing C++ code to model hydrostatic-hydrodynamic air-lubricated bearings. (I calculate the pressure generated, load supported, friction, torque, etc.) I have worked to model both journal and thrust bearings. There is a significant need to increase the rotational speed and operating temperature of load supporting components for future aircraft gas turbine engines. As a result, I see numerous applications where the modeling will be helpful to future designers.

**WIEP: Why are you involved with the Women in Engineering Program? Also tell us about what you do and how long you've been involved.**

**LW:** I began my master's studies in fall 2004 and immediately joined the Graduate Mentoring Program as a participant. I enjoyed attending monthly meetings and socials. After my first semester the LT had an opening, and I was selected to fill

the vacancy. I have served on the LT since January 2005. I wanted to be a member of the LT because the program had given me a great deal of support and many friends. I wanted to share those experiences with new students as well. I enjoy planning the meetings and social activities for the participants.

**WIEP: Why did you choose Purdue for your engineering degree(s)? Do you still think it was the right choice?**

**LW:** I visited Purdue for a Mechanical Engineering visitation weekend. I had a wonderful visit and was able to interact with professors, meet current graduate students, and tour facilities. The students, faculty, and staff made me feel welcome. I felt Purdue would offer me an excellent degree program with coursework that interested me along with first-class research that would prepare me for future opportunities.

As a large university Purdue has an enormous number of opportunities for students of all interests. There is always something going on here. There are activities at the university as well as Lafayette/West Lafayette community festivals and celebrations.

I am still confident Purdue was the right choice for me. My coursework has been beneficial, and my research has been interesting. I have had numerous opportunities and unique experiences here. I have also met many wonderful friends and created many lasting memories.

**WIEP: What are some of your fondest memories of your times at Purdue?**

**LW:** I purchased season tickets to the Purdue football games this past year with several people from Mechanical Engineering. We always had a great time cheering for the team and often went out to dinner after the games. When the weather is warm I often eat lunch outside

by the engineering fountain with friends. Many of my friendships have strengthened through these frequent conversations. I also had the opportunity to attend the SWE national conference this past year to recruit graduate students. I had a wonderful time traveling with the other Purdue students, interacting with SWE members from other schools, and meeting Purdue alumni.

**WIEP: What do you do in your "free" time?**

**LW:** I enjoy relaxing by listening to music, reading, exercising, or just spending time outdoors. I also enjoy talking on the phone to my family or grabbing a cup of tea and a delicious dessert with a friend at a local coffee shop.

# Focus on Faculty

Purdue Engineering welcomed 10 new female faculty members during the 2005-2006 academic year.



**Robin Adams**

Assistant Professor,  
Engineering Education



**Cordelia Brown**

Visiting Professor,  
Electrical and Computer  
Engineering



**Mary Comer**

Assistant Professor,  
Electrical and Computer  
Engineering



**Monica Cox**

Assistant Professor,  
Engineering Education



**Demetra Evangelou**

Visiting Assistant Professor,  
Engineering Education



**Carol Handwerker**

Professor,  
Materials Engineering



**Dan Jiao**

Assistant Professor,  
Electrical and Computer  
Engineering



**Katherine Peterson**

Assistant Professor,  
Mechanical Engineering



**Maria Sepulveda**

Assistant Professor,  
Civil Engineering



**Lia Stanciu**

Assistant Professor,  
Materials Engineering

# Personal Connection Program (PCP) Matches Alums With High School Seniors



PCP's "Alums for Seniors" is an exciting way to connect with a female high school senior considering engineering. You can do so by sharing your experiences from Purdue and wherever engineering has taken you. While engineering may not be your current profession, your Purdue experiences are still valuable to prospective students.

Statistics show that a significantly higher percentage of admitted students who receive a personal contact from an alum actually enroll in engineering at Purdue. Each month for three months (December-February), as students are admitted, we match them with an alum who will contact them by mail, telephone, e-mail, and when possible, through personal visits in the workplace.

We do our best to match alums and students by geographical area if possible. Many of our alums indicate a willingness to be matched with more than one student and to make long-distance contacts, which helps us tremendously in reaching our goal of matching every admitted female with someone who could add a special personal touch to her Purdue experience. This may mean that a personal visit might not be possible, but we feel that some contact (by mail, e-mail, or phone) is better than none at all.

The ongoing success of PCP depends upon your continued willingness to volunteer your time and experience. We appreciate your support of our efforts and look forward to hearing from you.

To sign up as a resource person, please complete the online form found at:

**<https://engineering.purdue.edu/WIEP/PCP/PCP20AlumnForm>**

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