STUDENT PROJECTS

2008-2009

- Senior Design
- Senior Projects
- Internships
- Diploma Thesis Projects
- Thesis Projects
- Graduate Programs Projects

Friends of MSOE:

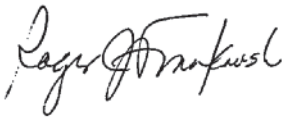
Our students' hard work is a source of great pride at MSOE. We encourage you to visit the MSOE campus to see their projects, find out more about the university and to converse with advisors or students directly.

We also encourage you to suggest project ideas, offer assistance to future student projects and create internship opportunities within your organization. Communicate any such opportunities in writing to Sue Miller, executive secretary to the V.P. of Academics Office. She will forward your suggestion to the appropriate department chairperson.

Sue Miller, Executive Secretary
V.P. of Academics Office
MSOE
1025 North Broadway
Milwaukee, WI 53202-3109
(414) 277-7190
miller@msoe.edu

If you submit suggestions or ideas, they need to be received by Aug. 10 to be considered for the 2009-2010 academic year. Include a brief description of any senior design project, class project or internship position along with the name, address and telephone number of the person to contact regarding the idea. Project ideas submitted for engineering courses must have a significant design component.

Thank you for your continued interest in the work of MSOE students.



Roger J. Frankowski, Ph.D.
Vice President of Academics

Senior Projects

The following list of senior design projects, class projects and internships, compiled with the help of the academic department chairpeople and program directors, represents an important segment of student academic activities conducted during the 2008-2009 year. A variety of projects were completed, some for outside organizations and some for the benefit of MSOE. Some of the projects involved student teams, while others were the work of individual students.

MSOE has a very strong relationship with industry, and many senior design projects often originate in companies where students work as interns. Senior engineering students work in teams on senior design projects, which most students begin planning in the spring of their junior year. The students, with the help of a faculty advisor, usually define the projects.

Most senior design projects run through the fall, winter and spring quarters. In the fall, design teams define a design problem, identify several alternative solutions and develop a project plan for evaluating the possible solutions and solving the problem. Students develop a thorough project proposal, often working with the MSOE Institutional Review Board. The winter and/or spring quarters emphasize design, where students draw from their previous knowledge, specifically from their specialty courses. At the end of the design project, students are expected to have produced complete project documentation and written reports, and oral presentations are required.

Business, management and technical communication students are required to participate in an internship with a company or organization as part of their curriculum to gain practical experience in a work environment that relates to an area of their career interest. Internships allow them to experience the realities of their professions, and to apply the skills they have learned in the classroom in real work situations.

Nursing students complete senior research projects. Working with staff nurses, nurse administrators and physicians, they work to implement a change in some aspect of the health care process.

Student Projects
Schedule and Building Locations

Architectural Engineering and Building Construction Department (pages 3-10)
Saturday, May 16
11:30 a.m. - 1:30 p.m.
Todd Wehr Auditorium, 1047 N. Broadway

Rader School of Business (*Projects not on exhibit.)* **(pages 11-18)**

Electrical Engineering and Computer Science Department (pages 19-30)
Friday, May 22
10:30 a.m. – 3:30 p.m.
Walter Schroeder Library, 500 E. Kilbourn Ave. (CE, EE, EET, and SE projects)

Fred F. Loock Engineering Center, 912 N. Milwaukee St. (BE projects)

Kern Center, 1245 N. Broadway (outdoor EE projects)

Mechanical Engineering Department (pages 31-46)
Friday, May 22
Noon - 3 p.m.
Kern Center, 1245 N. Broadway

School of Nursing (pages 47-51)
Friday, May 22
Noon - 2 p.m.
Kern Center, 1245 N. Broadway

Technical Communication *(Projects not on exhibit.)* **(page 52)**

Architectural Engineering and Building Construction Department

All AE/CM undergraduate senior projects will be displayed at an open house Saturday, May 16, 2009, from 11:30 a.m. to 1:30 p.m., in the Todd Wehr Auditorium.

Architectural Engineering and Construction Management Student Projects

The bachelor's degree in architectural engineering and the bachelor's degree in construction management senior project is a pseudo-design/build project involving a client, faculty team and professional construction mentors. The project teams are composed of students from the architectural engineering (with design specialties in building structural, building environmental and building electrical) and construction management programs. The one-year project starts with programming and includes the design concept through development, working drawings and construction management. The design process includes architectural engineering systems selection and analysis. Construction management includes construction methods, project feasibility, estimating and cost analysis, and project scheduling. Presentation and communication skills are reinforced by the formal presentations to a jury consisting of the client and construction industry representatives.

Section 1 – Corporate Office Building for McCarthy Building Co.
Student Teams: A, B, C

McCarthy Building Co., one of the nation's largest and premier builders, wishes to construct a new office building in the St. Louis area. The building will replace their current building and consolidate and house three divisions into one structure. The three building users include McCarthy Midwest, MC Industrial and the McCarthy Corporate Headquarters. A site was located by McCarthy near their current office building. The building will be designed and constructed with a 20 percent growth/expansion plan. The development is required to be a LEED Silver structure in a design-build project delivery method. The proposed development will satisfy the following requirements:

1. A best value design-build budget of $16.5 million must be met
2. Designed for expansion of 300 employees
3. A two to three-story building
4. Incorporating the McCarthy brand in the design
5. Exceeding ASHRAE energy standards by 30 percent
6. Providing training and other necessary support spaces

The students will need to communicate with the owner representative on a weekly basis and be required to make presentations through an internet connection and Web cam when necessary.

Section 2 – New Headquarters for BCI Group
Student Teams: D, E, F
The challenge this year is to design a LEED Gold office/warehouse facility for the BCI Group to replace their existing building in the city of Racine, Wis. This new facility will include a warehouse with an outdoor storage area, office space for BCI and a tenant, plus room for expansion.

The site for this project is approximately four acres in the town of Sturtevant, Wis. in the Renaissance Industrial Park. The budget is approximately six million dollars.

Team proposals will show variations in budget, site size and configuration based on each team's interpretation of the design program. The design-build project delivery system will be used by the project teams.

Section 3 – The North Powerhouse Site Brewery Works Inc.
Student Teams: G, H, I
Project Details:
The property is located in the north sector of downtown Milwaukee and is part of the Park East Corridor Redevelopment District. This urban site offers significant opportunities for site development and building design. The site is highly visible from all sides and is fronted on the east by an existing river walk. The new Manpower International Corporate Headquarters is located immediately to the north, and the Time Warner Building serves as a prominent community anchor to the south. Due to current marketplace conditions, the client has instructed the three teams to design a new building with varying functional uses. The completed designs will allow the client to evaluate the options and the best use of the site, when a final project is initiated in the future. Each of the three teams prepared a detailed program for one of the following functional uses: an apartment building that will include underground parking and other support functions; a mixed-use apartment and office building that will include underground parking and other support functions; and an office building that will include underground parking and other support functions. Total area pending the specific building uses: approximately 85,000 - 100,000 gsf. Number of stories: four to five.

Section 4 - Six Points Neighborhood
Student Teams J, K, L
This project is Phase 3 of revitalizing the Six Points Neighborhood located on the corner of 66th St. and Greenfield Ave in West Allis, Wis. The client, Toldt Development, has charged the students with developing the site using three different buildings, one for each of the teams in the section. The buildings are mixed-use structures with commercial space as well as residential spaces above, and each building has one unique feature such as a parking structure or a restaurant. The three teams worked together to make sure each of their buildings fits together with the others for proper use of the site.

Student Team Members

Section 1

Team A	Team B	Team C
Geocentric Design Group	**Summit Enterprises**	**Olympic Design**
Dave Angove (CM/PM)	Mark Berger (CM)	Tony Horacek (CM)
Jordan Lipp (CM)	Stephen Schmitz (CM/PM)	Jason Sevener (CM)
Elizabeth Zakelj (CM)	Derek Burdick (CM)	Jeff Schwasinger (CM/PM)
Alison Bernero (S)	Andrew Blau (S)	Heather Christensen (S)
Garret Lund (S)	Russell Richard (S)	Ryan Schreiber (S)
Andrea Hedin (S)	Joel Vande Boom (S)	Jesse Schuh (S)
Ryan McNally (EV)	Jared Blayney (EV)	Jay Kaiser (EV)
Kelly Washick (EV)	Louis Vanden Bush (EE)	Tim Kaebisch (EV)
Nicki Bloedorn (EE)		Kathryn (Lucy) Myers (EE)

Section 2

Team D	Team E	Team F
Arcanum Associates	**Diversified Design Group**	**Total Building Design**
Andy Goetz (CM/PM)	Chris Byers (CM)	Kevin House (CM/PM)
Scott Mueller (CM)	Kyle Schmocker (CM/PM)	Danelle Ziegler (CM)
Bradena Fisher (S)	Michael Hector (CM)	Doug Grewe (CM)
Chris Cichon (S)	Danielle DeTennis (S)	Brett Diggins (S)
Tory Struck (S)	Justin Stuchlik (S)	Jonathan Syvertson (S)
Kristen Brastad (EV)	Kevin Cutts (S)	Zach Kremer (EV)
Michael Carrillo (EV)	Adam Ruys (EV)	Jason Nenonen (EV)
Allison Friedli (EE)	Zach Goldsworthy (EE)	Cymon Jude (EE)

Section 3

Team G	Team H	Team I
Visionary Design & Construction	**Hyperion Design & Construction**	**Conventus Design Build**
Dave DeMeuse (CM/PM)	Matt Geier (CM)	Michelle Joers (CM/PM)
Emily Knowlen (CM)	Shawn Schneiker (CM/PM)	Brian Wozniak (CM)
Timothy Moser (S)	Amie Maennena (CM)	Adam Wojcik (CM)
Daniel Ford (S)	Jason Goike (S)	Andy Goldschmidt (S)
Charles Grochala (S)	Joe Gullo (S)	Jessica Helmin (S)
Joy Cirilli (EV)	Adam Messing (S)	Kevin Kaiser (S)
Matt Stefan (EV)	Chris Dent (EV)	William Mak (EV)
Kelly Kornel (EE)	Yiu Ting Lu (EE)	Francis Paretti Jr. (EV)
		Jeff Thiel (EE)

Key: (S) Building Structural Systems, (EV) Building Environmental Systems, (EE) Building Electrical Systems, (CM) Construction Management

Section 4

Team J	Team K	Team L
Intergrated Design & Construction	**Solid LLC**	**Precision Arch, Eng & Construction**
McCoulter Eaton (CM)	Jacob Voelker (CM)	John Rhodes (CM/PM)
Andy Schmitz (CM/PM)	Chris Schwab (CM/PM)	Paul Wyszkowski (CM)
Chad Kucik (CM)	Ryan Nutt (CM)	Josh Fenske (S)
Josh Anderson (S)	David Mattox (S)	Jackie Brunette (S)
Brian Norby (S)	Daniel Neumann (S)	Kyle Tielens (S)
Brian Pfeifer (EV)	Ryan Imbach (EV)	Erika Glapinski (EV)
Heidi Roatch (EV)	Adam Rhode (EV)	Nicholas Cleaver (EV)
Mike Mocchi (EE)	Ashley Degner (EE)	

Key: (S) Building Structural Systems, (EV) Building Environmental Systems, (EE) Building Electrical Systems, (CM) Construction Management

