

MECHANICAL AND MANUFACTURING ENGINEERING

2007 Student Research Colloquium participation:

Seven presentations, 16 students, 5 faculty sponsors

All graduating seniors participated in the 2007 Student Research Colloquium held in April. They showcased a variety of research and design projects, all undertaken as required in their capstone courses and in collaboration with an industrial partner.

Some partners were Minnesota industries, such as Komo Machine Inc., in Sauk Rapids and Whirltronics in Buffalo. Others were national or international firms, such as BME, the world's third-largest defense contractor which is headquartered in the United Kingdom, and Douglas Scientific, which is headquartered in Hawaii.

The projects included the following:

- Design and production of a fully automated, variable-stroke chop saw and its integration into an existing indexing machine for Alexandria Extrusion's aluminum projects;
- Design of a faster automatic tool changer with increased tool capacity to augment the productivity and flexibility of the routers at Komo Machine Inc., in Sauk Rapids;
- Design of a planar biaxial test system for material properties of natural or synthetic tissues used in medical procedures;
- Non-destructive testing method to find voids and other anomalies in samples of composites proposed for use in ablation shields in a vertical launch system;
- Redesign of the press bed and dies to make die changing quicker and easier for Whirltronics, a manufacturer of lawn mower blades;
- Design of a polymerase chain reaction process for fast, efficient DNA sample amplification;
- Mechanical design system for an unattended ground vehicle (UGV). This vehicle went on to win the General Dynamics UGV competition in April 2007.

Void study earns DMMSRA

"DDG 1000 Program: MK57 Vertical Launch System Composite Void Study" by Marie Melsha earned a participation certificate in the 2007 Denise M. McGuire Student Research Award competition. Melsha's faculty sponsor was Associate Professor Kenneth Miller.

Four write master's theses

- Judith Peters, "Modeling Displacement Ventilation with Energyplus." Adviser: Miller
- Yew Wai Tham, "Lean Techniques for Cost Reduction in a Job Shop Manufacturing Environment." Adviser: Warren Yu
- Raghavendra Nelli, "Quality Connection-Staffing Effectiveness Versus Patient Outcomes." Adviser: Ben Baliga
- Harpreet Singh, "Business Process Re-Engineering and Optimization by Development and Implementation of Information Systems." Adviser: Baliga

Exemplary exam results continue

All seniors who took the Fundamentals of Engineering Exam in the 2006/2007 academic year passed, making it the 12th consecutive year that MME graduates have maintained a 100 percent pass rate on this national exam.

Fluids specialist joins department

Assistant Professor Yongli "Julianna" Zhao, whose research interests include computational fluid dynamics and biofuels, joined MME in fall 2007.

Zhao has master of science degrees from Beijing Jiaotong University and Southern Illinois University at Carbondale. In 2006, she received a Ph.D. from the University of Iowa, where she was a post-doctoral research associate and adjunct professor.

Zhao's interests include computational fluid dynamics (CFD), computational multiphase/multi-scale flow, nano fluid mechanics, particulate transport, particle collision and adhesion, with applications to nano particle/nanotube suspensions in spin coating energy production (biofuel combustion) and to biotechnology, i.e., blood flow and low-density lipoprotein (LDL) models for the treatment of cardiovascular events.

A number of journals have published her research, including the Journal of Fluid Mechanics, Physics of Fluids, Materials and Design. She has also presented her research results many times at Division of Fluid Dynamics of the American Physical Society conferences.

Bantwal "Ben" Baliga, Professor. Ph.D. 2000, Swinburne University of Technology, Australia.
design of experiments, lean manufacturing, plant layout, quality engineering

Certification/Licensure
 Professional Engineer in Minnesota

Andrew Bekkala, Professor. Ph.D. 1990, Michigan Technological University.
automation, control systems, Kaizen, lean manufacturing, robotics

Certification/Licensure
 Professional Mechanical Engineer in California and Minnesota, Professional Manufacturing Engineer in California,

Jeoungmin Byun, Assistant Professor, Ph.D. 2003, Purdue University.

manufacturing processing, materials processing, metrology/measurement, computer-aided design, computer-aided manufacturing, MEM/nanotechnology

Steven J. Covey, Professor. Ph.D. 1993, University of Cincinnati.

biomedical, experimental methods, finite element methods, manufacturing processes, mechanical design

Certification/Licensure
 Professional Engineer in Minnesota

Kenneth Miller, Associate Professor. Ph.D. 2000, University of South Carolina.

automotive engineering, experimental methods, heating ventilation and air conditioning, solid mechanics, thermal sciences

Certification/Licensure
 Professional Engineer in South Carolina and Minnesota

Presentations

A Survey on the Use of Printed vs. Electronic Vapor Tables. ASEE International Conference, June 24 – 27, 2007, Honolulu.

Grants

\$27,568 for The Effects of Rumble Strips on Non-Conventional Vehicles. From the Minnesota Department of Transportation, 2006-2008.

\$25,502 for Study of LED vs. Conventional Lighting on Snow Plows, with Timothy Vogt (PI) of ECE. Minnesota Department of Transportation, 2006-2008.

Warren Q. Yu, Professor. Ph.D. 1988, Washington State University.

new product development, lean manufacturing, mechanical design, project management

Yongli "Julianna" Zhao, Assistant Professor. Ph.D. 2006, The University of Iowa.

computational fluid dynamics, computational multi-phase/multi-dimensional flow, particle collision and adhesion, energy production (biofuel)

Presentations

Numerical Study of Particle Transport and Aggregates During Spin Coating of Ag Colloidal Suspension, 60th APS/DFD (Division of Fluid Dynamics) Conference, Nov. 18 – 20, 2007, Salt Lake City, Utah.

Grants

\$5,000 for LDL Aggregation and Deposition in Artery Wall, from SCSU Research Fund.

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