

MANUFACTURING Matters

Mass Customization

Ananth. V. Iyer *DCMME Director*

SATURDAY, APRIL 8, 2006, was Bug Bowl at Purdue and as I wandered with my family through the exhibits, we walked into the Wood Lab, part of the School of Forestry. DCMME has had interactions with the Wood Lab over the course of this year - Professor Rado Gazo was a speaker at the Fall 2005 DCMME Partners meeting. His doctoral student, Emmanuel Kodzi, is working on a thesis focused on Mass Customization in the Furniture Industry.

On Bug Bowl Day, the Wood Lab offered people the option of purchasing a hard maple cutting board, designing an inscription or lettering, watching it being programmed and sent to a CNC router, which then manufactured the board on site. The completed board was then finished with mineral oil and delivered, all for a \$13 fee. The actual process offered a glimpse into the manufacturing costs of a make to order manufacturing with participant interaction to produce a customized product.

I was curious about the implied costs for such customization. While my data is just one data point, it provides a sense of the issues that have to be managed for such a system to be effective. The first issue was to get our lettering choice entered into a sheet of paper and programmed and placed on the board in digital form. The spelling was checked and we approved of the placement. Then the student operating the computer created a cutting pattern for the tool and sent it to the router which created the product in a few minutes.

As a special case, our product was produced in a batch size of one, to speed up the lead time. The moment the manufacturing was completed, we discovered a problem, the "E" in the word "kitchen" showed up as an "F." The computer had the right spelling but the routing program was off. Next, the lettering overflowed into the edge pattern, something which had not been captured by the computer.

Time to repeat the exercise. But we had another customer ahead of us who was being

very finicky about her pattern and her choices. Customer service meant that the rest of us had to wait while she decided, pondered, adjusted her choices etc. The machine remained idle, waiting for a batch to be loaded. Finally, the process was repeated and a batch of orders was loaded along with a batch cutting pattern for the router. This time, all four of the boards, each of which was different, were completed in a few minutes. The completed customized product was excellent.

What were the interactions in this customized manufacturing process? The students operating the computer were both putting in the patterns and advising customers about how to adjust their fonts and locations for the final product to look acceptable. They were programming the router and placing the parts. Boards had been pre-cut and positioned to speed up manufacturing. Finished products were repeated until customers were satisfied. But the manufacturing process was now directly interacting with the customer so that service related issues and manufacturing issues were now intertwined.

Is this the future of manufacturing? An INDOT (Indiana Dept of Transportation) sponsored study, directed by Prof Svenja Sommer and myself, with MBA student Justina Mikals providing research support, is analyzing the furniture industry in Southern Indiana (Dubois County). Our data shows that the future of the Indiana furniture industry lies in increased direct interaction with customers to provide customized furniture solutions. While such a trend will have significant implications for logistics, what about manufacturing costs? Is my experience with the cutting board an anomaly, or typical of the issues to be managed in the future manufacturing world? Stay tuned for more as we complete the study.



Krannert MBA and EMBA students visit China during Spring Break *A closer look at the world's factory floor*

By **Charlie Kuo**, MBA 2007

To help Purdue MBA students learn more about manufacturing and supply chain management practices in China, GSCMI & DCMME organized a Spring Break trip to China which focused on industries in the greater Shanghai region, the biggest port in China and the center of technique, trade, finance, information and culture.



During the nine-day tour the participating students had the opportunity to network with MBA students from one of China's most prestigious universities, meet with Krannert alumni in China and to tour and be briefed by leaders of different manufacturing industries. A few factories visited by the group were Cummins, Delphi and Kimberly Clark, just to name a few.

Purdue's MBA program is well-known for its strengths in Operations and Supply Chain Management and the trip offered these students the opportunity to bridge what they have learned in the MBA curriculum with actual field practices. The trip was designed to award students maximum exposure to the latest technology and management advancements in the manufacturing sector but at the same time allow them to have time to learn more about Chinese culture and local business practices. The students were very impressed by the breadth and depth of the company presentations and facility tours.

Connie Pan, a first-year MBA student, commented, "The China trip is fruitful, amazing, and wonderful! The schedule is tight that we hardly got any time to take a break, but I like it!" David Chipman added, "It [the China trip] is a very rich experience, full of insights into life and business in China. We learned from both the American and Chinese perspective."