Faculty Advisors

Jeffrey Bateman – Fire Protection
Aaron Block – Plumbing
Jim Delain – Heating, Ventilating, and Air Conditioning
Michael Emmer – Senior Project Coordinator
Richard Eschner – Architecture
Dave Grassl – Heating, Ventilating, and Air Conditioning
Michael Hassler – Fire Protection and Plumbing
Joe LaMonte – Plumbing
Tim Larson – Electrical
Robert Lemke – Architecture
Michael McGeen – Architecture
Dudley Outcalt – Electrical
Jayme Radomski – Fire Protection
Chris Raebel – Structural
Gaurie Rodman - Architecture
Rachel Rueckert – Heating, Ventilating, and Air Conditioning
Douglas Sauer – Electrical
Jeff Saunders – Heating, Ventilating, and Air Conditioning
Bob Schumacher – Structural
Doug Stahl - Structural
Chris Ulm – Electrical
Blake Wentz – Construction Management
Jeong Han Woo – Construction Management
Ann Woodhull – Structural

Construction Mentors

Nate Keller, J.H. Findorff & Sons (Team A)
Bob Woloszyk, Pieper Electric (Team B)
Ben Goetter ’00, Mortensen (Team C)
Andy Reahm ’01, Catalyst Construction (Team D)

Chris Schmidt, CD Smith (Team E)
Jim Gamon, J.P. Cullen & Sons (Team F)
Mike Jahner '05, Marquette University (Team G)
Matt Mehring '04, Anderson-Ashton (Team H)
Nick Teichert, Total Team Construction (Team I)
Tom Heinrich '99, Oliver Construction (Team J)
Adam Arndt, CG Schmidt Inc. (Team K)
Dave Rhoda '00, KBS Construction (Team L)

Master of Science in Structural Engineering (MSST) Student Thesis/Capstone Projects

Title: Novum Structures' Free Form Structural System: An Evaluation of the Beam-Node Connection
Student: Kevin Kolodziej
Date: Nov. 17, 2008
Advisor: Dr. Doug Stahl

Title: Comparison of Modeling in Metal-Plate-Connected Wood Roof Trusses
Student: William Moorhead
Date: Jan. 20, 2009
Advisor: Dr. Doug Stahl

Title: Interaction of Bond and Bearing for Headed and Hooked Reinforcement
Student: Daniel Nordling
Date: Feb. 3, 2009
Advisor: Dr. Richard A. DeVries

Master of Science in Environmental Engineering (MSEV) Student Thesis/Capstone Projects

Production of Electrical Energy and Heat from Gas Microturbines Using Biogas: Waukesha Wastewater Treatment Plant Case Study

Student: Brian Tierney, B.S. Architectural Engineering/M.S. Environmental Engineering

Advisor: Professor Steve Arant

The Waukesha, Wis. Wastewater Treatment Plant (WWTP) flares most of the biogas produced in the plant's anaerobic digester. Only a small amount of the gas is used in the plant for building heat during colder months. The WWTP could use its biogas to generate electrical power either for in-plant use or for return to the electrical grid. Either of these options may benefit from financial incentives offered for renewable power, and may help meet Wisconsin's Renewable Portfolio Standard. This capstone project will address alternatives to the current practice of biogas flaring by evaluating the use of microturbines for combined heat and power generation (cogeneration), and evaluate life cycle costs and pollution prevention benefits for such a system, at the WWTP.

Arsenic Removal from Drinking Water in Torreon, Mexico, by Chemical Precipitation

Student: Pablo Garza, M.S. Environmental Engineering

Advisor: Dr. Frank Mahuta

Arsenic in drinking water is becoming a health problem for many cities around the world. The city of Torreon, Mexico, obtains its drinking water from a groundwater aquifer containing levels of arsenic approaching 100 ppb. This concentration is significantly in excess of the EPA's maximum contaminant level (MCL) for arsenic in drinking water of 10 ppb. The objective of this capstone project is to evaluate the removal of arsenic from Torreon's drinking water by chemical precipitation using ferric salts (iron co-precipitation). The project will evaluate the capability of iron co-precipitation to remove arsenic to below the MCL limit. Laboratory bench-scale treatability studies will be conducted to determine the values of ferric chloride dosage and pH required to achieve maximum arsenic removals. This capstone project will also evaluate life cycle costs and pollution prevention benefits for such a system in Torreon.

Urine Source-Separation and Recovery: Strategies for Implementation in the United States

Student: Laura Anthony, B.S. Architectural Engineering/M.S. Environmental Engineering

Advisor: Professor Steve Arant

Nitrogen, phosphorus and potassium—nutrients necessary for plant growth—are all found highly concentrated in urine. Farmers in the United States currently purchase synthetic mineral fertilizers to get these needed nutrients for their crops. Urine in the United States is typically mixed with other wastes prior to treatment and disposal, making it difficult to recover the nutrients in urine for use as fertilizer. Several countries, including Sweden and Switzerland, have implemented urine source-separation technologies in order to capture these nutrients. Source-separation includes the collection, treatment, transport and distribution of urine to needy crops or plants. The process begins when urine is diverted from fecal waste and water via urinals or special toilets. The diverted urine flows to storage tanks where it can be treated. Finally, the urine is transported and applied to arable land as needed.

Evaluation of the Effects on the Fox River of the Effluent from the Waukesha Wastewater Treatment Plant in Terms of Fecal Coliforms

Student: Anthony Steffel, B.S. Architectural Engineering/M.S. Environmental Engineering

Advisor: Professor Jeff MacDonald

The Waukesha Wastewater Treatment Plant utilizes ultraviolet (UV) radiation as a means for disinfecting their plant effluent between May 1 and September 30 of each year. The plant has experienced instances over the past few years of flows that have exceeded the capacity of their UV system, thus having to bypass a portion of the effluent past the UV system where it then combines with the disinfected effluent and is released into the Fox River. This is a violation of Wisconsin State Statue and the plant's permit with the Wisconsin DNR. The DNR has given the plant a grace period to allow them to evaluate the effects of the plant effluent on the Fox River and to determine a solution to the disinfection problem, or to disprove that a problem exists. This capstone project will include the design of a monitoring program to assess a mass balance of fecal pollution in the Fox River from upstream to downstream of the plant's effluent outfall. This can then be used to assist in a full evaluation of the effectiveness and necessity of their UV system.

Developing Elements of an Environmental Management System that Addresses Hazardous Waste Generation at Milwaukee School of Engineering

Student: Laura Jarmuz, M.S. Environmental Engineering

Advisor: Dr. Carol Diggelman

An environmental audit conducted at Milwaukee School of Engineering (MSOE) in late 2008 identified several violations of the Resource Conservation and Recovery Act (RCRA), which regulates hazardous waste generation and disposal. While the violations were addressed as required, MSOE would like to investigate implementation of a system to prevent recurrence of any violations. Environmental management systems (EMS) have been used to manage environmental requirements in industry, and have been adapted for use in academic settings. The capstone project will evaluate EMS in place in other academic institutions around the United States, as well as recommend an EMS model for MSOE and design certain key elements of the EMS.

Effluent Injection Into the Deep Sandstone Aquifer in Waukesha County

Student: Ryan McVeigh, B.S. Architectural Engineering/M.S. Environmental Engineering

Advisor: Professor Kathi Ried

Waukesha County pumps its drinking water from wells drilled down to the deep sandstone aquifer. Population increases over the past 100 years have caused the removal of water to exceed the ability of the aquifer to replenish itself. This has caused a cone of depression in the water table that is up to 500 feet deeper than the standard water level. As the water level drops, high concentrations of radium are occurring in the deeper water, and the water is becoming less potable. Once the water is removed and used, it is sent to the Waukesha Wastewater Treatment Plant, and the treated effluent is released into the Fox River. This project evaluates the cost and design of pumping the effluent back into the aquifer, provided it is cleaned to drinking water standards. This would replenish the water that is removed, and could help the aquifer recharge itself.

Rader School of Business

Undergraduate Diploma Thesis

Gunnar Droescher – Actuant Corp., Butler, Wis.

Topic: Development of a generic model for international relocations under consideration of the North American Free Trade Agreement for the purpose of standardization within Actuant.

Advisor: Prof. David Tietyen

Marko Striedieck – Pflow Industries, Milwaukee

Topic: Optimization and relocation of work areas and implementation of standardized work instructions in the assembly and shipping departments of an industrial lift manufacturer under consideration of Lean Manufacturing principles.

Advisor: Dr. Thomas Schuppe (ME)

Fabian Geisler – Huf North America, Milwaukee

Topic: An analysis and development of a visualization and evaluation tool to deal with customer schedule fluctuations.

Advisor: Dr. Bruce Thompson

Alexandra Rexin - Huf North America, Milwaukee

Topic: Development of a proactive strategy to minimize customer schedule fluctuations focusing on the interaction of sales with the internal and external supply chain contributors

Advisor: Dr. Bruce Thompson

Alexander Klemann – Strattec, Milwaukee

Topic: Optimization of the die-cast change-over process on the 40 ton and 125 hot chamber machines under the consideration of Lean Manufacturing.

Advisor: Prof. David Schmitz

Christian Junge - Strattec, Milwaukee

Topic: Analysis of the potential market segments for a new lock cylinder.

Advisor: Prof. Salvatore Agnello

Jeannette Jaeger – Krones Inc., Franklin, Wis.

Topic: Production scheduling and Lean Manufacturing as methods of resolution to expand bottlenecks in a job shop environment.

Advisor: Prof. David Schmitz

2008 - 09 Undergraduate Internships

Robert Kester - Business Process Intern - American Family Insurance, Madison, Wis.

I reported to the quality and planning director in Madison at the national headquarters. I worked with planning specialist on business case development and cost benefit analysis and assisted project managers in completing documents for priority discussions and would recommend changes as part of a team. Working in project management, one would need to understand project criteria to make value-based decisions.

Adam Kirchner - IT Manager - Stone Fire Pizza Co.

I worked alongside our business analyst to put together projects on what is important to analyze. We also manage and organize spending and sales. We determined patterns in sales and reasonable explanations for them. We also worked with the general ledger and placed the expenditures in the correct expense accounts. The other team I worked with was sales, using demographics of the area to tap into resources in the community to advertise or brand to people.

Mick Payton - Client-Services Intern - Harley-Davidson Motor Co.

My job responsibility included level 1 and level 2 help desk support, taking phone calls and walking customers through issues. I also did hands-on support of various computer equipment and applications and had the privilege of interacting with nearly all areas of the company. This was due to the fact that IT plays a large role in operations of the company.

Allison Balistierri - Leasing Consultant/ Technology Trainer - English Meadows Partnership

My responsibilities entailed data entry, legal paperwork, processing applications including running and interpreting credit reports, training the properties on the computer, organizing, setting up appointments with tenants and contractors, organizing turn arounds for moving out and moving in, scheduling our maintenance and cleaning staff, deciding what work needed to be done in the apartments and around the complex, and corresponding with the appropriate contractors and writing various letters/memos responding to inquiries, questions and problems.

Matt Morgan - Marketing Manager Assistant - Davis Direct Marketing

I assisted with my team, ran promotional events, market research, sat in on conference calls and meetings. I assisted around the office in any way they needed help.

Matt Lietzan - Field Sales Coordinator - Harley-Davidson Motor Co.

My responsibilities were to manage marketing and business plans for dealerships throughout the country. I interacted with a few people throughout the organization with my manager and two team members. We managed, created, tested and edited business and marketing plans for dealerships.

Andrew Voigt - Administrative Internship - Carlson Tool & Manufacturing Corp.

I used Made2Manage, a business system designed for manufacturing operations. Created and updated databases in Access. I generated preventive maintenance sheets for every machine in the plant and 5-S scorecards and other high importance spreadsheets in Excel. I created standard operating procedures, completed quoting for current and potential customers, performed various shipping/receiving paperwork and worked in accounting doing invoicing and cash receipts. I created job packets for the machine operators and flyers for events and marketing purposes.

