



Wichita State University, Wichita, Kansas

# Industrial and Manufacturing Engineering

Bringing Composite Manufacturing to the Next Level

## Inside Look:

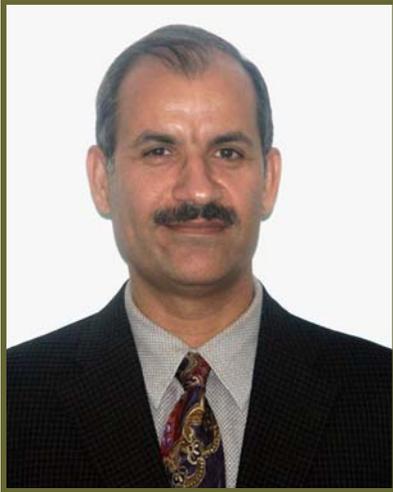
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*Students are working on composite lay-up*

As part of the College of Engineering (CoE) initiative in the area of composites and in line with the needs of our constituents, a dedicated 500 sq. ft. laboratory was completed to support the newly established course in composites manufacturing, IME576. The course, required for all manufacturing engineering students, was offered for the first time in Fall 2006 and received enthusiastic support from students. The course introduces students to all aspects of composites manufacturing including the various manufacturing methods utilized in the aerospace industry and the prevalent quality assurance methods. The laboratory provides students with hands-on experience in the manufacturing of composites. It is expected that the laboratory will be further expanded by another 500 sq. ft. and new equipment will be added to ensure richer educational experience by the students. The developed laboratory provides the CoE the possibility of offering short courses in the area of composites. Furthermore, the newly designed CoE certificate program in Advanced Composite Materials will also utilize this laboratory.

## Message from the Chair



*S. Hossein Cheraghi, Ph.D.*

On behalf of the faculty, students and staff of the Department of Industrial and Manufacturing Engineering (IMfgE), I welcome you to the 2006 issue of our newsletter. There are many exciting news that we would like to share with you. A major challenge faced by the IMfgE department has been to increase the size of its undergraduate program. The IMfgE department at Wichita State currently enrolls 81 undergraduate students, and 130 graduate students (109 M.S. students and 21 Ph.D. students). To meet this challenge, the faculty, students and members of the Industrial Advisory Board have worked together through a number of initiatives to improve undergraduate enrollment. These include revising the undergraduate curriculum to stress our commitment to high-quality education and to emphasize life long learning, partnering with community colleges, taking a leadership role in the development of summer camps, and continuing efforts to introduce Industrial Engineering and Manufacturing Engineering to high school and middle school students. As a result, we are witnessing signs of improvement in our enrollment. However, we are still far from our targeted numbers and hope that, with the continued effort of faculty and students, we will be able to meet our goal in the near future.

The undergraduate curriculum has undergone revisions in response to the changing needs of our constituents. Based on the recommendation of the Industrial Advisory Board, two new courses were added to the Manufacturing Engineering curriculum. The composites manufacturing course, offered for the first time in Fall 2006, received excellent reviews by the students. The newly developed composites manufacturing laboratory provided students with hands-on experience in the manufacturing of composite parts. The aircraft manufacturing course will be offered for the first time in Summer 2007. To achieve academic excellence, our undergraduate students are encouraged to become involved in scientific research, and they are encouraged to participate in a cooperative experience at a local company for which they will receive academic credit. Feedback from the faculty, students, and industry has been very positive. Our graduates continue to be highly sought out by industry; most of them receiving offers before the completion of their degrees.

IMfgE students have continued a long tradition of excellent performance at the national and regional academic competitions. In the 2006 annual IIE Region V technical paper competition, our undergraduate students received first place and second place awards. They also received the first place National IIE paper competition award in the 2006 IERC conference. Our graduate students have also continued their historical path of excellent performance nationally in the APICS competitions. The ASQ society at Wichita State has been very active in mentoring students to receive ASQ certifications. And, as this newsletter is being distributed, the IIE student chapter is preparing for the 48<sup>th</sup> annual Region V Technical Paper Conference to be held in Wichita.

Faculty activities in collaborative research, recruitment and retention of students, and evaluation and revision of the curriculum has resulted in a fruitful 2006. A number of faculty members have taken leadership roles in collaborative and interdisciplinary research within the department and between departments. Collaborative research efforts in manufacturing, sustainability, composites, and engineering education have been and continue to be spearheaded by the faculty in our department.

