



The Importance of Green Manufacturing

The world's population is projected to increase by a factor of two over the next 50 years and the GDP per capita is likely to go up by a factor of four or five. These changes will likely lead to a sharply increased need

for manufactured goods. And in generating vast volumes of waste, no other sector comes close to manufacturing. Timothy Gutowski, chairman of the WTEC Environmentally Benign Manufacturing panel and a professor at the Massachusetts Institute of Technology, says, "To keep things the way they are right now, the environmental impact has to be reduced by something on the order of a factor of 10."¹ In a number of industries, management has been under pressure from government agencies, environmental groups, suppliers, as well as customers themselves, to implement environmentally friendly manufacturing initiatives.

However, sustainable manufacturing—the concept of producing goods while minimizing the effect on the environment—should be thought of as more than simply ceding to environmental pressures and regulations. Sustainable manufacturing can be considered a way to secure production cost advantages over competitors. Kenneth Oye, associate professor of political science at MIT and director of its Political Economy and Technology Program, says

that "Public regulatory standards, test procedures, and models should be viewed as important sources of private competitive advantage, and as mechanisms for containing private business risks."² He claims that a wise use of regulatory strategy can bolster both a company's supply-side and demand-side strategies. For example, it can lower both production costs and increase sales of green (environment-friendly) products. Xerox Corporation reported more than \$2 billion in costs saved or avoided due to its dedicated, eco-friendly product designs, and manufacturing processes over the past ten years.



MTM Students Yoshiro Fukasaku and Victor Munsen with their plan to extract energy from landfills. See story on page 9.

Green Process Improvement

Pollution control responsibilities in a manufacturing facility are frequently delegated to an environmental engineer, an unenviable post in most factories, frequently outside of the normal hierarchy of the corporation and in many cases one not involved in the day-to-day decision-making of operations. Because s/he operates in this "operations and business vacuum," when problems do arise, the standard approaches are frequently end-of-pipe type solutions.³

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These end-of-pipe solutions will almost always increase costs of the product without adding value because the waste has already been created, and energy and money must now be expended to remove the waste. Examples of end-of-pipe approach would be items like scrubbers, waste-water treatment and fume collectors. Because of this, it is recommended that pollution-prevention measures be considered within the production process itself, before the waste is created. It would be ideal if products could be designed to utilize low-waste production, helping to reduce the dependence on end-of-pipe solutions.

There are three basic drivers to proactive pollution prevention: Reduce, Reuse, and Recycle.

Reduce: When a facility turns its attention towards reducing the use of its resources, from raw materials to electricity, the firm is taking a lean approach to manufacturing. We would like this to process improvement, and will speak more about it later.

Reuse: Reusing materials is a relatively simple concept, and its application should be much more widespread than it is. The most sophisticated form of reuse would be Design for Disassembly (DFD). This concept allows for the goods themselves to be disassembled and components reused. In a basic sense, this also involves the reuse of items used along the value chain, such as packing materials or natural resources. Examples of reuse would be Xerox's design of reusable shipping containers, which were previously discarded after a single use or the reuse of cooling water in machines, rather than simply piping the water out to a stream. Companies should look towards reusing materials wherever possible to save on long-term disposal costs.

Recycle: The use of recyclable materials in production is important to the long-term sustainability of the environment. A number of companies have become more innovative in their use of recycled materials in production, such as Patagonia – a company that has begun to manufacture fleeces wholly from post-consumer recycled materials.⁴ In addition to use of recycled materials in production, companies are beginning to plan for recycling of their product at the end of their lives. This couples the concepts of designing for minimum

environmental impact with a Lifecycle Approach to product management.

So, how does a manufacturing manager go about developing a sustainable manufacturing initiative? And how do any of these changes fold into the existing process-improvement concepts which may be in effect on the factory floor? Fortunately, many of the existing concepts of process improvement blend well with environmental sustainability. Below we outline processes which have shown documented improvements in both environmental impact and productivity.

Lean/Just in Time Manufacturing

As the stereotypical waste reduction methods in use right now, lean manufacturing and “just in time” manufacturing both strive towards the continual reduction of waste in materials, labor and energy. By eliminating non-value-added steps, firms are able to realize reductions in processing time, scrap and other areas of waste.⁵ Logically, these reductions in waste have been shown to lead to greater productivity and lower environmental impact. While there are going to be obvious differences from one plant to another, studies have shown that managers can expect some sort of reduction in pollution from these improved manufacturing processes.