Lucky Allen - Network Technician - Metavante Corp.

I was the primary contact for the IT help desk and was responsible for basic troubleshooting of system problems and escalating requests to appropriate technical personnel for problem resolution. I logged all help desk calls into the help desk tracking system, investigated, analyzed and resolved hardware problems on desktops, laptops, PDAs, printers and peripherals (including those involving the monitor, power supply, CPU, memory, keyboard, mouse, etc.) and then repaired or contacted the warranty provider for maintenance.

Lue Yang - Workstation Support Intern – Harley-Davidson Motor Co., GIS Client Services

I handled first- and second-level computer support for the assembly lines as well as office customers. In addition, I would troubleshoot PC issues as well as assist customers with application questions, imaging and deployment of PCs. I dealt with Harley-Davidson users on all management levels on a daily basis as well as outside services suppliers.

Travis Hoffman - IT Intern - Horizon Retail Construction Inc.

I was responsible for maintaining the current help desk support log, assisting with the set up and deployment of equipment to new office and field employees and assisting with installing upgrades, repairs, movement and replacement of desktops, laptops and peripherals. I provided effective end user PC support over the phone and in person for more than 150 employees in the field and over 100 in the office, then provided training to end users as well as create and maintain documentation. I assisted with major IT projects and business initiatives.

Ashley Kimball - Research Assistant for Institutional Reporting - MSOE

I provided statistical data about Milwaukee School of Engineering (MSOE), did research projects for my supervisor Len Vanden Boom and assisted with institutional reporting and data analysis. I worked with a variety of internal departments at MSOE to develop statistical data about the school. Some internal groups I worked with were marketing, human resources and enrollment. Some of the external groups I dealt with included Integrated Postsecondary Education Data System (IPEDS) for the U.S. Department of Education, Engineering Workforce Commission, Princeton Review and the National Science Foundation.

Aaron Renzelmann - Webmaster - Expedition Outdoor Supply

My main responsibilities were to manage the company's Web site and keep information up to date while designing a new flash-based Web site in the background that will be released once the owner feels it is appropriate. We are talking about implementing more of the store products into the Web site so customers can specifically see what Expedition Outdoor Supply (EOS) has in its inventory.

Bernis Stewart - Powerplant Supervisor (Maintenance) - We Energies

I am a maintenance supervisor for a 1,100 mega-watt power plant. I am the team leader for ash handling and fuel preparation. I have 14 direct reports. I manage the budget, people and work for my project team. I directly interact with asset managers, maintenance managers, the director of fossil operation and power traders.

Dan Koenig - Global Purchasing Intern - Johnson Controls

For the most part, I help my supervisors track the quality of our suppliers. I also help track the savings within our department and compare it to our annual goals. Another task I am responsible for is creating RFQ for suppliers. This is a very involved process because I have to use SAP to figure out usages, prices, forecasts, etc. I then have to access internal databases to pull specification sheets on different parts.

I had the opportunity to participate in special projects within the company as well. For example, I had to create a commodity strategy and present to many of the executives in the Supply Chain department. This project took a couple of months because I had to contact different suppliers and other engineers, sourcing managers and buyers all over the world.

My most recent project was working to figure out what management can do differently to improve scores on the annual employee engagement survey. The survey is done annually and asks employees how they think operations are being done and how they are being treated by their managers. Overall, my main responsibilities have to do with savings, quality and putting together RFQs. I do get the opportunity to branch off and do work on other special tasks as well.

Justin Kissinger - Marketing and Advertising - Custom Equipment

My job responsibilities are to prepare marketing plans, including budgets, for advertising, tradeshows and promotional materials to determine where to advertise, to develop advertisements, to determine what tradeshows to attend, design tradeshow booths, develop and maintain website, and to supply customers with market materials.

Erik Gumm - Network Administrator - Ladish Forging

My job responsibilities are, but not limited to, end user support, managing and maintaining the network, replacing/upgrading switches, cables, and computers, maintaining and servicing the phone system including replacing/upgrading phones and the installation of new phone lines.

Doug Klosiewski - Systems Engineer - NightHawk Radiology Services

My duties are to build and maintain servers, manage Milwaukee site backups, install and configure hardware in our Milwaukee office and Chicago Data Center, support NightHawk Radiology staff when system issues arise, troubleshoot office network issues and order hardware and maintain inventory for the Milwaukee office and Chicago Data Center.

Blake Manz - Marketing and Public Relations Intern - MSOE Marketing and Public Relations

My duties included creating and administering the official Facebook group for MSOE, advertising MSOE on free advertising sites, writing for *Dimensions* magazine, creating and researching writing assignments for the MSOE newsletters and assembling layouts for various marketing projects.

Kyle Carstensen - IT Development Program Mainframe Team - Navistar International

I am able to try out different sections of IT such as Windows, Linux, Mainframe and Networking, but for this internship I am on the Mainframe Team. I help monitor servers and am also the troubleshoot guy, as well as the webmaster. The main aspect of my job is to monitor servers and be alerted if there are any problems. When problems arise, I either try to fix the simple things or alert the correct team that there is a problem with their servers and it needs to be fixed immediately. Another job I have been working on since I started my internship is a program that does all the monitoring and alerts by itself which will eventually make no need for a mainframe team. Another part of the mainframe team is collecting information and creating reports that make sense to a business!

Charles Hillen - Manager - Jimmy Johns

I directly supervise a varied group of employees. I am also involved with decisions that can directly impact the efficiency of the store. I am responsible for running the store, ordering produce, keeping track of inventory, designing the schedule, keeping track of paperwork and auditing it for integrity. I am in contact with the owners of the store on a daily basis, and we have frequent meetings outside of work to discuss logistics. I also am required to keep track of labor on my shifts to make sure that we are not going over 26 percent.

Zach Molner - Marketing Intern - CertaPro Painters

As a marketing intern I had many responsibilities. For the marketing side I helped make fliers that we put into mail boxes. I would then put them together and then someone would take them around in subdivisions putting them in all the mailboxes. Then about two days after that I did cold calling, usually for about three hours a day. During the other five hours in the day I worked in the office, putting together pamphlets. I also answered phone calls from customers or businesses and helped resolve their questions or problems.

Master of Science in Engineering Management Thesis Titles

Title: Reducing the Costs of Stress in Organizations
Student: Elizabeth Beasley
Date: March 2008
Advisor: Dr. Steven Bialek

Title: A Definitive Approach to Outsourcing Aircraft Maintenance
Student: Jeff Weaver
Date: May 2008
Advisor: Richard Edwards

Title: Knowledge Management in the Construction Industry
Students: Shauna Boyer, DeAnna Leitzke and Michael Siwek
Date: July 2008
Advisor: Dr. Paul Hudec

Title: Implementing a Collaborative Workplace to Support Knowledge Management in Product Development at Harley-Davidson Motor Company
Student: James Braun
Date: July 2008
Advisor: Gene Wright

Title: A Project Involving a Small Manufacturing Company
Student: Don Gooden
Date: July 2008
Advisor: Dr. Tom Schuppe

Title: Necessovation: Applied Strategies for Integrating Innovation with Necessity
Student: Louis Bruner
Date: Nov. 2008
Advisor: Gene Wright

Title: The People Capability Maturity Model®: Analysis and Application
Student: James R. Grant
Date: Nov. 2008
Advisor: Curtiss Peck

Title: Ice Rink Management and Youth Recruitment: A Study of Youth Development Strategies in Speed Skating
Student: Mark Jeter
Date: Nov. 2008
Advisor: Dr. David Howell

Title: Service Delivery: Managing Horizontal Relationships in a Vertical Organization
Student: Josh Tillman
Date: Nov. 2008
Advisor: Dr. Paul Hudec

Title: Risk Analysis Methods for Research and Development Projects
Student: Rob Bertz
Date: Jan. 2009
Advisor: Gene Wright

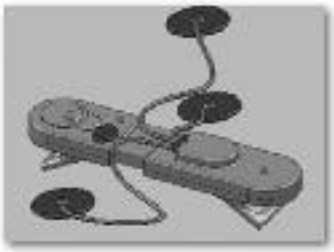
Title: A Framework for Collegiality, Communities of Practice, and Knowledge Management Within the Global Enterprise
Student: Scott Bose
Date: Jan. 2009
Advisor: Dr. Paul Hudec

Electrical Engineering and Computer Science Department (EECS)

All EECS design projects will be displayed Friday, May 22, 10:30 a.m. – 3:30 p.m. in the Walter Schroeder Library (L), the Fred F. Loock Engineering Center or the Kern Center. Specific room numbers are listed with each project description.

Biomedical Engineering Design Projects

Real-time Wireless Premature Infant Monitoring System
Project Manager: Andrew Bublitz (BE)
Associate Project Manager: Nathan Grams (BE)
Engineer: Brian Wallace (EE)
Advisor: Dr. Samantha Jacques
Location: S-366



Current technology trends are surpassing current healthcare innovations at an increasing rate, and one of the most prominent technologies that has yet to make a foothold in hospitals is wireless data transmission. For the past four years our team of engineers has been developing a wireless innovation for Neonatal Intensive Care Units (NICUs) that will drastically increase the efficiency and effectiveness of doctors and nurses caring for and treating neonatal infants. Our product acquires the heart rate, respiratory rate, and core temperature of a neonatal infant and transmits the data using a Bluetooth® connection in a real-time manner. Bluetooth® is a common wireless technology in the majority of computers, PDAs and cell phones currently on the market, and our device can link up with any of these devices and present real-time encrypted and password encoded data from the neonatal infant to the display. The product's mobility is enhanced with a rechargeable power source that outlasts the competition by more than four hours and eliminates the need to continually buy replacement batteries. The design also improves access to the critical areas of the infant needed for treatment and diagnosis by eliminating the power cord and using a three lead ECG measurement. The double band design allows for the system to be used on any size and shape of infant without reducing the quality of the acquired data. Our product has been designed to maximize the efforts of both the doctors and nurses with their daily routines in the NICU and consequently saves the hospital much needed funds.

Self-Adjusting Ankle Brace
Project Manager: Dane Van Domelen
Associate Project Manager: Leanne Ausprung
Engineer/General Manager: Olaf Rogness
Advisor: Dr. Samantha Jacques
Location: S-325

Successful recovery from a lateral ankle sprain often requires the use of several different ankle braces during different stages of rehabilitation. During the initial time period after the injury, a highly restrictive ankle-foot orthosis, or walking boot, may be implemented to severely limit lateral ankle movement. As the ankle heals, progressively "softer" braces are used to gradually return function to the patient. Using multiple braces is costly, and current braces require periodic manual adjustments by the user in order to maintain support, as they tend to loosen and shift out of place over time. The present design of a self-adjusting ankle brace features a closed-loop control system with inflatable air bladders, pressure sensors, a miniature air pump, and a solenoid valve to monitor and maintain the application pressure between the side plates of the brace and the ankle. Additionally, the pressure level can be specified by the user, thus giving the user control over the stiffness level of the brace. In summary, the self-adjusting brace ensures that a constant level of support is provided during activity, and allows the user to specify that level of support based on the severity of injury and current stage of rehabilitation. Once complete, the self-adjusting ankle brace will function as an effective, versatile product that can be used exclusively during ankle sprain rehabilitation.