Despite all the advancements in our department, we still face major challenges to achieve our vision of becoming one of the best Industrial and Manufacturing Engineering programs in the nation. This will only be possible through the generous support of our alumni and friends. To this end, I encourage you to visit our website at [www.wichita.edu/imfge](http://www.wichita.edu/imfge) to learn first hand the achievements and activities in our department, and if you are in the Wichita area anytime, please stop by the department to meet us.

— Dr. S. Hossein Cheraghi

## Student Spotlight



*Mitchell Rausch*

**Mitch Rausch** won the first place at the Institute of Industrial Engineers (IIE) National Student Paper Competition held in Orlando, Florida. Rausch's paper was titled "Lean Initiative at Advanced Industries' Machining Cell." The paper provided recommendations to Advanced Industries to increase the capacity of the machine shop utilizing lean methodologies. While Mitch was an undergraduate at WSU he was active in Alpha Pi Mu, IIE, Engineering Council, and was also a Cessna Scholarship recipient. Currently, Mitch is a Masters student pursuing an MS degree in Industrial Engineering with an emphasis in reliability engineering and is employed by Cessna Aircraft Company as a reliability engineer.

**CONGRATULATIONS!**

## Excellent IE Students

In 2006 as well as the past five years, WSU IMfgE students maintained excellent records in IIE Paper Competition at both the regional and the national levels. Congratulations to our students!

### At IIE National Level

Name	Year	Place
Mitchell Rausch	2006	First
Janise Hamilton	2005	Third
Samantha (Vitt) Corcoran	2004	First
Jennifer Sutherland	2001	First

### At IIE Regional Level

Name	Year	Place
Mitchell Rausch	2006	First
Rebekah Drake	2006	Second
Janise Hamilton	2005	First
Kelly Zens	2005	Third
Samantha (Vitt) Corcoran	2004	First
Marki (Farris) Huston	2004	Second
Virginia Youse	2003	First
Carrie Ekzut	2002	Third
Jennifer Sutherland	2001	First
Charity Kennedy	2001	Second

## *IIE Student Chapter Updates*



*Recipients of 2006 regional IIE student paper competition award.*

*Left: Mitchell Rausch, 1<sup>st</sup> place  
Right: Rebekah Drake, 2<sup>nd</sup> place*

**Faculty Advisor: Dr. Bayram Yildirim**

## News from APICS Student Chapter

The student chapter has won the Platinum Award for the Student Chapter Management Program. The program provides benchmarks on student chapter management and activities. In recognition of achievement, student chapters earn Bronze, Silver, Gold, or Platinum awards and a monetary award. The chapters are recognized on the APICS Web site. Platinum designates 5 years of Gold status. The WSU APICS Student Chapter has been awarded Platinum for the last three years.

The Region 5 graduate student **winner** of the Donald W. Fogarty International Student Paper Competition is **Dennis D. Leierer** of Wichita State University, for “*Approaches between Business Process Redesign and Traditional Continuous Improvement.*” The **second place** graduate student winner is **Naveen Mukund Rajan**, also of Wichita State University, with “*Lean, Agile or Leagile.*”

The following students won the 2006 Wichita Chapter Awards:

### Graduates

1. Dennis Leierer
2. Sunny Repaka
3. Rajeindra Singh

### Undergraduates

1. Jason Kong Wai Ray
2. Ken Ooi Foo
3. Sunny Wong



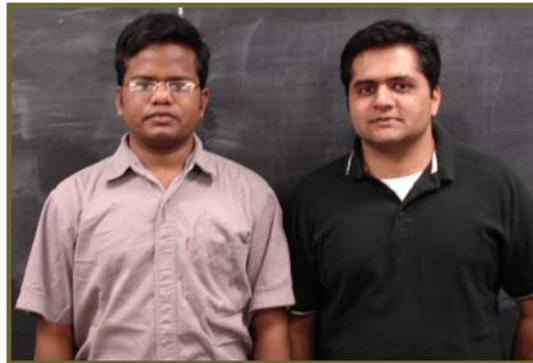
Faculty Advisor: *Dr. Lawrence Whitman*

## WSU—ASQ Student Branch Update

At the beginning of the Spring 2006 semester, the student branch at Wichita State University celebrated the certification of eighteen new members. This group includes one Certified Quality Engineer, **Karin Kandananond**, two Six Sigma Green Belts, **Hemant Kumar** and **Nirlep Sanghvi**, and fifteen Quality Improvement Associates. This is a new record of success and benchmark that the student members at the Industrial and Manufacturing Engineering Department promise to exceed in 2007.