We would like to express a special thanks to the participating partners who contributed greatly to the trip's success! Please visit our website for details and the complete event itinerary.

Student Profile **David Chipman** By **Wayne Chan**, MBA 2007

STUDENT PROFILE

Dave Chipman is a second year Krannert MBA student. Even when Chipman was an undergraduate student, he had plans of attaining an MBA. So, he chose his post-baccalaureate work carefully to make a smooth and logical transition to business one day. Hence, he worked for Parametric Technology Corporation (PTC) based in Salt Lake City, Utah. Some of his assignments entailed technical support to PTC's customers, new design solutions and general application-based engineering work.

Dave decided to attend the Krannert School of Management of Purdue University because it is a great fit for him. This school has a strong faculty and is world-renowned for its supply chain and operations management fields. Some of his likes of Krannert

include the solid student body, spirit of cooperation and diversity. Some of Chipman's favorite classes are Logistics (organization methodologies of businesses and costs to streamline) and Procurement (sourcing).

Chipman's internship last summer was with Electronic Data Systems (EDS) based in Dallas, TX. The project he worked on was on the total cost of ownership. Total cost of ownership is the business end of the supply chain function and encompasses service, licensing, and retirement costs.

During Spring Break, Chipman attended the Study Abroad trip to Shanghai, China that was organized by DCMME and GSCMI. The class, entitled *Globally Competitive Manufacturing in China*, toured several manufacturing facilities. The tours were facilitated by



high-level business personnel. Chipman said he learned that the speed of business there is brisk while the development of relationships is slow.

Lastly, after Chipman graduates from Krannert in May, he will be working for Raytheon in the Supply Chain Leadership Program. He is looking forward to working there and, because he has a strong penchant for supply chain, believes this job is exactly what he has been looking for.



Executive Interview

By **Rasheeda Washington**, MBA 2006

Mr. Gary Lehman

President & Chief Executive Officer
Fairfield Manufacturing

Purdue Alum **Mr. Gary Lehman** obtained his Bachelor of Science in Industrial Management ('74) from the Krannert School of Management and later completed his MBA at Case Western University. He has worked with companies such as The Cannelton Group, Philips Lighting Electronics for North America, Advanced Transformer, and ITT Automotive. Mr. Lehman is very active within the Purdue community as is a member of Krannert's Dean Advisory Council as well as the CIBER Advisory Council. I had the fortune to speak with Mr. Lehman after his presentation on "International Manufacturing Strategy" for Krannert's DCMME's Leadership in Manufacturing and Supply Chain Management Speaker Series.

A native of Lafayette, IN, Mr. Lehman takes great pride in his hometown. In 2003, he left the comfort of a private consulting firm to join what was a troubled Fairfield Manufacturing. Why did he want to join a company that was on the brink of its demise? Mr. Lehman's ties to the community were such that coming back was a must! He knew the company and the legacy of its founder, Mr. David Ross, and did not want the legacy to end after 85 years of business. This experience has been challenging for Mr. Lehman; but he has never regretted coming back.

Business has flourished since his arrival! Fairfield was strategically acquired by Saurer AG (Jan. 2006) to help Saurer meet its three strategic needs of: growth; having a balanced business portfolio; and leveraging its presence in China. In light of GSCM's Spring Break trip to China I asked Mr. Lehman if there were any intellectual property concerns in China. His response, "Sure"; but Fairfield is not as concerned about this as other companies. Most of what they do requires a lot of expertise in the manufacturing process – knowledge that is difficult to duplicate and transfer if you are not in the business.

Mr. Lehman has remained in the manufacturing industry because he feels "The journey to success never ends." When examining his career, Mr. Lehman has made both strategic moves as well as taken advantage of current opportunities. When managing your career he believes one must ask himself/herself three questions: Am I happy? Am I learning? Am I providing for my family? He feels it is important to keep the answers to these three questions balanced because no one will step in and do it for you. This philosophy has worked well in that one of his rewarding moments is raising three beautiful children that have an interest in business. Mr. Lehman followed in his father's footsteps and has been successful in passing that same passion for business to his children.

What is Mr. Lehman's advice for Krannert students? Realize that you have gone to the best business school in the country! You have the education so you have exhibited you can survive a rigorous program. Now go out and do something you can have fun with because by doing so, your chance at success and happiness will be greater!