Phrenic Nerve Pacing System
Project Manager: Sarah Waite
Associate Project Manager: Amy Green
Engineers: David Brody, Matt LaValley, Dan Miller
Advisor: Dr. Samantha Jacques
Location: S-327

The main goal of the Phrenic Nerve Pacing System (PNPS) is to replace the mechanical ventilator in order to reduce negative side-effects and recovery time for patients. In a PNPS system, the phrenic nerve is stimulated via an implanted electrode, which causes the diaphragm to contract, and induces breathing. The proposed system incorporates a specialized feedback loop based on the individual patient response to the stimulation waveform. To begin the feedback cycle, initial patient parameters are used and the stimulation signal is adjusted automatically until the optimal patient PCO2 level and ventilation rate are achieved. The proposed project here is to develop the feedback control device and test the same with a specifically designed Human Response Simulation Program (HRSP). This way the loop, which contains the feedback control device, and human simulation program can be tested and compared to the known and expected results.

Wireless Surgical Instrument Tracking System
Project Manager: Brian Head
Associate Project Manager: Peter Feilen
Engineers: Nathan Duhnke, Shane Rismeyer
Advisor: Dr. Samantha Jacques
Location: S-365

Each year in the United States alone, 3,000 to 5,000 surgical patients have a surgical instrument left inside them upon conclusion of a surgical procedure. This problem greatly impacts patient safety, including the ability to heal in a timely manner post-operation. One current method practiced is manual counting of instruments before and after a surgical procedure. Some institutions use x-rays taken after a procedure, which is costly to the patient and the institution alike. As such, the current methods have proven to be timely, costly, and an inefficient use of hospital staff. Additionally, factoring in the time and money spent on repeat operations and legal settlements, it is easy to see how this current problem costs U.S. health institutions in excess of one billion dollars annually.

The Surgical Instrument Tracking System (SITS) is intended to create a new and technologically advanced operating room. In order to automate instrument counting and replace the post-surgery x-ray, radio frequency identification (RFID) technology is utilized. This allows for the real-time tracking of each surgical instrument using a unique identifier with quick and reliable results. In order to determine placement of an instrument, a seamlessly integrated antenna is placed along the perimeter of the surgical table, and the antenna reads a tag on each instrument. The individual identification tag contains information that is monitored in real-time through a central computer system and by hospital staff who are present in the room. This system provides instantaneous feedback of instrument location before, during, and after the operation.

Computer Engineering/Software Engineering Design Projects

Wireless Integrated Interactive Camera (WIICAM)
Team Members: Nik Karpinsky (SE), Bharath Kudaravalli (CE), Tyler Pausma (SE), Tony Sericati (CE), Ben Shoemaker (SE)
Faculty Advisor: Professor William Barnekow
Sponsor: Plexus
Location: Library

The goal of the WIICAM project is to create an interactive robot that can take commands and stream video across existing network infrastructure. This robot is different from any others because its goal is to make the user feel that they are not just controlling a robot, but that they are actually part of the robot, seeing what the robot sees and moving how the robot moves. The WIIBot uses an existing 802.11 wireless infrastructure to connect and communicate to a laptop, which displays video to the user. The next level of interaction comes from the use of a Nintendo WiiMote. Using the WiiMote gives the user an unparalleled level of interaction with the WIIBot, allowing the user to feel more like a part of the robot than just someone who is controlling it.

Peggasus
Team Members: Kenny Gregory (CE), Brett Peppler (CE), Jasher Perry (CE), Brian Seniuk (CE)
Faculty Advisor: Professor William Barnekow
Location: Library

Our project was to design and create a real-life version of a game based on Peggle™, which currently exists only in the digital world. Peggle™ is a puzzle type video game created by PopCap Games®. Its basic premise is to clear a playing field of different colored pegs with X number of projectiles, with corresponding pegs giving you higher and higher scores. The game is comparable to Plinko or Pachinko, but unlike these games, once pegs are struck by the projectile, they disappear from the playing field. Our goal was to have a user control the launch of a projectile into the playing field comprised of the background and the pegs. Once the pegs are struck, their point values are assessed, and the struck pegs are retracted back into the board at the end of play. Game play is completed when the user is able to clear the entire playing field of pegs, or runs out of projectiles.

Technologically Secure Display Case
by The Jewelry Thieves
Team Members: Scott Chamberlain (CE), Riley Johnson (CE), Durrell Purdy (CE), Adam Wrobel (CE)
Faculty Advisor: Professor William Barnekow
Location: Library

In the current era of technology, item security has improved greatly; yet year by year, associations and alliances still report high grab-and-run thefts, distraction thefts, break-ins and other types of theft. We have designed a secure display case that is protected against these threats but at a much lower price than current security technology. Infrared light emitting diodes (LEDs) detect if there is a clerk attending the case and if a person's hand is obstructing the sliding window's open or close operation. Also, radio-frequency identification cards (RFID) will be used to unlock the case, since the program does not allow unidentified employees to operate any function on the case.

Abrasion Hologram Printer
Team Members:
Team Leader: Mike Miller (CE), Software Engineering
Project Manager: Daniel Wrachford (CE), Embedded Engineering
Quality Control: Spencer Kennedy (ME), Mechanical Engineering
Faculty Advisor: Professor William Barnekow
Sponsors: Seven-Mile Fair, Caledonia, Wis., and Plexus, Neenah, Wis.
Location: Library

"Abrasion holography" is a method of making 3D holograms on acrylic or metal surfaces without using lasers. Instead, the method involves "scratching" extremely fine arcs onto a planar surface. The holograms are able to be viewed when a bright point-source of light (such as the sun or a flashlight) is shined toward the surface. The light reflects off the curves, producing one "point" of light per curve. Based on the position, radius and length of the arc, the position of this point of light can be controlled in three-space, appearing above or below the surface and moving as the user changes point-of-view just as a real three-dimensional object would.

This project involves producing a computerized system to create these arcs by controlling a mechanical scratching arm. Although hand-made abrasion holograms have been made in the past, no system has ever been made to interface with computer-modeled three-dimensional designs and automatically "print" them onto a surface. First, PC software programmed using C# imports 3D files from standard CAD software and renders equivalent arcs using vector-based calculations. Then, the resultant holographic image is printed with a precise five-axis mechanical device. The mechanical device is coupled to the PC software via an insulated digital signal processor (DSP) running embedded Linux.

MADCAP Robot

Team Members: Doug Anson (CE), Ryan D. Erickson (CE), Ben T. Malchow (CE), Chaning Ogden (CE), Ryan A. Piaskowski (CE)
Faculty Advisor: Professor William Barnekow
Location: Library

Our primary project is to implement an embedded systems robot to showcase potential course studies at MSOE. The implemented design will display subject matters of circuit design, low level software design and external peripheral interfacing. The main focus of use will be for open houses, curriculum based visitor tours and any public media related demonstration of the EECS programs offered at MSOE.

Our design incorporates a microcontroller-based system as well as an x86 based computer. Peripheral devices include a camera mounted to servo motors, so it can be rotated in any direction. The robot has four geared motors to drive the wheels and is controlled wirelessly from the PC with a software suite we created. The wireless technologies we are using include Zigbee and 802.11 G. Video from the robot is also transmitted wirelessly to the PC that is controlling the robot. Bi-directional audio is sent between the PC and the robot in order to communicate with anyone around the robot from the control station. Lastly, the robot is able to track and follow specific colors of objects we place in front of it.

Bike Tracker

Team Members: Akshat Vasudev (CE), Eric Beales (CE), Anthony Gray (CE), Dan Winch (CE)
Faculty Advisor: Dr. Mark Sebern
Sponsor: Harley-Davidson
Location: Library

The goal of our project is to incorporate technologies such as GPS and web-based control into a motor vehicle. Our ambitious project aims to provide the motorcycle owner not only with live updates on the motorcycle's location, but also with the ability to remote start, disable starting, and view a trip as a series of images using our on-board camera. Our project aims to provide support for mobile devices in a secure manner.

Bugstomp.net
Team Members: Adam Hartman (SE), Robert Herold (SE), Kyle Malloy (SE), Ryan Nelson (SE)
Faculty Advisor: Dr. Mark Sebern
Sponsor: Darrin Rothe
Location: Library

What is a "bug stomp?" A bug stomp is a fun and entertaining timed software testing competition where teams find defects in a given application to compete for prizes and boasting rights. The goal of this project is to create a web application to allow any user to hold a bug stomp competition. Our system will support and streamline functionality required for the administrator, judge, and contestant user roles. It uses the new ASP.net Model View Controller framework from Microsoft as well as many other useful and innovative technologies.

Dragondrop
(A Real-Time Task Management System)
Team Members: Grace Bolanos (SE), Joshua Fasching (SE), Matt McAnelly (SE), Erich Schroeter (SE)
Faculty Advisor: Dr. Mark Sebern
Location: Library

The Dragondrop project aims to solve the human factor (i.e., procrastination, forgetfulness and prioritization) problem involved in task management. The basis of the project is to store user tasks. In order to accomplish this, we are allowing users to store and retrieve tasks through existing technologies, such as web browsers and cell phones. These technologies give the user the ability to access our system from an environment they are comfortable with, rather than learning to use a new one.

The project varies from existing task management systems, such as Outlook, by presenting the user with task management strategies created by experts in personal organization. The system will offer functionality that will enable users to better organize and complete their tasks. Dragondrop attempts to help users with the often overlooked problem of completing tasks rather than simply keeping track of them. We like to call this "solving the human factor."

Radio Frequency Inventory Tracking System
Team Members: Thomas Erickson (CE), Dan Fischer (SE), Brian Semrad (SE), Matthew Zeman (SE)
Faculty Advisor: Dr. Mark Sebern
Sponsor: Milwaukee School of Engineering Walter Schroeder Library
Location: Library

The purpose of the RFID Inventory Tracking System project is to create a tool for the Milwaukee School of Engineering's Walter Schroeder Library that will help with the tracking and locating of books. The library currently has a system that informs the employees whether a book has been checked out or checked in. When in the checked in stage, a book is assumed to be in its correct location on the right shelf. This tool is designed to allow the library staff to locate any book (down to the shelf) at the last checkpoint. A checkpoint is created whenever the reader is taken around the library, scanning all the shelves and books. This allows less wasted staff resources typically lost on searching for books that have been misplaced as well as allowing a simple way to inventory the library's collection of books.

Electrical Engineering Design Projects

Instrumentation and Controls for SAE Formula Hybrid Car
Team Members: Nathan Bahr, Jason Kothrade, Matthew Peppler, Sam Sheeks, Sam Yost
Faculty Advisor: Dr. Stephen Williams
Location: Outside of the Kern Center

The Instrumentation and Controls team is a subgroup of the 2009 SAE Formula Hybrid Car project. The main purpose of the Instrumentation and Controls team is to assist in designing and building a competition-ready car with the specific focus of creating a driver interface and meeting all electrical safety rules and regulations. Ease of use and simplicity are the main focus points for the driver interface. This interface includes systems such as the brake pedal, accelerator pedal, speed display, and battery voltage display. The team is also responsible for ensuring that the vehicle adheres to the strict safety regulations set forth in the 2009 SAE Formula Hybrid Rules. This is accomplished through the design of a high voltage warning system and an emergency stop system.

H.O.M.E. System
Team Members: Nick Gibson, Jim Murray, Ben Neher, Tim Richmond, Chris Thuss
Faculty Advisor: Dr. Steven Reyer
Location: Library

The Home Office Mobile-Network Extender (HOME) is a landline replacement solution that allows the user to make and receive phone calls using their existing cordless phones. This allows for the convenience of a home phone network without paying for landline phone service. This product will be competing with two existing solutions on the market that complete the same task at a higher price premium. The HOME System has two interfaces. It connects to a cell phone using Bluetooth® and connects to the home phone network using a standard RJ11 phone cable. The design consists of a microcontroller that controls the operation of several components within the circuit that work together to transfer digital information obtained from the cell phone using the Bluetooth® module to analog information that is output on an RJ11 cable and vice versa.