*Karin Kandananond (CQE)*



*Hemant Kumar and Nirlep Sanghvi (CSSGB)*



**CONGRATULATIONS TO ALL AND KEEP UP THE GOOD WORK!**

Faculty Advisor:

*Dr. Gamal Weheba*

## Other Student Achievements

**Chandan Nayak**, IMfGE Ph.D. student, received John S. W. Fargher Scholarship for the 2006 academic year from IIE.

**Khurram Khan**, IMfGE Graduate Student, received The Kansas Academy of Science Award.

**Ragunandan Yedehalli** won 2nd place at 18th Annual student paper competition by IIE Society for Health Systems, Conference with his paper entitled “Revenue Management Approach To Appointment Allocation in Rehabilitation Outpatient Clinics”.

## Faculty Awards and Activity



**Dr. Abu Masud** has been elected president of Alpha Pi Mu, the national honor society of Industrial Engineering with 74 chapters and more than 41,300 members. Previously, Dr. Masud, a fellow of the Institute of Industrial Engineers, was the executive vice president and regional vice president of Alpha Pi Mu.

**Dr. Michael Jorgensen** received the 2006 Wichita State University Board of Trustees Young Faculty Scholar Award. This award is given annually to a faculty member who, during their third through eighth year of service has attained a record of outstanding teaching performance and substantial achievement in research or creative activity. In 2006, Dr. Jorgensen also received the Dwane and Velma Wallace 2006 Outstanding Educator Award for Excellence in Teaching. This award is given annually to a WSU College of Engineering faculty member who has demonstrated outstanding ability and success to teach subject matter.



**Dr. Janet Twomey** was named Boeing Faculty Fellow. The fellowship is based upon her record of teaching, publications, funded research, interactions with industry and service to the University.

- **Dr. Whitman**, with the support of College of Engineering, is organizing 2007 Midwest Regional ASEE Annual Conference. The conference will be hosted by Wichita State University in Wichita, KS, September 19-21, 2007. The theme of this meeting will be, "Educating the 21st Century Engineer." Several events are planned around this theme, including a panel discussion on various topics suggested by the National Academy of Engineers. *For more details:* <http://www.wichita.edu/asee> .
- **Dr. Jorgensen** has been elected Chair of the Industrial Ergonomics Technical Group of the Human Factors and Ergonomics Society for 2007 and 2008, and became a Member of the Editorial Board of the journal *Human Factors*.
- **Dr. Masud** organized 138th Kansas Academy of Science Annual Conference and served as a ABET evaluator for IE program.
- **Dr. Cheraghi** served as a Member of the Editorial Board of *International Journal of Industrial and Systems Engineering*, a member of IIE national awards council, and a ABET evaluator for IE program.
- **Dr. Madhavan** served as Associate Technical Editor of *Machining Science and Technology*.
- **Dr. Twomey** served as an Executive Board Member of INFORMS Data Mining Subgroup.
- **Dr. Weheba** served as a Member of the National Nominating Committee, American Society for Quality.
- **Dr. Whitman** was appointed the Director of Engineering Education of College of Engineering, Wichita State University.

## Successful Alumni — Efforts Towards Excellence

### *In Academia*



*Ihsan Sabuncuoglu, Ph.D.  
Chairman, Department of  
Industrial Engineering,  
Bilkent University, Turkey*

**Dr. Ihsan Sabuncuoglu** is currently the Chairman of Department of Industrial Engineering at Bilkent University in Turkey. He received his bachelor and masters degrees from Industrial Engineering Department of Middle East Technical University. After that, he came to the US and spent four years in pursuing his Ph.D. degree in Industrial and Manufacturing Engineering Department at Wichita State University. In August 1989, he received his Ph.D. degree and joined our alumni community. In 1990, he went back to Turkey and became a faculty member of Department of Industrial Engineering of Bilkent University.

Dr. Sabuncuoglu teaches and conducts research in the areas of simulation, scheduling, artificial intelligence, and manufacturing systems. As a successful scholar, he has been very active in conducting research in those areas and providing service to the professional community. So far, he has published more than 48 journal papers. He serves as Associate Editors of International Journal of Systems Science (IJSS) and Transactions on Operational research (TOR). In addition, he is on the Editorial Board of International Journal of Computer Integrated Manufacturing (IJCIM), Journal of Operations Management (JOM), and International Journal of Operations and Quantitative Management (IJQOM).

