

ENGINEERING

challenges

Vol 10 Issue 1

See the future through the eyes of an engineer

Engineering Challenges is a showcase for innovative projects developed at the School of Engineering

This Issue:

Student's Project Empowers Disabled Workers at Goodwill Industries

Senior Design Projects

Students Create Custom-made Models

Engineering Scholar-Athlete Alex Boutin



WESTERN
NEW ENGLAND
COLLEGE

School of
Engineering

FOR MORE INFORMATION CALL
413-782-1272

VISIT OUR WEBSITE
www.wnec.edu/engineering

Student's Project Empowers Disabled Workers at Goodwill Industries

Project Earns Honors in the 2006-07 National Scholar Award for Workplace Innovation & Design

When Goodwill Industries approached the School of Engineering to create some tools to assist in its manufacturing processes, Western New England College responded by sending one of its best and brightest.

Senior industrial engineering major Melissa Labrie from Biddeford, ME, was tapped by Dean Eric Haffner to work on an improved tape cutting process for a joint project between the charitable organization and the federal government. Goodwill Industries, which employs disabled people and runs small factories, handles projects for local businesses and organizations that require light assembly and manufacturing work.

"The process in which I was involved was taping two pieces of cardboard for accordion folders used by the government," explained Melissa. "I designed a fixture where the employee actually takes the tape and strings it into the fixture. The groove in the fixture is exactly the width of the tape and there is a fence at the end of the fixture so the employee knows where to stop. Employees push a toggle clamp on the fixture which has a lever so even people with limited mobility can perform the job."

A week after installing the device at the Goodwill factory in Springfield, Melissa returned to see the creation in action.

"According to the managers at Goodwill three or four people who couldn't even think about doing the process can actually do it now and they get really



Engineering major Melissa Labrie works with a Goodwill Industries employee.

excited," said Melissa. "Knowing that I had helped them was the best feeling in the world."

This interdisciplinary design project from the Industrial Engineering Senior Lab class is another example of Western New England College's dedication to allowing students to solve real world problems from real organizations.

For her efforts on this project, Melissa earned second place plaudits in the 2006-07 National Scholar Award for Workplace Innovation & Design. The award included \$5,000 in prize money each for Melissa, the Department of Industrial Engineering, and Goodwill Industries. Melissa, Dr. Haffner, and representatives from Goodwill received their awards at a Congressional Reception

at the U.S. Capitol Building in Washington, DC.

Melissa is a member of Tau Beta Pi, national honors society for engineering students; Omicron Delta Kappa, the Leadership Honor Society; Mortar Board, the National Senior Honor Society; and won the Industrial Engineering Outstanding Senior Award. She graduated summa cum laude in 2007 and currently works in the Manufacturing Engineering Development Program at Pratt & Whitney in East Hartford, CT. Σ



Rapid Prototyping Machine Revolutionizes School of Engineering

As most members of the School of Engineering community are fast asleep, regaining the energy needed to take on another day in Sleith Hall, at least one key contributor to Western New England College can be found hard at work. The Rapid Prototyping Machine, the state-of-the-art device that builds three-




dimensional layered, ABS plastic models of student's SolidWorks designs, can build small, simple models in a matter of hours. For larger or more complex pieces, many students will begin the building cycle at the end of the day and return in the morning to collect their creation from the machine.

"The machine gives us a way to see if what our students have designed will work as expected," explained Dr. Eric Haffner, dean of the School of Engineering. "The Rapid Prototyping Machine can quickly make a model that we can test for functionality and performance."

The device takes designs created on SolidWorks or other CAD programs and builds them by laying plastic down in strips .04 inches wide by .01 inches high. So far students have made new "LEGO" pieces, a functioning crescent wrench, a Geneva mechanism, and designs for mixer/ejector nozzles.

"The machine allows students to realize their designs," said Dr. Haffner.

The machine is available for use by all engineering students and all freshmen are able to create parts for their design project. 

Senior Design Projects 2007

Controller Design for a Multi-Fan Hovering System

EE Major Hibret Stambovsky '07—Springfield, MA



EE major Hibret Stambovsky '07

Whether on an aircraft carrier at sea or a remote command center in a mountainous region, the military has always been working on ways to minimize the space required for take off and landing of aircraft.

Recent examples of military use of Vertical Take-Off and Landing (VTOL) aircraft currently in service include the Harrier Jump Jet and the V-22 Osprey. The latter served as inspiration for electrical engineering major Hibret Stambovsky's Senior Design Project, a control system for a multi-fan hovering system using the XPC Target Application Toolbox of MATLAB.