HVAC Energy Harvester
Team Members: Jason Pries, Dan Rumler, Matthew Schmidt, Craig Schultz
Faculty Advisor: Dr. Stephen Williams
Sponsor: Johnson Controls
Location: Library

Many heating, ventilation, and air conditioning (HVAC) systems control the airflow through the ductwork based on feedback from wireless sensor networks that monitor quantities such as temperature and pressure. Currently, these networks are powered either through wired connections or batteries, both of which have drawbacks. The wired solution has significant installation costs. In addition, the notion of using wired connections has become increasingly outdated by the proliferation of wireless technology in recent years. The battery powered solution is more flexible, but has a shortened lifespan and increased maintenance costs as compared to the wired solution.

The abundance of renewable energy that exists within HVAC systems presents energy harvesting as a novel technique for powering sensor networks. HVAC Energy Harvesters (HVAC-EHs) combine the longevity of wired power with the flexibility of battery power by placing small wind turbines inside a duct system. The energy extracted from the airflow within the ducts is used to power temperature sensors and charge super capacitors that act as energy storage devices. Although it is designed with a specific sensor in mind, the HVAC-EH system could serve as an effective power source for any low power wireless sensor capable of running on 2.5 Volts.

Formula Hybrid Electrical Drivetrain
Team Members: Tim Carlson, Randy DeCoster, Ryan Jipp, Jeff Kazmierski
Faculty Advisor: Dr. Stephen Williams
Location: Front of Kern Center

The Formula Hybrid Electrical Drivetrain team is one of multiple subgroups on the MSOE Formula Hybrid race car project. The goal of the overall project is to design a hybrid technology race car to compete in an official Formula Hybrid competition. This subgroup specifically is responsible for the electrical systems pertaining to the drive train system of the vehicle. This involved design, fundraising, construction, and testing of multiple subsystems that are essential for the vehicle's operation. These include the vehicle's accumulator, motors, controller, rectifier units and intersystem wiring.

The Brew Crew's Automated Brewing System
Team Members: Eric Butzler (EE), Jordan Engedal (EE), Ed Thiry (ME)
Faculty Advisor: Dr. Steven Reyer
Location: Library

The automated brewing system allows the brewer to control the brewing process via an easy-to-use touch screen interface. Geared more towards the microbrewers, brew pubs and larger scale home brewers, the automated brewing system enables large scale brewing to be done without the need of more than one or two brewers. The brewing system utilizes programmable logic controller (PLC) technology to control the different aspects of the brewing process. Having both hardware and software implemented safety features, the system meets federal regulations in the areas of electricity and water hazards and food industry standards. The automated brewing system produces a non-alcoholic brew that can be consumed, or can be fermented if the brewer so chooses.

Meter Parking System
Team Members: Floyd Bayiha, Kadi Guiro, Todd Lane, Erin Reeves, Rob Van Den Berg
Faculty Advisor: Dr. Steven Reyer
Location: Library

There is a need for a cost effective and efficient city parking system that will improve the monitoring and flow of street parking. The Meter Parking System will improve the quality of city street parking by providing an efficient monitoring system utilizing sensors and wireless technology that allows for individual parking space surveillance to determine the period of time a car has been parked. Upon time expiration for any given space, the system will notify city parking personnel of the offense and the spot occupancy so that personnel

will only proceed to ticket spots where offenders are present. The system will also provide the meters the ability to reset time allotted to spaces upon the departure of cars whose time had not yet expired.

Electrical Engineering Technology Design Projects

The Green Blade

Team Members: Mike Brown, Dan Gottschalk, Jason Hicks, Jason Ruffalo
Faculty Advisor: Dr. Richard Kelnhofer
Sponsors: Texas Instruments and Tripp Lite
Location: Library

Many new age electronics, like home audio/video equipment and computer peripherals, draw power when they are in their standby modes. These components, called vampire electronics, can account for up to 13 percent of a household's annual power consumption. The purpose of this project is to design a wireless control system capable of switching power on and off on multiple remote power strips to reduce the amount of standby power. Switching will be time and date programmable based on user entered inputs on the wireless controller. Energy savings through the use of this product will more than pay back the cost of the system in less than two years.

Remote Synchronization to WWV
Team Members: Cooper LaFond, Jacob Marsh, Frank Schramke
Faculty Advisor: Dr. Richard Kelnhofer
Location: Library

Remote synchronization to a time standard is often performed with either GPS or a calibrated time source. Both options can be costly and in some locations ineffective due to terrain and weather. GPS requires line-of-sight to several satellites which is not always possible in heavily wooded or mountainous areas. Calibrated time sources will drift without regular recalibration. An alternative is to use the National Institute of Standards and Time (NIST) radio broadcast of the national time standard. The most common NIST signal used is that of WWVB which is used to synchronize consumer "atomic clocks." However, NIST also broadcasts its time standard on a 100 Hz subcarrier from WWV in Boulder, Colorado. WWV is broadcast in the high frequency (HF) region; therefore, reception can potentially be much farther than WWVB. WWV also provides audio information regarding propagation conditions, the time, and reference frequencies. This project's goal is to design a radio receiver capable of capturing the national time signal and audio information on the 5, 10, and 15 MHz WWV broadcasts.

W.A.V.E. (Wireless Audio/Video Equipment)
Team Members: Joe Hessel, Chad Kubly, Steve Midcalf , Andy Oehlke
Faculty Advisor: Dr. Richard Kelnhofer
Location: Library

Project W.A.V.E. will enable users who own multiple entertainment systems the ability to quickly and conveniently switch between systems. This will be accomplished by designing a hub that accepts up to four audio/video sources (each source having standard RCA jack signals – two audio and one video) from entertainment systems and transmit the signal wirelessly to receivers that will be connected to the video monitors. Also, a switch within the hub allows for simultaneous output of one or two sources. The switch can be operated either manually through a human-machine interface located on the hub, or wirelessly via a remote control.

Team S.O.L.A.R.
Team Members: Anthony Delaney, Charles Kirby, Nicholas Smith, Justin Tracey
Faculty Advisor: Dr. Kishore Acharya
Sponsor: Global Solar Energy Inc., Tucson, Ariz.
Location: Library

Today's golf courses offer no environmentally friendly way to supply energy to golf carts. The primary means for charging the batteries electrically is from a standard 120V power outlet. With an increasing concern for today's environment and the need for alternative energy, we have designed a system utilizing solar energy to charge the golf cart batteries while in use. In order for the consumer to get the most functionality out of the onboard computer, a scoring system is incorporated using Visual Basic. Data acquisition is utilized to display voltage and current levels produced by the solar panels on the onboard computer. This design will provide the user with valuable insight regarding the benefits of alternative energy.

Portable Party Power
Team Members: Richard Hamalainen, Fred Lueneburg, Gerald Reuter, Thong Vang
Faculty Advisor: Dr. Kishore Acharya
Location: Library

We live in a mobile, well-connected society dependent on iPods, laptops, cell phones, and PDAs. Electronic devices do not carry enough power for extended periods of time. When people stray from their home power outlets, there is a need for a moderate-sized power source to recharge electronic devices and also operate small120V appliances during outdoor activities. This mobile power mimics household AC power by using a battery bank capable of delivering up to 800 watts for 1 hour. This battery bank will be rechargeable via automobile auxiliary DC jack, or home outlet. This portable system will also have a solar panel to utilize green energy and be rechargeable without other sources of power.

Mechanical Engineering Department

All mechanical engineering design projects will be displayed on Friday, May 22, 2009, Noon -3 p.m. in the Kern Center, Rosenberg Pavilion, 1245 N. Broadway.

Industrial Engineering Student Design Projects

UPS Customer Counter
Students: Brittney Christensen, Jason Sheffer
Advisor: Dr. Thomas Schuppe

United Parcel Service (UPS) delivers packages to business and residences worldwide. UPS wants to improve customer service at it's Elm Grove, Wis. facility. Due to erratic customer arrival rates, customer waiting times are long while employees experience excessive idle time during slow periods. Worker scheduling was done without regard to actual customer demand. The goal of this project is to reduce customer wait times, customer service times, and increase worker efficiency. To reach this goal, design options were developed and tested using an experimental design implemented in a simulation model. Critical factors were identified along with specific settings for these factors. This resulted in three promising designs that reduced customer time in the system by 15 percent to 30 percent. Additionally, by rescheduling workers to match customer arrival rates, labor costs were reduced by 21 percent. Due to these labor savings, the cost of implementing these solutions would be paid back in only 62 work days.

Facility Layout Redesign at Magnetek
Students: Chris Maramba, Nthabeleng Monese
Advisor: Dr. Charlene Yauch

Industrial engineering students analyzed the electrification goods production process of Magnetek to assist Magnetek's facility layout planning needs. The major objectives were to develop a cellular layout for electrification goods manufacturing and to determine which high-volume parts to store within the cellular layout in order to reduce production lead time by 25 percent. Using the Simplified Systematic Layout Planning methodology, several layouts were developed and justified. Two layouts were recommended, one with pendant production and one without, and each reduced average travel distance by at least 35 percent. Each layout contains the storage space for point-of-use inventory, which allows for the elimination of twelve non-value added processes. The point-of-use inventory in the recommended layout with pendant production relocated was calculated to potentially reduce Magnetek's production lead time by 32 percent, resulting in an average savings of $18,126 per year.

Mechanical Engineering Student Design Projects

Self Sustaining Scoliosis Spinal Correction Device
Team: Biomedical
Students: Matt Rutz (ME), Joshua Spitza (ME)
Faculty Advisor: Dr. Robert Rizza

The implementation of a self-sustaining spinal correction device can be regarded as a breakthrough in technology. Current methods of correction involve fastening screws and rods to the spine and undergoing major surgery every 3-6 months for adjustment. It is apparent from the existing spinal correction methods that the medical field is in great need for an advanced correction device. The scope of this project involved designing a safe, biocompatible, light weight, low volume force generating device that was to be used for pushing the deformed spinal column to a straighter shape. This new device was designed to exploit the properties of fluids through the use of a piston cylinder. The device was found to easily generate the required force while maintaining the utmost strength. In addition to successfully meeting the force requirements the device was designed for minimum total weight (0.64 lbs), smallest in volume (approx. 4.25 in^3), and highest strength (titanium). This device proved to be an exciting step towards the improvement of current methods both from an engineering and clinical perspective.

Appreciation is extended to: Dr. Liu and Children's Hospital of Wisconsin

Electric Hovercraft
Team: Ervy Greenwaldt (ME), Alex Rubash (ME), Mike Borkowski (ME)
Advisor: Dr. Robert Kern

The final design and prototype is a proof of concept that an electrically powered hovercraft is feasible. Existing hovercrafts are conventionally powered by small four stroke engines that produce substantial noise, vibration and emissions. Replacing the standard engines with electric motors virtually eliminates all three problems. The little amount of noise and vibration that is produced by the motors is easily suppressed by the excellent damping characteristic of the composite hull material. The added weight of the battery system was a challenge that was addressed by using modern lightweight composite materials to reduce the overall weight of the craft. The end result was an electrically powered hovercraft that has excellent versatility and performance while showing that new green technologies can be equally thrilling as their 20th century counterparts.

Appreciation is extended to: Lawrence J. Brown and Raymond W. Jordison of Hover-shuttle for their services and donation that allowed the project to be successful.