### *In Industry*

**Teresa O'Leary** was born and raised in Wichita, KS, and the fifth of six children. She attended WSU and received her BS in Mechanical Engineering. After her junior year in college she interned for Cessna Aircraft Company. During her senior year Cessna offered her a job as a design engineer on the new twin turboprop, where she got her first taste of what a design engineer does. She worked for six months when she realized that there was no way she could see herself sitting in front of a computer terminal designing for the next forty years. A short time later she was asked to assist with the consolidation of the two Cessna facilities in Wichita. It was during this time that she learned she was a very good project coordinator. She enjoyed the work tremendously, however, after eighteen months the consolidation was complete, and she would need to move on.

It just so happened that at that time, she received a call from her first boss asking if she would be interested in becoming an accident investigator. She thought the job sounded very interesting so she accepted the new position and began investigating airplane crashes. She did this for about 4 years. During that time she learned a lot about human nature. She would go out to investigate a crash, and the most interesting activity was learning the background of the pilot and the circumstances leading up to the crash. She also became quite familiar with the inner workings and systems of Cessna's aircraft.

While crash investigating she trained and received her private pilot's license. Learning to fly while investigating crashes was a very humbling experience. She thought "Who am I to think that I could learn to fly while I am picking up the pieces of pilots who had hundreds and some times thousands of hours of flying time? I must say that when I flew I was very conscious of my mental and physical state. Making sure that when I flew I was healthy and not under any undue stress." Since her pilot's license is for VFR only (meaning she can not fly in clouds or low visibility conditions), she became very aware of what the weather was doing that day. She also discovered how fun and entertaining the weather could be.



*Teresa O'Leary  
Director, Supply Chain Quality  
Cessna Aircraft Company*

As a crash investigator she also saw our legal system at work. For a short period of time she thought about attending law school. She decided however, that she was much more suited for management. While traveling extensively and obtaining her pilot's license she also found the time to obtain her MS in Engineering Management, with an emphasis in Operations Research.

Shortly after obtaining her masters she was given her first supervisory position. According to Teresa she was fortunate that she was put in charge of a group of individuals who had been with the company a long time. "They were very tolerant of my mistakes and helped me learn the right way to manage people."

After two years she was promoted to Program Manager over the sustaining aircraft. The organization was disbanded a year after she join. She was then moved over to Cessna's JPATS (Joint Primary Aircraft Training System) bid group. Since she did not have a say in choosing this new position she felt she had been put in the first place they found with an opening. During this time she discovered the old saying "Through adversity breeds strength" was very true. She felt she had learned more about business during her time on the JPATS program than she learned in all her previous jobs combined. "The experience taught me a very important lesson and that is, when you think things are at their darkest there is always goodness that comes from those experiences."

The progression of jobs she has held with Cessna have educated her on what it takes to run a successful business.

For about two years she managed the department that controlled the configuration of aircrafts delivered to Cessna's customers. That position made her very aware of the intricacies and interrelationships between the different departments and how the coordination has to be robust if Cessna was going to meet both the customer as well as the regulatory agency's requirements.

She was then asked to join ten other individuals to redesign the business model at Cessna. She spent two years with the group redesigning the Order Fulfillment Process. "I have to say that was a very rewarding time for my career at Cessna." Unfortunately, the CEO of the company retired and with it the sense of urgency to implement the improvements the group identified. The interesting thing that came from the time spent in the Process Based Management group was that it wasn't a waste. Many of the recommendations the group made have since been implemented, realizing the monetary and flow benefits.

She was then asked to become the Director of Supply Chain Quality. She was a little hesitant because her background was not in Quality. However, she states "I have always challenged myself to work outside my comfort zone and I felt that as long as I had the right people in the organization I could make a positive difference for the company."

As Director of Supply Chain Quality, it requires her to travel to Cessna's supplier facilities to assist them in understanding the quality requirements of Cessna. Typically, she will only visit when a supplier is in big trouble. The Quality Engineers who work in Supply Chain Quality use her as a kind of trump card if they hit a road block in their progress with the Supplier.

She stated, that she once had a mentor telling her she had received her promotions based on what she was able to accomplish, but from this point forward her movement within management would be based on the relationships she forms. She did not understand what he meant at the time but now has a greater appreciation for his wisdom. "I tell people that I really don't have the technical knowledge, but I do know who to call. If I make that call I have sufficient influence to get the job done."

It has been a wonderful ride so far for Teresa, and she is looking forward to the new challenges that will certainly head her way in the future.

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Special thanks to our secretary, **Beatrix Lawrence**, for providing her service to all the faculty members, our students, and alumni.

