

Senior Engineers Present Design Projects

By Joe Kupec

Thursday, December 11, at 3 p.m., the MET 442 senior project presentations were given in the Olmsted Building auditorium. Cheryl Songer outlined the program objective of simulating all phases of project inception, design, and production in the preliminary introduction. MET 442 is a culmination of fifteen weeks of a mock-up industrial environment where seniors and faculty participate in an employee-supervisor scenario to complete the project.

Twenty senior Engineering students had prepared ten projects for formal presentation. The presentation process itself resembled an Engineering presentation that would typically take place before upper-level management. Where possible, the finished project was displayed. Projects of a size that precluded transportation were represented by slides and overhead transparencies similar to those that would be used in an actual presentation.

Project sources originate in three areas. Students with hobbies or special interests may propose subjects for the senior design project. Three presentations at the fall semester presentation reflected the personal interests of the students involved with them.

Ruediger Gebhard and Charles Kensky designed and built a portable refreshment center. This project's inception was to build a portable, self-contained beverage center on wheels that would use a heat exchanger to "flash cool" beer as it was pumped from a keg. During the presentation, Kensky

noted that secondary fermentation occurred in beer at temperatures above 45 degrees, requiring a modification of their project.

Jeffrey Goozak and Randall Henry designed and built an automatic batting tee based on their interests in sports. Their idea came from a batting drill to improve a batter's speed. Initial specifications for the project included allowances for anole, velocity, and time interval of balls being "pitched" to the batter. Later revisions to the project included modifications to permit various ball sizes to be used and greater variation of speeds to simulate a wider range of pitching. Following their presentation, Goozak and Henry demonstrated the batting tee. After ironing out minor technical difficulties, the apparatus threw a tennis ball out into the auditorium.

Kevin Buxton used his design project to aid the handicapped. He developed a lightweight, affordable utility cart that may be used with a wheelchair. The idea came to Buxton from his mother-in-law, who loves to work in the garden despite her confinement to a wheelchair.

The finished cart and its linkage to the wheelchair had to be designed and tested for ease of operation and handling from a wheelchair. Keeping the cart's weight low enough to provide easy maneuvering led to choosing PVC pipe as a major construction component. Following stress analysis, Buxton found that 1/2" PVC pipe had a yield strength up to 6000 psi, well within design limitations. Final cost of the project was only \$76.00.

Private industrial sources sponsored three of the projects presented. Steven Smith worked with Brockway Incorporated to develop a computer program that would select gauging equipment used in checking bottles manufactured by machine. The resulting program would reduce set-up time for inspection. Smith reported that his project was being implemented at Brockway following testing.

John Butler and Erick Turin developed a Smith machine for Main Street Gym. Their interests in metalworking and financial backing by the Main Street Gym combined to make the project a success. Among their goals for the project was to develop a weight machine with improved mobility, stability, design, and bearings. Stress, deflection, and bending were all major factors in the design of the weight machine. Limited heat-treating and metalworking facilities on campus necessitated Butler and Turin to go off campus for heat-treating and drilling of some components.

Christopher DiMascio, Andrew McGill, and Andrew Rios initially wanted to design a window-sized heat pump for use in a single room, similar to the conventional window air conditioner. Working with York International, the group soon discovered that heat pump component sizes available were larger than the project design specifications. Well into the semester, the project group modified their objective following the donation of an air conditioning unit by York. The new goal was to build a heat

pump for the Engineering Technology Lab. At the end of their program time frame, DiMascio, McGill, and Rios had modified and rebuilt the system's components and performed preliminary testing. They concluded their presentation by indicating that future design projects would continue to modify the initial project for use as a heating and cooling the MET lab.

The four remaining projects were sponsored by the university and intended as improvements to existing projects and facilities or to fill a need for laboratory equipment.

Michael Grady, Cheryl Songer, and John Wazenski formed the Hot Air Solar Group. Their personal interest in solar heating led to the objective of designing a small, functioning system for applications in residential home unit. Prior to design of their project, the group researched hot air solar systems, duct and measuring devices. Following preliminary designs, the group discovered limitations in the HVAC Industries' availability of parts and equipment to monitor and direct air flow. Following their presentation, the design group observed that while the project was outside the direct application of the MET major, they learned the importance of developing a concept into design and detailed drawings and how to pursue an objective through all stages of development.

Jerry Gates used his senior design project to address the problem of maintaining a comfortable room environment in the campus Computer Center. A heat gain analysis on the facilities indicated that a 39% heat gain existed from sources that included people, lights,

equipment, sunlight, and heat stored in the building walls.

Initial design of temperature control systems considered chill water, evaporation coolant, and a convertible roof system. The final design involved individual systems for each room in the Computer Center with allowance for individual control linked to demand.

A torsional fatigue testing machine was developed by Jeffery Horgan and John Shoff to demonstrate torsion to a 1/4" metal sample measuring time to failure and the degree of torsion. The final project had to be small enough to be used in the existing lab space.

To complete the project, Horgan and Shoff had to design, fabricate parts, assemble, and test the machine. While much of the material was available for construction, Horgan and Shoff warned juniors not to underestimate the time necessary to complete the project. Metalworking skills were an essential part of this project.

Upgrading an existing piece of lab equipment was the goal of Robert Carbrey, Timothy Rentschler, and Andrew Webb. The subsonic wind tunnel was tested and improved. Documenting their project with slides and overhead transparencies, this design group explained their testing and modification to the power transmission and fan blades and the improved performance of the tunnel following design implementation. While the overall wind velocity of the tunnel improved, the objective of achieving laminar and turbulent air flow eluded the design group. Citing problems with smoke accumulation in the observation chamber, they suggested that this may serve as a future field of study for another design group.

Conceived as an opportunity to utilize all of the skills acquired while at Penn State at Harrisburg, the senior design project presentation serves as the capstone of four years of endeavor for the Engineering student. Considering the importance placed upon the course by the Engineering faculty, it is unfortunate that attendance by junior MET students was so low. Many of the presentations made suggestions and conclusions of considerable value to future students in MET 442. Several groups stressed time management, adequate research, and experience in metalworking as key elements to a successful project.

Going to the Movies?

The following movies will be shown in the auditorium at 7:00 p.m. on the following dates:

Movie	Fri.	Sun.
"Back to School"	3/13	3/15
"Fx"	3/20	3/22
"Ruthless People"	3/27	3/29
"Cat's Eye"	4/3	4/5
Cheech & Chong's "Up In Smoke"	4/10	4/12
"Star Trek I"	4/17	4/19
"Caddy Shack"	4/24	4/26

Sponsored by: The Resident Assistants
Funded by: SGA & SUBOG
Admission: \$1.00

ATTENTION BSN CLASS OF 1987.

The Air Force has a special program for 1987 BSNs. If selected, you can enter active duty soon after graduation—without waiting for the results of your State Boards. To qualify, you must have an overall "B" average. After commissioning, you'll attend a five-month internship at a major Air Force medical facility. It's an excellent way to prepare for the wide range of experiences you'll have serving your country as an Air Force nurse officer. For more information, call

Capt Tom Moerschel
1-800-USAF-REC

AIR FORCE