Harley-Davidson Intake Optimization Project
Team: Cones
Students: Ben Bichler (ME), Zach Fosse (ME), Kyle Heyrman (ME), Jeff Kowalchuk ME), Kyle Rate (ME)
Advisor: Dr. Robert A. Kern

Harley-Davidson is a staple of Milwaukee and millions of people all over the world ride their motorcycles. However their engine design is more concentrated on the sound and feel of the engine rather than performance. This project will look at increasing air flow through the intake and thus increase volumetric efficiency. Two numerical models will be used for analyzing the intake system, an incompressible "slug" model and the compressible wave motion "characteristics" model. Using these models, an ideal intake system was designed for the Revolution engine. A test stand was also created and fully instrumented in order to run tests on the engine. The results of these models were compared to data collected from sensors on the engine to determine the model accuracy. This experimental setup can be used for other engineering coursework to study unsteady systems as well as high speed data acquisition instrumentation.

Appreciation is extended to: Harley-Davidson, Milwaukee School of Engineering

SAE Baja

Team: Hammerzeit
Students: Dan Beck (ME), Mark Danielson (ME), Jeremy Egert (ME),Dan Goray (ME), Jake Frederick (ME), Kyle Jacobs (ME), Brandon Kresol (ME), James Lerner (ME), Cheng Zhang Li (ME), Jan Manke (ME), Mike Nelson (ME), Sameer Pai (ME), Frank Pizzitola (ME), Tom Proney (ME), Freddy Roed (ME), Kai Rohwedder (ME), Heather Sotelo (ME), Sandy Schuppner (ME), Bob Tech (ME), Steve Waas (ME)
Advisor: Dr. Mathew Schaefer

The objective of this project is to design and build an off-road vehicle that can tackle any terrain ranging from mud pits to rocky inclines. Intended for sale to weekend enthusiasts, this vehicle design must protect the driver and abide by the rules and regulations established by SAE all while providing a fun experience. This year the team concentrated on redesigning the power train, chassis, rear suspension, and braking system. Once the design is complete, funds are raised, and a prototype is built, the team travels to Burlington, Wis., to compete with more than 120 of the nation's best schools.

Appreciation is extended to: Speedy Metals, Wayne Haynes, Lerner Family, Signicast Corp. and Timken Co. for supporting this project.

SAE Formula Hybrid

Team: The Knack
Students: Efrem J. Blaha (ME), Stephen R. Bosshart (ME), Andrew E. Carlson (ME), Robert L. Coehoorn (ME), Anthony R. Corners (ME), Benjamin C. Fenske (ME), Brian D. Goodwin (ME), Kristopher J. Holley (ME), Thomas C. Kasprzycki (ME), Christopher R. Kipp (ME), Brandon M. Klos (ME), Chad H. Kuiper (ME), Ryan N. Lampe (ME), Dominic B. Maio (ME), Anthony S. Mente (ME), Nicholas J. Zepnick (ME), Timothy J. Carlson (EE), Matthew A. Peppler (EE), Samuel H. Sheeks (EE), Ryan B. Jipp (EE), Randy A. Decoster (EE), Jeffery Kazmierski (EE), Sam Yost (EE), Nathan Bahr (EE), Jason Kothrade (EE)
Advisors: Dr. Christopher Damm, Dr. William Carnell, Dr. Steve Williams

The MSOE Society of Automotive Engineers (SAE) Formula Hybrid provided the opportunity for students to work together as a team to design, build, test, and race an efficient race car. This team competes in two acceleration races, an endurance run, and an autocross race per the SAE Formula Hybrid Regulations. In addition to race results, the team is also judged on engineering design, fuel economy, and an oral presentation. Formatted as a senior design project, the Hybrid team is composed of mechanical and electrical engineering students that are working in conjunction to develop a competition ready vehicle. This year's vehicle consists of two Direct Current motors, an engine generator set, and six lead acid batteries in a series setup to improve manufacturability and efficiency. This international competition will be held at the New Hampshire Motor Speedway in New Hampshire on May 4 - 6.

With respect to the electrical system, the 36V generation unit for the vehicle is rectified and paralleled with two battery banks containing three lead acid batteries per bank. The 36V DC bus of the combined energy sources powers the motor controller unit. Based on the pedal location, the motor controller outputs a pulse width modulated waveform to two parallel configured permanent magnet brushed DC motors. Incorporated into the system are battery bank shutoffs for battery protection, multiple 36V rectifiers in parallel, and a freewheeling circuit for coasting.

The goal of the suspension team was to design, manufacture, and test a complete and operational suspension system to support the designed vehicle with the goals of: meeting specific SAE regulations, providing adequate cornering and maneuverability, ensuring driver safety for a variety of incidents and easily integrating into the remaining vehicle systems. A double wishbone suspension system with uprights machined using a full CNC process was designed to meet these design criteria. The complications involved in designing this type of suspension present considerable design obstacles while providing superior performance to the vehicle.

The Instrumentation and Controls team is a subgroup of the 2009 SAE Formula Hybrid Car project. The main purpose of the Instrumentation and Controls team was to assist in designing and building a competition ready car with the specific focus of creating a driver interface and meeting all electrical safety rules and regulations. Ease of use and simplicity were the main focus points for the driver interface. This interface included systems such as the brake pedal, accelerator pedal, speed display, and battery voltage display. The team was also responsible for ensuring that the vehicle adhered to the strict safety regulations set forth in the 2009 SAE Formula Hybrid Rules. This was accomplished through the design of a high voltage warning system and an emergency stop system.

Appreciation is greatly extended to our sponsors at: Briggs & Stratton, Hayes Brakes, Kohler Co., Rockwell Automation and Zepnick Custom Machine.

Splash Down Cooling

Team: I Dream of Exergy
Students: Hector Baez (ME), Jacob Cramer (ME), Kim Detert (ME), Dan Janssen (ME), Joshua Jenswold (ME), Chris Schulte (ME), Matt Tyler
Advisor: Professor Michael Swedish

In the 1965 T.V. sitcom "I Dream of Jeannie," NASA astronaut Major Anthony Nelson's one-man space capsule made an ocean landing near a deserted island far away from the planned capsule recovery area. After the capsule drifted to the island, Major Nelson stumbled upon a strange bottle, where he curiously removed the cork, and from a stream of pink smoke appeared a genie. As his first wish, he asked that he could be rescued off of the island, and with one blink from Jeannie, a NASA recovery helicopter appeared. Unfortunately for most astronauts, the chances of a genie rescuing them from the hot, humid conditions in the ocean are slim to none, which is why ensuring the capsule is equipped with an efficient cooling system is of such high importance.

This project focuses on the design of such a cooling system based on the specifications provided by NASA. Even after an ocean splashdown, it remains necessary to keep both a space capsule's crew and components cool to avoid system failures and potentially dangerous conditions. The design team was challenged with developing a new system to accomplish this that is lighter and safer than NASA's current ammonia evaporation design. So far in the project, several ideas ranging from older proven refrigeration techniques to new, undeveloped ideas for cooling systems have continued to show potential for success. This report is an in depth description and documentation of these systems and provides an overview of the project's total progress.

NASA Exploration Systems Mission Directorate Higher Education Project

Team: Regolith
Students: Nick J. Green (ME), Garret B. Hampel (ME), Roderick C. Wilson (ME)
Advisor: Professor Michael Swedish

The object of this project was to continue the research of the past senior design team, which was interested obtaining the apparent thermal conductivity of lunar regolith simulant. The results that they obtained were questionable due to some issues associated with their design. These issues were identified, corrected and more reliable apparent thermal conductivity values were obtained. Through research several factors which affect the apparent thermal conductivity of regolith were identified. The affect that these factors had on the apparent thermal conductivity was quantified.

Autonomous Lunar Regolith Excavation Robot

Team: MSOE Regolators
Students: Katrina Barhouse (EE), Keegan Ford (ME), Matt Gross (ME), Jake Lynch August (ME), Nate Mathiot (ME), Matt Potratz (ME), Paul Pribyl (ME), Jean-Yves Schneider (EE), Noah Schwalbe (ME), Josh Severson (ME), Luis Tulcanaza (ME)
Advisor: Dr. William Farrow

Lunar regolith, commonly referred to as lunar soil, has been recognized as a valuable resource. Therefore, there is a need for a safe means of harvesting the material considering limited manpower resources. The MSOE Regolators have the task of designing, building and testing a robot that is capable of excavating the regolith without any human intervention. The design problem is further complicated by the fact that the regolith has very unique properties. Lunar regolith consists of very abrasive particulate matter that, when disturbed, can create a 'dust cloud.' In addition, the moon's surface exhibits a density gradient where the regolith is very loose on the surface, but becomes more compacted with increasing depth. After much discussion and analysis, the Regolators have designed a robot that will overcome these difficulties, as well as meet the specifications laid forth by the Regolith Excavation Challenge rulebook. The entire robot is driven by a dual track system and must navigate through a box containing lunar regolith simulant and various obstacles. The robot will employ a chain driven bucket conveyor system that excavates the material and then transports it to a hopper. The robot must then be capable of travelling up a ramp and depositing the excavated simulant into a collection bin. It is the team's hope that, if conducted, the robot will be competitive at the Regolith Excavation Challenge 2009.

Appreciation is extended to: Dorner Manufacturing Corp., Weimer Bearing & Transmission Speedy Metals.

M.A.R.R.S. Multi-Axled Rock Retrieval System

Team: MARRS Project Team
Students: Niles Fetter (ME), Greg Kramer (ME),
James Rankel (ME), Jacob Wiskamp (ME)
Advisor: Dr. Mohammad Mahinfalah

NASA has completed extensive research into the environment of the planet Mars, with an ultimate goal of determining if the planet is capable of supporting human life. After successful collection of soil samples from the Phoenix Lander; the next step is to collect rocks for further analysis.

The Multi-Axled Rock Retrieval System is a vehicle designed to collect rocks on the surface of Mars. The prototype designed and constructed by the MARRS Project Team participated in the 2009 ASME student design competition, Mars Rocks!, on April 17. The design competition guidelines stipulate that the contest course will be a flat section of floor that will contain obstacles as well as rocks to be collected. The vehicle must surmount the obstacles, retrieve the rocks and bring them to a designated drop-off spot. After the rocks are collected the vehicle must return to the starting location. The contest is timed; with a maximum of four minutes allowed to complete the course. Different rock locations correlate to different point values; collecting the furthest rocks will be worth more points. Also the accuracy of the rock placement will increase the score. Points are subtracted for vehicle weight, vehicle power requirements, course penalties, as well as completion time.

The MARRS prototype is a six wheeled radio controlled vehicle designed to accomplish the design challenge while conforming to specifications stipulated by ASME.

Appreciation is extended to: Brett Peppler (Senior CE), Channing Ogden (Senior CE) and Professor Barnekow for helping with vehicle control, Jerry Kurhan from Butters Fetting for donating materials, Dr. Rizza for FEA advice, and Dr. Mahinfalah for his patience and advice over the three-quarter project.

ASME Student Design Competition: Mars Rocks

Team: Venom Fist
Students: Joe Koffman (ME), Mark Moser (ME), Jim Vecchio (ME)
Advisor: Dr. Mohammad Mahinfalah

The 2009 ASME Student Design Competition challenge is to design and build a small radio-controlled vehicle to retrieve rocks from a course and bring them to a designated spot, simulating the retrieval of rock samples during NASA's next mission to Mars. The vehicle must climb over several obstacles composed of 4x4 lumber, pick up several small rocks, and bring them back over the obstacles to a designated drop off location. The vehicle consists of two tracks in the front which are independently controlled for steering and one wheel in the back to increase stability. A bucket in the front picks up the rocks and is capable of carrying all rocks on the course. The vehicle is controlled via a wireless transmitter/receiver link.