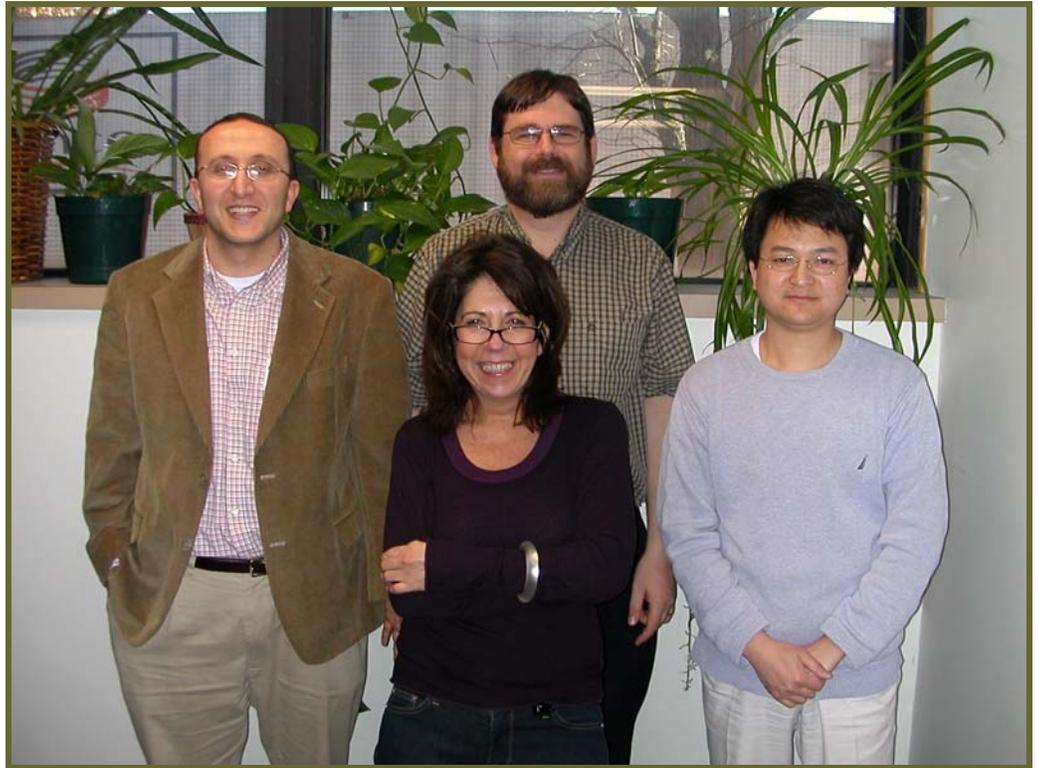


## Featured Research— Sustainable Engineered Systems Group

The Sustainable Engineered Systems Group, formed in 2005 is actively pursuing research and education in environmentally sustainable systems. The group consists of four faculty members from the Industrial and Manufacturing Engineering Department, 4 graduate students, and 4 undergraduate students. Faculty members include **Drs. Jan Twomey, Larry Whitman, Haitao Liao, and Bayram Yildirim**. The group began with a focus in Green Manufacturing but has recently broadened its scope to include issues related to the biofuels industry.

The group received funding in 2006 from the National Science Foundation (NSF) to investigate the relationship between operational decisions and environmental impacts at the sub-cellular, production and facility levels of a manufacturing enterprise. The majority of work thus far has focused on scheduling decisions and energy consumption at the sub-cellular level. One of the outcomes of this work will be energy savings controllers for manufacturing equipment. To this end, the group is also investigating the effect of such controllers on the machine's reliability. The objective is to advance the operational strategy that balances the energy savings that depend on the characteristics of various machining processes, and the potential loss due to system downtime. Another tactic taken by the group to reduce energy consumption in a manufacturing setting is through the Department of Energy's (DOE) Industrial Assessment Center (IAC) program that targets small and medium sized companies. The group has joined with Oklahoma State University's IAC (Dr. William Kolarik, Center Director) to perform energy assessments in Kansas. The objectives of the IAC are to 1) perform assessments that aid in reduction of energy and waste and increase productivity, and 2) educate and train the next generation of energy, waste, and productivity professionals. They will be getting started on this effort in the Spring semester of 2007.

Beyond manufacturing the group will begin an investigation in the Spring of 2007 of the infrastructure, distribution, and logistics requirements of the ethanol industry in the state of Kansas. The group with the assistance of NSF-EPSCoR funding will be teaming with researchers from other Kansas Universities who have expertise in grain science and the chemistry of biofuels, and Dr. Scott Mathews of Carnegie Mellon University who has conducted research on the same topic, to develop long term planning strategies and models.