"It's used for the military where they have a small space to take off or land an aircraft," explained Hibret. "I like control systems and enjoyed taking that class. I wanted to do a project related to that."

XPC Target provides a high performance, host-target prototyping environment that enables control system engineers to implement design concepts directly from Simulink to a hardware-in-the-loop host computer. Hibret applied what she learned about control systems from her coursework in this project.

Hibret is working for the United States Patent and Trademark Office in Washington, DC.

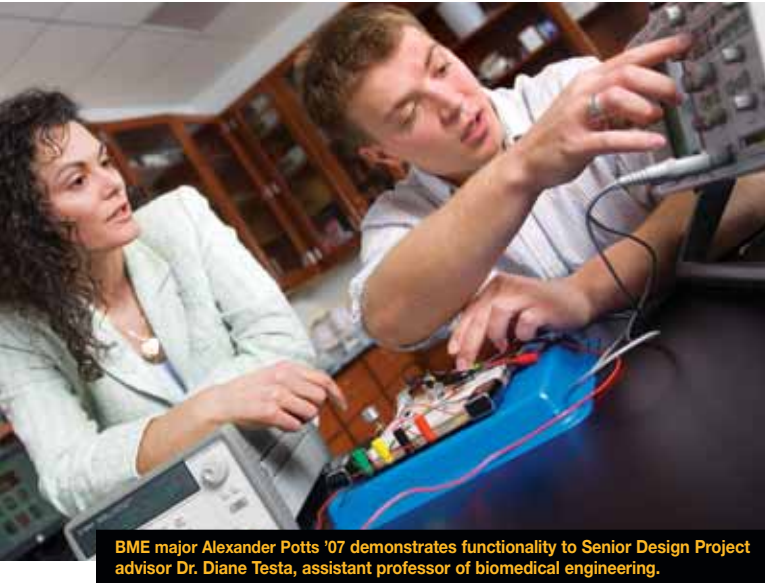


IE major Joshua Mackey '07 with Senior Design Project advisor Dr. William Brown, assistant professor of industrial engineering.

Design of a Low-cost Scintillation Detector for a Radiation Meter

BME Major Alexander Potts '07—Milton, NH

Hospitals in many developing nations rely on the generosity of the world community to acquire the necessary technology to treat their patients properly. Used equipment, such as



BME major Alexander Potts '07 demonstrates functionality to Senior Design Project advisor Dr. Diane Testa, assistant professor of biomedical engineering.

X-Ray machines, are commonly supplied to these hospitals, but often the devices needed to test the performance of the equipment is too expensive for these facilities.

Biomedical engineering major Alexander Potts, working with his sponsor Engineering World



Health, is trying to alleviate this problem with his work on his Senior Design Project, an inexpensive detector to determine if radiation meters are emitting the correct amount of energy. That is important because different parts of the body require different intensities of radiation to get useable X-Ray results.

"I am working on the detector for the meter because the commercial detectors were a bit too expensive," explained Alexander. "They cost anywhere between \$35 to \$90. The price range we are looking at is under \$4.

"The hospitals don't know if the X-Ray energy that they are sending out is actually what they want," said Alexander. "They need an inexpensive alternative to the costly pieces of equipment to make sure

the X-Ray machines are working properly."

Engineering World Health, a nonprofit group dedicated to improving hospital conditions in developing world facilities, plans to implement Alexander's project in hospitals around the world.

Improving Velocity of Product Flow Using Lean Manufacturing Techniques

IE Major Joshua Mackey '07—North Attleboro, MA

Making processes more efficient is the mantra of all industrial engineers and providing students with experience through work for real companies is one of the main objectives of the School of Engineering.

Industrial engineering major Joshua Mackey combined these two aims in his Senior Design Project, an analysis of product flow at DePuy Orthopedics, a Johnson & Johnson company, in Raynham, MA. Joshua interned at the plant, which produces knee, back, and hip replacement parts, for the previous two summers before taking on this endeavor.

"It was a project that I wanted to do during my internship, but I didn't have enough time, so I suggested it as a Senior Design Project," explained Joshua. "It's basically just a concept to improve efficiency.

"The purpose was to reduce lead time, the time it takes from the order of the part to the time it shipped out the door."

Joshua examined each stage of the product flow, over 30 in all, to determine where there were inefficiencies in the chain.

"A team of six people, including myself, was assembled to go through each process and look at different aspects that should be improved," said Joshua. "When we got down and looked at the whole process from step to step, things weren't always going the way we thought they should."