Global Focus: China— Rethinking Its Business Model

By **Ghazi Saleem**, MBA 2007

During a visit to China in 1988, the Indian Prime Minister, Rajiv Gandhi, declared that the 21st Century would be known as the "Asian Century." At that time, not many people took notice but less than 20 years later, Gandhi's statement is considered prophetic and visionary.

Goldman Sachs in its BRIC report predicted that by 2050 China will be the biggest economy in the world followed by U.S.A. and India. The report also indicated that China would be 'the industrial workshop of the world' and India 'one of the great service societies.'

While world economic dominance by 2050 may not be such a bad thing, Chinese leaders are already worried about the difficulty of sustaining its manufacturing advantage. The manufacturing industry is significantly more sensitive (than a service industry) to external factors such as political events or world oil price increases. For example, a significant increase in energy prices might be all it takes to make Chinese products economically unviable simply due to shipping costs.

The Chinese President, Hu Jintao, has already started talking about creating an innovation-based economy. In doing so, Hu is essentially admitting that brains, not brawn, are the key to China's future. This idea is an echo of U.S. economist Paul Krugman's who is a vehement proponent of "inspiration over perspiration."

"China should not be the factory of the world any longer," says Yang Fan, a professor of commerce at the China Politics and Law University. Headlines in newspapers echoed this sentiment of moving away from the "embarrassing" situation of having to export 800 million shirts to pay for a single imported airplane."

Economists in China had been calling for more innovation for years, says Yang, "The difference is that this time, I think the government is taking our suggestions."

SOURCES:

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In the News:

Cummins Enters Chinese Light-Duty Diesel Market

By **Brent Horrocks**, MBA 2006

Cummins has teamed up with Beiqi Foton Motor Company to form a new joint venture to produce two types of diesel engines in Beijing, China. The joint venture is named Beijing Foton Cummins Engine Company, and will produce engines used for commercial vehicles, including trucks, SUVs, MPVs, small construction equipment, and mobile power generators. The venture will combine Cummins' diesel engine expertise and long standing relations with Chinese companies with Beiqi's large marketshare and leadership in the light-duty truck industry.

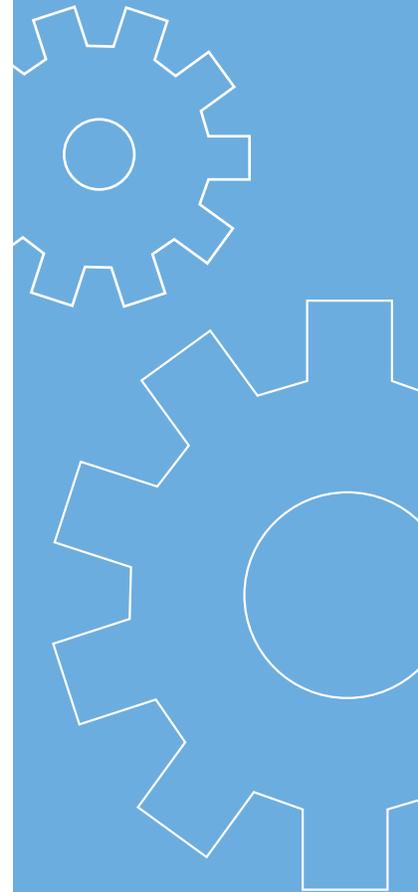
Under the terms of the agreement, both companies will contribute capital, equipment, and land to the 50/50 joint venture. The total investment will be approximately \$240 million. The company will be based in Beijing, and will begin producing engines after a final feasibility study is completed. Operations are scheduled to begin as early as 2006, with the first engines rolling out of production in early 2008.

The market for light-duty diesel engines in China is a source for huge growth. Last year 860,000 units were produced in China, and growth projections are estimated at 8% annually for the next few years. This is a new segment for Cummins in China. Cummins has had a Chinese presence since 1975, but has only produced heavy-duty diesel engines in China.

Cummins, which is based in Columbus, Indiana, has been a global company for a long time. In addition to China, Cummins serves over 160 countries through a network of 550 distributors and 5,000 dealers. Cummins employs 28,000 people world-wide.

SOURCE:

"Cummins Enters Chinese Light-Duty Diesel Market,"
Memphis Business Journal, March 7, 2006



 www.mgmt.purdue.edu/centers/dcmme



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