*From left: Drs. Bayram Yildirim, Jan Twomey, Larry Whitman, and Haitao Liao*



## Faculty Scholarly Activity

### Journal Publications

- \*Liu, W. and **Cheraghi, S. H.**, "Design and Implementation of a Generic Nonconformance Tracking and Recovery (GINTR) System Using Microsoft .NET," *Computers in Industry*, 57, 631-639, 2006.
- \*Liu, W. and **Cheraghi, S. H.**, "A hybrid approach to nonconformance tracking and recovery," *Journal of Intelligent Manufacturing*, 17, 149-162, 2006.
- **Cheraghi, S. H.** and \*Thirta M., and **Krishnan, K.**, "An Optimization-Based System for Adaptive Planning in a Discrete Part Manufacturing Environment," *International Journal of Computer Integrated Manufacturing*, Vol. 19(2), 125-135, 2006.
- \*Viswanathan, M., **Jorgensen, M. J.**, and Kittusamy, N. K., "Field Evaluation of a Continuous Passive Lumbar Motion System among Operators of Earthmoving Equipment," *International Journal of Industrial Ergonomics*, 36, 651-659, 2006.
- **Krishnan, K.** and **Cheraghi, S. H.**, \*Chandan Nayak, "Dynamic From-Between Chart: A New Tool for Solving Dynamic Facility Layout Problems," *International Journal of Industrial and Systems Engineering*, Vol. 1(1/2), 182-200, 2006.
- **Liao, H. T.** and Elsayed, E. A., "Reliability Inference for Field Conditions from Accelerated Degradation Testing," *Naval Research Logistics*, Vol. 53(6), 576-587, 2006.
- **Liao, H. T.**, Elsayed, E. A., and Chan, L. Y., "Maintenance of Continuously Monitored Degrading Systems," *European Journal of Operational Research*, Vol. 175(2), 821-835, 2006.
- Elsayed, E. A., **Liao, H. T.**, and Wang, X.D., "An Extended Linear Hazard Regression Model with Application to Time-dependent-dielectric-breakdown of Thermal Oxides," *IIE Transactions on Quality and Reliability Engineering*, Vol. 38 (4), 329-340, 2006.
- \*Chetchotsak, and **Twomey, J.**, "Combining Neural Networks for Function Approximation under Conditions of Sparse Data: the Biased Regression Approach," *International Journal of General Systems*, Online Journal, 1-21, 2006.
- **Weheba, G.** and \*Sanchez M. A., "Using Response Surface Methodology to Optimize the Stereolithography Process," *Rapid Prototyping Journal*, Vol.12(2), 72-77, 2006.
- Samarah, I., **Weheba, G.**, and Lacy, T., "Response Surface Characterization of the Mechanical Behavior of Impact-Damaged Sandwich Composites," *International Journal of Applied Statistics*, Vol.33(4), 427-437, 2006.
- Barut, M., **Yildirim, M. B.**, and Kilic, K., "Designing a Global Multi-Disciplinary Classroom: A Learning Experience in Supply Chain Logistics Management," *International Journal of Engineering Education*, Vol.22(5), 1105-1114, 2006.
- **Yildirim, M.B.**, Duman, E., and Duman, D., "Dispatching Rules for Allocation of Component Types to Machines in the Automated Assembly of Printed Circuit Boards," *Lecture Notes in Computer Science*, Vol.4263, 55-64, 2006.
- **Yildirim, M. B.**, Cakar, T., \*Doguc, U., and Ceciliano Meza. J. C.\*, "Machine Number, Priority Rule, and Due Date Determination in Flexible Manufacturing Systems Using Artificial Neural Networks," *Computers and Industrial Engineering*, Vol.50(1), 185 – 194, 2006.
- **Whitman, L.** and Panetto, H., "The missing link: Culture and language barriers to interoperability," *Annual Reviews in Control*, Vol.30, 233-241, 2006.

### Conference Proceedings

- \*Janardhan, P., Ahmad, J. S., and **Cheraghi, S. H.**, "Edge Trimming of CFRP with Diamond Interlocking Tools," Aerospace Manufacturing and Automated Fastening Conference, Toulouse France, September 2006, pp. 11-14.
- Shams, S. and **Cheraghi, S. H.**, "Minimal Lead Time Quotation under Service Level Constraint," Proceedings of the Industrial Engineering Research Conference (IERC), Orlando, FL, May 20-23, 2006, on CD.
- **Jorgensen, M. J.**, Khan, K.S., and Polsani, A., "Use of tungsten to reduce vibration in aircraft manufacturing," 1st American Conference on Human Vibration, Morgantown, WV, June 5-7, 2006, pp. 164-165.