Appreciation is extended to: Utility Tool and Machining for their donations and use of facilities.

Clay Pigeon Launcher

Team: Pneumatic Fanatics
Students: Steve Kenney (ME), James Van Essen (ME), David Waystedt (ME)
Advisor: Dr. Mohammad Mahinfalah

The Compressed Air and Gas Institute (CAGI) hosted a contest that challenged students across the country to create an innovative product using compressed air. Due to the lack of monumental breakthroughs in the field, the contest is held in order to educate students of the capabilities compressed air has to offer.

Team Pneumatic Fanatics has developed a clay pigeon launcher that brings innovative ideas to both the pneumatic applications and mechanical engineering fields. Average launchers today can project a target up to 60 mph, which sportsmen and manufacturers have accepted as the ceiling of operation. By experimentally proving that more force can be applied to a target with a distributed load, a rotating CAM profile lever wrapping a band on one hemisphere of the apparatus was designed. The use of a flexible band has not been implemented in the market to this day and with it, 63 percent more force can be applied to the targets without failure. With this new idea, the launcher can project a target over 100 mph while inducing spin necessary to maintain stability during flight. This design powered by compressed air will create new benchmarks for the industry and sportsmen will again be challenged beyond current industry capabilities.

CAGI: Multipurpose Ball Shooter
Team: MBS
Students: Mottakin Salam (ME), Abdullah Khuraibet (ME)
Advisor: Dr. Mohammad Mahinfalah

The design project covers several different aspects of a ball shooter. The ball shooter is intended to shoot tennis balls, baseballs and cricket balls. Each ball has its own unique projectile motion due to the ball mass and different dimensions of the pitch. Therefore, many factors will affect the flight motion during the launch of the projectiles. A MatLab and Simulink programs will be used to calculate the different projectile motion of the three different sports according to the air and ball properties.

The mechanics of the balls inside the ball shooter (i.e. pressure vessel) is a very demanding and important criterion to the designer. It allows the designer to identify the types and amounts of energy transferred in and out of the system. With that information, many different design standards can be modified to carefully secure the design with the minimum areas of failure.

Material selection of the different components the design is composed of is a critical principle that should be recognized. Therefore, different material testing through strain measurements will determine the favorable material to be selected in constructing the design. Experimental Stress Analysis methods will be used to determine the governing equations of the different states of stresses that are present in design. A material test between PVC and aluminum will be performed for pressure vessels calculations.

The design will be constructed using Solidworks. Solidworks allows us to see the flaws of the design before prototyping or building the actual design. Thus, the design can be altered or modified easily using CAD (Computer Aided Design).

Appreciation is extended to: Dr. Mohammand Mahinfalah, Dr. Robert Rizza, Dr. Hu Jim, Mr. Gus, Mr. Sheku Kamara (RPC Rapid Prototyping), Dr. Musto, Mr. Roger Hajny, MSOE Machine Shop, MSOE Fluid Power

Compressed Air Powered Tricycle (CAPT)
Team: WE'VE GOT GAS.
Students: Gary Gundlach (ME), Steffen Hammer (ME),
Danny Jamerson (ME), Derek Ptacek (ME).
Advisor: Dr. Mohammad Mahinfalah

With escalating concerns about global warming, pollution and declining reserves of non-renewable resources, alternative fuel sources are being more heavily considered. To investigate the possibility of compressed air as a fuel source, the CAPT will be designed using an air motor combined with a human powered drive system. The desired outcome is to determine how viable compressed air is

as a fuel source. The project will be submitted to the CAGI Innovation Awards.

A possible application for the CAPT will be for use in a factory where a current mode of transportation is small electric powered vehicles or standard bicycles. Most large factories have extensive compressed air networks which could be used to fill the tricycles tanks. This would eliminate the hazardous batteries which are a bi-product of current vehicles. The CAPT is not limited to factory use; it is also designed to be a recreational device as well as personal transportation for those seeking to minimize their carbon footprint. The CAPT is a zero emission vehicle which we hope will aid in the battle against global warming.

Appreciation is extended to: Jamerson and Bauwens Elec.

Rowing Ergometer

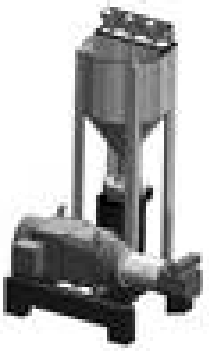
Team: Perfect Stroke Inc.
Students: Chelsey Jelinski (ME), Evan Kausalik (ME), Kory Weed (ME), Jason Yolo (ME)
Advisor: Dr. Vincent Prantil

Rowing is a sport that requires many hours of training before a crew is ready for a race. There are often times that this training must be done indoors on a training machine called an ergometer. The overall goal of this project was to design a rowing ergometer that more realistically models the dynamics and forces experienced on the water in order to provide a better training mechanism for athletes. In order to do this, a hydraulic resistance circuit is coupled with a digital control system which monitors the rower's stroke using a feedback loop and corrects the amount of force on the machine's handle to match a specified training curve. This curve can be easily modified which allows coaches to train their athletes for the type of force application they feel works best. The machine will provide consistent training for each athlete since it will correct each person's stroke to match the set profile. The machine also features pivoting oar handles which can be set up for sculling or sweep rowing, allowing rowers to maintain proper form while they are off the water.

Hydraulic Human Powered Vehicle
Team: Section 4
Students: Bryon Budahn (ME), Matthew Casura (ME), Troy Congdon (ME), Marko Lazarevic (ME), Shawn Lenagh (ME), Frank Ryan (ME), Alan Thompson (ME), Brenton Wehber (ME)
Advisor: Professor Thomas Labus

Section 4 set out to design and fabricate a completely new hydraulic Human Powered Vehicle (HPV). Goals were set with respect to the previous tricycle design as follows. The vehicle was to be the traditional two-wheeled cycle. Close examination of necessary components was to be conducted in an effort to drastically lower the overall weight of the vehicle. The design and implementation of variable pump and motor assemblies were to be conducted in an effort to provide increased maximum vehicle speed capabilities. Re-arrangement of the rider into the non-traditional prone recumbent position was to be carried out in an effort to eliminate unnecessary hydraulic losses within hosing by placing the pump and motor closer together. An automatic control design was to be created for adjusting the pump displacement. All of these goals were to be completed in compliance with rules set in the culmination of the eventual submittal of the vehicle into the Chainless Challenge competition.

Automated Hydraulic Component Test Stand With Emphasis on Fluid Conditioning
Team: Hydraulic Test Stand
Students: Joe R. Nelson (ME), Dan E. Moldenhauer (EE), Chaston T. Scarborough (EE)
Advisor: Professor Thomas Wanke



When testing the performance or endurance of hydraulic components such as pumps and motors, it is important to be able to monitor the contamination level, or amount of foreign particles, within the hydraulic system. Removing built-in contaminants is becoming more important as equipment manufacturers are striving to improve the reliability of hydraulic systems. Manufacturers need to know the amount of contamination that their components can withstand before they fail. The objective of this project is to design and construct a hydraulic pump test stand with an automated fluid conditioning system which will be able to alter the fluid flowing in the test stand according to certain test specifications. This system will keep the test stand at a steady contamination level throughout the test by adding particles and removing particles from the hydraulic fluid as well as utilizing a heat exchanging circuit to keep the fluid at a stable temperature.

Mechanical Engineering Technology – Senior Capstone Design Projects

Design of a Radiator Squaring Fixture
Student: Amir Mahmoud
Advisor: Dr. David Dreifus

Radiators are widely used as heat exchangers for internal combustion engine cooling. To perform acceptably, the radiator core must be firmly bonded to an outer frame during manufacturing. The "core" consists of coolant-carrying tubes bonded to a dense core of fin structures. Furthermore, the core can be easily damaged during the framing process.

This project involved investigating the existing manufacturing process and developing a new design for a squaring fixture. This squaring die design should yield dimensional tolerances within specific limits, as well as improved quality.

Analysis and Redesign of Failed Pipe Guides in Buried Steam Distribution Conduits
Student: Scott Lancelle
Advisor: Professor Stephen Rather

Many of the buildings in downtown Milwaukee (including much of the MSOE campus) are heated by a steam distribution system which is supplied by the Valley Power Plant located in the Menomonee Valley. A common type of construction used in this steam distribution system consists of a steel steam carrier pipe centered inside a buried steel conduit pipe. To allow for controlled expansion and contraction of the carrier pipe, a series of expansion joints and guides are used. A recent failure of this type of construction due to excessive corrosion of the conduit pipe raised questions about the design of the guides. The suspected failure mechanism was destruction of the epoxy coating on the conduit caused by excessive heat transfer through the pipe guide.

This project will attempt to confirm the failure mechanism and propose alternative designs for the guide which will prevent similar future failures. This will be accomplished through materials testing and heat transfer analysis of existing and proposed guide designs using both manual and computer modeling techniques.

Design of a V-Rod Engine Fuel System for Use in a Laboratory Test Environment
Student: Curtis Knight
Advisor: Dr. William Carnell

MSOE has received a donated V-Rod motorcycle engine, including various tuning equipment and accessories. These items were donated so that MSOE can update their labs relating to internal combustion engines analysis.

This project involved the design and equipment specification of a fuel system for this engine. The fuel system is designed to be compatible for gasoline and diesel as well as be flexible enough to use in multiple lab test cells at MSOE.

Swivel Seat Stroller Design
Students: Dawn Fink and Jill Corsten
Advisor: Professor David Gerow

Most parents have strollers to aid in outings with their children. Sometimes a child is crying and can be comforted by seeing the adult. Depending on the direction the child is facing, the sun may be in their eyes as well. In a typical stroller the seat direction is in a fixed position thus not allowing the child to see the adult or for the adult to help shade the child's eyes from the sun. A stroller with a swivel seat design will give the adult the opportunity to have the child facing them thereby calming the child or shielding their eyes from the bright sunlight.

The project developed several swivel seat designs and analyzed them mechanically and economically.

Re-Design of a Commercial HVAC System
Student: Josephine Murkley
Advisor: Dr. Subha Kumpaty

This project focused on improving the design of a Heating, Ventilating and Air Conditioning (HVAC) system in an existing commercial building.

The current system was analyzed using available utility records and equipment specifications. Computer simulations were done to investigate possible design changes.

The final proposal was justified both economically and environmentally by using renewable energy sources where possible.

Small Engine Valve Optimization Study
Student: Chris Drew
Advisor: Dr. Christopher Damm

With new emissions regulations standards driven by the Environmental Protection Agency (EPA), a small internal combustion engine will not be able to meet emissions requirements because of its current intake/exhaust configuration. A new Overhead Valve Engine (OHV) is being developed in order to reduce emissions and maintain the cost benefits of the current design.

This project was focused on the valve design. A four millimeter diameter valve stem has been proposed mainly because of its low cost and a smaller valve stem diameter in prior designs has equated to greater flow because of less restriction. Because of the size, the strength and durability of the valves are in question if they are can survive the desired engine's life.

The exhaust valve opens before bottom dead center causing the valve to be exposed to high combustion chamber pressure as well as extreme heat. Design considerations include the following: material capability, manufacturability, head diameter to stem diameter ratio, dynamic loading, performance, stress and cost. Research, Finite Element Analysis, natural frequency calculations, load calculations, and benchmark comparison studies were used to aid in development of the valve design.