Joshua presented his findings to DePuy Orthopedics and offered suggestions for available improvement opportunities and a prototype for Value Stream Mapping as a process improvement tool.

Ace on the Court and in the Classroom

One of the benefits afforded by the College's size is the ability for engineering students to be student-athletes. Sophomore Alex Boutin epitomizes Western New England College's academic-athletic cooperation.

The mechanical engineering major is a member of the Western New England College men's tennis team and posted a pair of wins in the 2007 Great Northeast Athletic Conference (GNAC) championship



match as the Golden Bears knocked off rival Emerson for the title.

"It felt great to win the GNAC championship, especially because last year we went to the championship against the same team and lost," explained Alex who was named GNAC Player-of-the-Week following his efforts in the conference tournament.

Alex was also one of five Golden Bears named to the ITA Division III Scholar-Athlete Team in 2006 thanks in part to his 4.0 GPA during his freshman year.

"Coach Pearson pushes for academics first," said Alex. "He was very proud of the team having the most scholar-athletes and the highest cumulative GPA out of all of the teams on campus." Σ



WESTERN
NEW ENGLAND
COLLEGE

School of
Engineering

1215 Wilbraham Road
Springfield, MA 01119-2684

ADDRESS SERVICE REQUESTED

College Facts

Engineering Degrees Offered:

- Biomedical
- Electrical
- Industrial
- Mechanical

Combined Degree Programs:

- Five-year Bachelor/MBA
- Six-year Biomedical Engineering/Law

Schools at the College:

- Arts and Sciences
- Business
- Engineering
- Law

36M/10.08

Non-Profit
Organization
U.S. POSTAGE
PAID
Springfield, MA
PERMIT NO. 896



WESTERN NEW ENGLAND COLLEGE

School of
Engineering

**Design of an Experiment to Demonstrate
the Principles of Modal Analysis**

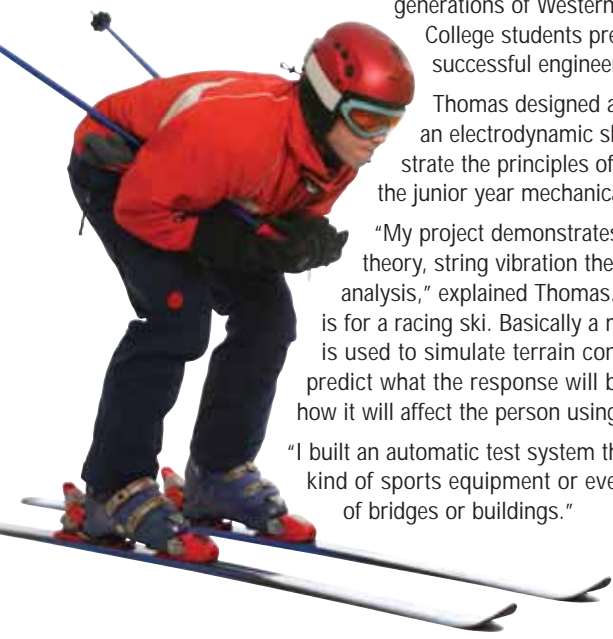
ME Major Thomas Mulcahey—*Southbury, CT*

While some Senior Design Projects are produced specifically for certain companies, Thomas Mulcahey choose a project that will help future generations of Western New England College students prepare to become successful engineers.

Thomas designed an experiment using an electrodynamic shaker to demonstrate the principles of modal analysis for the junior year mechanical vibrations class.

"My project demonstrates cantilever beam theory, string vibration theory, and modal analysis," explained Thomas. "The application is for a racing ski. Basically a mechanical shaker is used to simulate terrain conditions and then predict what the response will be of the ski and how it will affect the person using it."

"I built an automatic test system that can test any kind of sports equipment or even models of bridges or buildings."



ME major Thomas Mulcahey '07 inspects wiring with Senior Design Project advisor Dr. Bart Lipkens, associate professor of mechanical engineering.

Thomas' enthusiasm for Western New England College has been evident since he first visited campus and is still present today as he has presented his Senior Design Project to prospective students at several open houses.

"When I came to visit the School the first time, I saw the professors leaning over the desks to help the students and I had never seen that at any of the other colleges I had been too," said Thomas. "I've seen them here in the evening helping students finish projects. The accessibility of the faculty is really helpful."

Thomas works in the Air-Preheater Division at Alstom in Windsor, CT.

www.wnec.edu/engineering