## Conference Proceedings (Cont.)

- **Jorgensen, M. J.** and Smith, F. W., "Sagittal Plane Moment Arms of the Male Rectus Abdominis: Upright vs. Supine Posture," 50th Annual Human Factors and Ergonomics Society Conference, San Francisco, CA, October 16-20, 2006, pp. 1270-1273.
- **Jorgensen, M. J.**, Viswanathan, M., and Kittusamy, K., "Field Evaluation of a Continuous Passive Lumbar Motion System among Operators of Earth Moving Equipment," National Occupational Research Agenda Symposium, Washington, DC, April 18-20, 2006, pp. 353.
- Kittusamy, K., Aedla, P., and **Jorgensen, M. J.**, "Validation and Reliability of a Checklist for Evaluating Cab Design Characteristics of Mobile Construction Equipment," National Occupational Research Agenda Symposium, Washington, DC, April 18-20, 2006, pp. 145.
- **Krishnan, K., Cheraghi, S. H.**, and \*Nayak, C., "Solving Dynamic Facility Layout Problems Using Dynamic From Between chart," Proceedings of the Industrial Engineering Research Conference (IERC), May 2006, on CD.
- \*Nayak, C., **Krishnan, K.**, and Gowda, S. C., "Risk-Averse Facility Layout Design for Uncertain Production Environments," Proceedings of the Industrial Engineering Research Conference (IERC), Orlando, FL, May, 2006, on CD.
- Jin, T. D., **Liao, H. T.**, Xiong, Z. H., and Sung, C. H., "Computerized Reparable Inventory Management with Reliability Growth and System Installation Increase," Proceedings of 2006 IEEE Conference of Automation Science Engineering, Shanghai, China, October 8 – 10, 2006.
- **Liao, H. T.**, Zhao, W. B., and Guo H. R., "Predicting Remaining Useful Life of an Individual Unit Using Proportional Hazards Model and Logistic Regression Model," Proceedings of the 52nd Annual Reliability and Maintainability Symposium, Newport Beach, CA, January 23-26, 2006.
- \*Deshpande, A., **Madhavan, V.**, \*Pednekar, V., \*Adibi-Sedeh, A. H., and Ivester, R., "Effect of Change in the Thermal Softening Parameter of the Johnson-Cook Material Model on Finite Element Simulation of Metal Cutting," Transactions of the North American Manufacturing Research Institute of SME, V 34, Milwaukee, WI, May 2006, pp. 293-300.
- Hijazi, A. and **Madhavan, V.**, "A Novel Multi-channel Non-intensified Ultra-high Speed Camera using Multi-wavelength Illumination," Proceedings of SPIE - The International Society for Optical Engineering, v 6302, Imaging Spectrometry XI, San Diego, CA, August 2006, pp. 630209.
- \*Zhao, W. and **Madhavan, V.**, "Virtual Assembly Operations with Grasp and Verbal Interaction," Proceedings of VRCIA 2006: ACM International Conference on Virtual Reality Continuum and its Applications, Hong Kong, China, June 2006, pp. 245-254.
- **Whitman, L., Twomey, J.**, and \*Patil, A., "Greening the Value Stream: Towards an Environmental Index," Proceedings of 9th IFAC Symposium on Automated Systems Based on Human Skill And Knowledge, Nancy, France, May 22-24, 2006, on CD.
- \*Kandananond, K. and **Weheba, G.**, "The Integration of Automatic and Statistical Process Control Techniques: A Literature Review," Annual International Conference on Industry, Engineering and Management Systems, FL, March 13-15, 2006, pp. 554-559.
- \*Vontivilu, H. and **Weheba, G.**, "Performance Characterization of a CNC Lathe," Annual International Conference on Industry, Engineering and Management Systems, FL, March 13-15, 2006, pp. 548-553.
- **Whitman, L.**, and **Malzahn, D.**, "Industry/University partnership in a Capstone Course," American Society of Engineering Education Midwest Section Conference, Kansas City, MO, September 14-15, 2006.
- **Whitman, L.**, and Chapparo, B., "Efficacy of Virtual models in a Production Systems Course," American Society of Engineering Education Midwest Section Conference, Kansas City, MO, September 14-15, 2006.
- **Whitman, L.**, Panetto, H. and Desilva, D., "The Missing Link: Culture and Language Barriers to Interoperability," 9th IFAC Symposium on Automated Systems Based on Human Skill And Knowledge, Nancy, France, May 22-24, 2006.
- **Whitman, L.**, Santanu, D., and Panetto, H., "An Enterprise Model of Interoperability," 12th IFAC Symposium on Information Control Problems in Manufacturing, Saint Etienne, France May 17-19, 2006.
- \*Drake, R., **Yildirim, M. B.**, **Twomey, J.**, **Whitman, L.**, **Ahmad, J.**, and \*Lodhia, P., "Data Collection Framework On Energy Consumption In Manufacturing," Proceedings of Institute of Industrial Engineering Research Conference, Orlando, FL, May 20 - 23, 2006, on CD.