Design of a Motorcycle Luggage Rack
Students: Jeremy Nesthus and R. Jason Veliquette
Advisor: Dr. Joseph Musto

The frame for the 2009 Harley-Davidson Touring motorcycles has been re-designed for stiffness and improved handling. This OE update will drive the change of many accessories including all detachable racks and accessories currently being offered.

Design specifications call for a detachable functional luggage rack, as well as a detachable Tour Pak Rack. However, the need to develop a rack that provides both premium styling and practicality is necessary to satisfy customer expectations.

The design will hold at least 10 pounds of luggage securely and be aesthetically pleasing.

Method of Selecting Tooling for Manufacturing of Plastic Tubes
Student: Vance Bronson
Advisor: Professor Dennis Tronca

To produce plastic tubing by an extrusion process, tooling is typically selected based on historic runs of similar products. Developmental trial runs are made until the desired end product is achieved. This method can be costly, inefficient, and time consuming.

This project developed methods for tool selection by analyzing past manufacturing records statistically. Significant time savings were realized in reduced setup time by using methods to calculate the specific tooling dimensions needed without going through a trial and error process.

Design of a Self-Regulating Air Compressor Control
Students: David Witte and Robert Townsend
Advisor: Dr. Joseph Musto

The design solution is intended to secure a market differentiation between larger volume compressors and the rest of the market. Currently air compressors are a commodity market, with a limited number of oversea suppliers manufacturing the pumps and tanks. Differentiation between each brand is accomplished by repackaging them with a different motor shroud, tank orientation or color scheme. All pressure regulation is currently accomplished by manually turning the regulator knob to increase or decrease the compressors supplied pressure setting. The intent of this project is to allow for a push button pressure setting that automatically adjusts the line pressure to eliminate variations in the pressure delivered to the tool.

Automatic Storage and Retrieval System Exercise
Students: Kyle Bonnett, Mark Schuessler, Tim Schwarz and Josh Vanbommel
Advisor: Dr. John Pakkala

This project focuses on developing specifications for long-distance operation of an automated storage and retrieval system (AS/RS). Long distance operation of such systems is becoming more common as manufacturing has been moved "off-shore."

The MSOE team will be partnered with student teams at two universities in Mexico. The teams will investigate communications and control problems by playing "long-distance" board games that require use of positional logic, such as chess.

Hydraulic Pump Control Re-Design
Student: Scott Kranz
Advisor: Mr. Tim Kerrigan

This project seeks to identify causes of problems in a positive displacement hydraulic pump and develop design changes to cure them. Known problems are external leaks in the pump cases and difficulty adjusting smoothly to "step-up" or "step down" flow rate and pressure changes.

The goals of the project are to fix leaks, reduce the cost of the pump control and eliminate the low frequency "hunting" that occurs during pressure changes within the pump.

Vermin-Proof Garbage Collection System
Student: Alan Watkins
Advisor: Dr. Joseph Musto

Currently many apartment buildings use standard plastic garbage cans to handle household waste. Buildings often use four of these lightweight cans, with additional containers for recycling. The garbage cans are currently stored next to the building on a patio that is also used for outdoor gatherings. Vermin will enter into the garbage cans by either an open lid or chewing through the closed lid. They will then eat and/or relocate trash throughout the property causing unnecessary cleanings throughout the week. This project will focus on addressing the issue of providing the option for homeowners to obtain a vermin impervious garbage handling system.

School of Nursing

All School of Nursing Senior Change Projects will be shown on Friday, May 22, 2009, Noon-2 p.m. in the Kern Center, Rosenberg Pavilion, 1245 N. Broadway.

Student: Bart Davidson

Title: Emergency Department Patient Loyalty and Satisfaction

Most recently within state and national publications, patient satisfaction and loyalty scores have come to the forefront of hospital based acute care. At Aurora Health Care, administration has taken the results to these scores seriously and has implemented a change within specific units which have scored low on these patient satisfaction results. In the Emergency Department in one hospital, patient satisfaction scores have been well below the average results. Based on this critical issue, along with the help of my nurse preceptor and nurse manager, I was able to implement various changes in the emergency department to increase patient satisfaction scores while continuing to deliver safe and competent patient care.

Student: Maggie Reutemann

Title: Emergency Department Ambulance Reporting Improvement Project

This project was created for use in the Waukesha Memorial Hospital Emergency Department, to improve the communication accuracy, speed, and flow of the current ambulance reporting system. This proposal, if implemented, could reduce the door to care response for incoming ambulance patients, by providing all necessary ED (Emergency Department) personnel with a heads-up approach to "who, when, and where", well before the ambulance arrives at the ED door.

Students: Morgan Nelson and Tammi Neville

Title: Spotless Stethoscopes? - Striving for Better Infection Control

Research shows that stethoscopes can be a vector for transmitting infections among patients in the hospital. This project looked at changing and improving the way stethoscopes are cleaned through revising a hospital policy and procedure as well as creating an annual educational/competency requirement for all staff that use stethoscopes. Through education and encouraging staff to regularly clean their stethoscopes, our aim was to reduce the transmission of the spread of infection on stethoscopes and prevent unnecessary patient infection.

Student: Barbara Ferch

Title: Continuous care for patients who need Sitters

My project is implementing a new form onto a general medical floor to improve communication between staff that are sitters for patients. It is important for this unit because currently the staff work off verbal report and a lot of patient information is being left out from shift to shift. I am hoping by implementing this form the staff will provide continuous care to patients and both staff and patients can be safer.

Students: Lisa A. Wos and Cherise C. Rauter

Title: Facilitating Communication to Reduce Hospital Acquired Pressure Ulcers

To assist and facilitate communication within the multidisciplinary teams' efforts to identity, treat, and prevent hospital acquired pressure ulcers. This is important to reduce length of stays and reduce overall hospital/patient costs as Medicaid/Medicare no longer reimburse treatment costs for hospital acquired pressure ulcers as of October, 2008. Our hope is to reduce the number of complicated pressure ulcers acquired during a hospital stay in conjunction with facilitated communication between the multidisciplinary care teams.

Students: Allison Sowinski and Queena Chiu

Title: The importance of patient awareness and education

A new type of "hourly nursing rounds" has been started at Froedtert Hospital which involves nursing staff who do hourly checks on patients to address bathroom needs, pain, and safety. These "hourly nursing rounds" include decreasing the amount of falls which increases patient safety and overall patient satisfaction. Our goal was to improve patient's awareness of this program through education which will facilitate the nursing staff to provide the best quality patient care.

Students: Cathy Brabeck and Raina Adichithara

Title: Making Condoms available at MSOE Health Services

The purpose of this change project is to make condoms available for MSOE students at Health Services as a way to prevent STDs. This change is important because currently, Health Services can only diagnose and treat STDS but not help prevent. As health care providers, our job is not only to treat and diagnose but also to prevent. Health care providers are also key components in providing and advocating the use of condoms. Our hope through this project is to allow condoms for students at Health Services to help to prevent STDs.

Student: David Scottberg

Title: Bridging the Gap

There are people in our community who are often overlooked or left behind in the world of healthcare simply because they do not understand English. I am working with the City of Milwaukee Public Health Department in attempting to facilitate communication between the Spanish speaking communities in the southeast Wisconsin area so that they can be accurately informed of their current communicable disease healthcare status as mandated by the CDC. By being able to inform this community we can hopefully slow or stop the spread of communicable diseases to others.

Student: Terance Chi

Topic: Nurses End of Shift Report at the Bedside

End of shift report is an important part of the communication process that occurs three times in 24 hours at Froedtert (3SW). This project is a description of the implementation of a new system of end of shift report at the bedside that will replace the traditional way of conducting shift report in the conference room. The outcomes of this change will include centralization of patients to the whole process of managing care, fostering patient care as evidenced by a smooth and more accurate shift transition, enhancement of patients' safety since critical information will less likely be omitted during shift report, and last but not least, saving money for the organization as extra time used for lengthy shift reports in conference rooms will be limited.

Students: Sarah Gipp and Katie Zimmerman

Title: Nursing Shift Report Form: A Need for Standardization

Communication is key in nursing, especially during change-of-shift report where vital information about a patient should be communicated. The information provided during this time can allow the nurse to plan patient care and goals for the day. Lack of a standardized format for shift report may result in loss of important information.

The purpose of this project was to create a standardized change of shift report form for the Waukesha Memorial Hospital ICU. Using this form, nurses will be able to streamline their report and it is hoped that it will help to save time when this process occurs. Currently, the report method used is a combination of verbal and taped report. Additionally, a standardized format may help to facilitate introduction of new nurses into the critical care environment by allowing him/her a set format to give or receive report.

Students: Shavonya Wright and Laura Schneider

Title: Improve Communication and Awareness for Patients on Fluid Restrictions

We want to improve communication and awareness of intake for patients on fluid restrictions. This is important because patient's are on fluid restriction for various reasons and if they are getting more fluid than what is ordered by the doctor then it puts them at risk for things like fluid overload, edema, and fluid accumulation in the lung. Our expected outcomes are to prevent fluid overload, and improve communication between nurses, nursing assistants, and family.

Student: Greta Wolfeschmitz

Title: Implementing Oral Mucosa Assessment Documentation on the East 5 Oncology and Bone Marrow Transplant Unit at Children's Hospital of Wisconsin

Most of the clients on the unit have scheduled oral cares but there is no place on the current assessment flowsheet to specifically document an oral assessment. Patients receiving chemotherapy are at a very high risk for developing oral mucositis (stomatitis). Many of these patients are on pain medications and other medications that may decrease oral sensation. Patients with decreased sensation may not be able to identify when he/she are developing sores and other mouth problems. The change project I am proposing to implement relates to the documentation of an oral assessment on all patients that have scheduled oral cares. This assessment would take place once a day, preferably at the noon or four o'clock nursing assessment. It would involve asking the patient if they have any mouth discomfort and then using a flashlight inspect the oral cavity and tongue. If the patient is too young or unable to understand, use a gloved hand to open the mouth and assess. The assessment would be documented in the skin assessment boxes on the purple flowsheet. An example of a documented assessment would be: "oral cavity free from signs and symptoms of infection, no discomfort" or "unable to assess oral cavity" depending on the patient situation. The documentation of the oral mucosa assessment would call additional attention to the importance of oral care for all patients and parents, as well health care professionals.

Technical Communication Internships

March 2008 – March 2009

MSOE Marketing and Public Affairs Department
Student: Amanda Brushafer
Faculty Supervisor: Dr. Steve Bialek

Description: Amanda's responsibilities included updating Web sites that contained statistics about MSOE. During her internship, Amanda also wrote a number of advertorials and stories about MSOE students and their degrees or organizations. One story was published in an edition of *The Wisconsin Independent*, the quarterly newsletter of the Wisconsin Association of Independent Colleges and Universities (WAICU). One of her advertorials was published in the *Waukesha Freeman* and other community newspapers.

Real Time Automation (RTA)
Student: Ashley York
Faculty Supervisor: Jim Friauf

Description: Real Time Automation creates industrial automation systems. Working with network protocols, RTA is able to help companies save money by connecting devices that use different protocols. The small size of RTA (15 employees) creates a culture where each employee feels responsible for the success of the company, and every product is carefully crafted to fit the needs of individual customers. Ashley wrote more than ten high-level papers for RTA during his internship. He also created an on line education program for potential customers. The program explained the features of industrial networking and various protocols. Ashley also created a Web-page template, a quick start guide and a comic-book style newsletter that are in use by RTA.

Milwaukee School of Engineering
1025 North Broadway
Milwaukee, WI 53202-3109
www.mose.edu
(800) 332-6763