## Research Projects

- **Cheraghi, S. H. and Jorgensen, M. J.**, “Detection and Prevention of Carbon Monoxide Exposure in General Aviation Aircraft,” FAA.
- **Cheraghi, S. H.**, “Development of de facto standards for tool calibration programs,” FAA.
- **Cheraghi, S. H. and Krishnan, K.**, “Tolerancing Overview of Application to Support Aircraft Final Assembly,” NIS.
- **Cheraghi, S. H. and Krishnan, K.**, “Application of Virtual Reality and Simulation for Assembly Planning and Costing,” Aircraft Design and Manufacturing Research Center (ADMRC).
- **Jorgensen, M. J.**, “Evaluation of Low Back Pain Intervention Effectiveness among Long-Haul Truck Drivers,” NIOSH, Working Class Hero’s Safety & Health Services, LLC.
- **Krishnan, K. and Cheraghi, S. H.**, “Virtual Reality Systems for Aircraft Manufacturing,” ADMRC.
- **Liao, H. T.**, “Collaborative Research: Design of Equivalent Accelerated Life Testing Plans Involving Single or Multiple Stresses,” National Science Foundation (NSF).
- **Liao, H. T.**, “Integrated Approach for Optimizing Maintenance Schedules under Time-varying Operating Conditions,” University Research/Creative Projects Award (URCA) – Wichita State University.
- **Madhavan, V. and Fang, N.**, “Collaborative Research: Experimental and Numerical Investigation and Improved Modeling of the Cutting Edge Contribution in Metal Cutting,” NSF.
- **Madhavan, V.**, “Wear Tests on Falex Pins,” DoD/NRL.
- **Twomey, J., Yildirim, M. B., Ahmad, J., Whitman, L.**, “Research Study: Inter-relationship of Operational Decisions and Environmental Impacts,” NSF.
- **Twomey, J.**, “Logistics, Distribution, and Infrastructure Planning for Kansas Biofuels and Biomass Industries 2020,” KS NSF-EPSCoR.
- **Twomey, J.**, “Sustainable Manufacturing: IV Global Conference on Sustainable Product Development and Life Cycle Engineering; San Carlos, Brazil Oct 3-6, 2006,” NSF.
- **Yildirim, M. B.**, “Comparison of Disaster Logistics Planning and Execution for 2005 Hurricane Season,” Midwest Transportation Consortium.
- **Yildirim, M. B.**, “Optimal Multi-skilled Worker Assignment in Aircraft Manufacturing,” ORA, Wichita State University.
- **Yildirim, M. B.**, “Image Database and Web Management Project,” Amerimerck.
- **Weheba, G. and Smith, B.**, “Rapid Fabrication of Composite Lay-up Tools,” ADMRC.
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## Special Thanks to Our Industrial Advisory Board

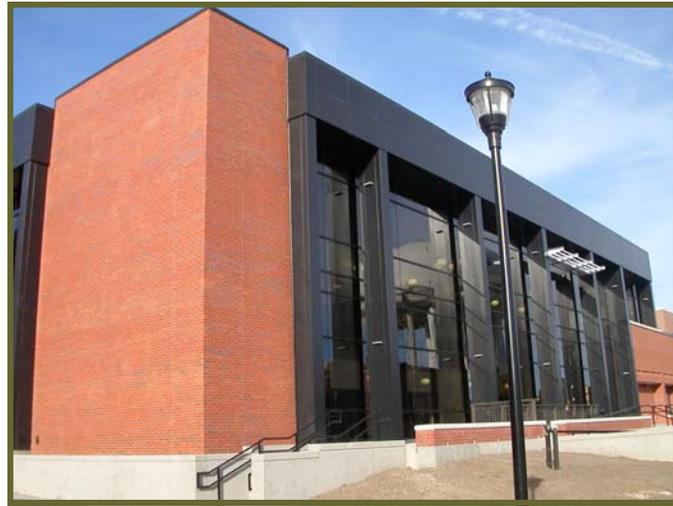


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*Some of our IAB members. From left: Dr. Ming Liu, Nancy Brox, Keith William Chodak, Tarek Maguid, Shawn Webb, and Teresa O’Leary*

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