An example of pollution reduction can be found in a survey and series of field interviews of furniture manufacturers across the U.S. Undertaken by Robert Klassen of the Ivey School of Business, University of Western Ontario, the study investigated the companies' experiences with JIT and pollution reduction.⁶ Professor Klassen made a few significant observations. In conversations with manufacturing managers, he found “that process changes in manufacturing or finishing operations that were intended to improve environmental performance had also improved delivery performance.” In some cases, the installation of automated machinery to reduce cutting times or increase design flexibility unintentionally led to the reduction in material waste which would otherwise have gone to the landfill. The survey found that among 83 furniture plants there was a statistically significant increase in environmental performance which correlated with investment in JIT initiatives.

Klassen also found that the converse was true. Firms looking to reduce their pollution through process changes found that there was an unintended improvement in manufacturing. As an example, improvements in spray equipment to reduce overspray and lower volatile organic compound emissions also happened to increase labor productivity and increased the line speed for that department, and overall throughput time was decreased. Another plant chose to replace one of its organic adhesives with a water-based adhesive. As a result of process changes required to accommodate this new technique, curing times were decreased, as were the error rates.

In a seemingly contradictory article, Sandra Rothenberg found data suggesting the opposite.⁷ In her survey of 31 automobile assembly plants in North America and Japan, she found a negative correlation between the use of lean process techniques and Volatile Organic Compound (VOC) emissions. However, upon closer examination, her findings showed that a great deal of the environmental improvements made by plants not utilizing lean manufacturing processes were achieved through “end-of-pipe” solutions - something which a number of the lean plants avoided using. In these situations, the actual environmental improvements which could be realized from “end-of-pipe” solutions were not congruent with the concept of lean manufacturing. “Lean” strives to reduce all waste, including unnecessary pollution prevention. While pollution levels from the lean factories were higher, they were able to do this without capital investment, and further pollution reduction could be attained if these companies chose to employ the end-of-pipe cleaning measures which the other companies were already using.

Kaizen

Kaizen has been defined by Soltero and Waldrip (2002) as a corporate culture focused around the concept of continual small improvements in order to eliminate waste throughout an organization, in all systems and processes.⁸ As such, it frequently is used to support other programs, such as Lean Manufacturing or P2 (Pollution Prevention). Here we want to explore how this cultural concept can be coupled with a manufacturing process to improve any pollution prevention already in place.

Since Kaizen is an improvement-based approach, it is important that management defines the goals of the firm upfront to the employees. When workers properly understand what they are attempting to accomplish, it becomes easier to accomplish constant small improvements towards that goal. The paper by Soltero and Waldrip discusses compatibility between Kaizen and lean manufacturing, as well as between Kaizen and P2. The authors discuss the advantages Kaizen has in making improvements in pollution creation as well as in production through small, non-capital intensive changes.⁹ In essence, they suggest that incremental improvements can have a greater impact than large technical improvements.

In one example, comparing incremental manufacturing improvements Toyota made throughout the 1970s to the ones made by U.S. auto makers in the same time period, the authors suggest that these incremental improvements allowed Toyota to outperform its U.S. counterparts. The synergy between Kaizen and P2 can be seen in the comparison of the two philosophies. P2 tends to focus on improvements in machinery and the adoption of newer machines to reduce pollution while maintaining productivity. In contrast, Kaizen focuses on improvements in methods themselves and the incremental improvements therein.

¹ *Manufacturing and Technology News*, Vol 7, No. 16, September 15, 2000.

² *Stanford Report*, May 14, 2003, Symposium makes a case for “green” business practices by Greg Gonzalez.

³ Singh, Jasbinder, “Making Business Sense of Environmental Compliance,” *Sloan Management Review*, Spring 2000.

⁴ Patagonia Website - <http://www.patagonia.com/enviro/pcr.shtml>

⁵ Durham, Delcie R., “Lean and Green: Improving productivity and profitability,” *Manufacturing Engineering*. Vol 131, Sept. 2003, p. 16.

⁶ Klassen, Robert, “Just-in-time Manufacturing and Pollution Prevention Generate Mutual Benefits in the Furniture Industry,” *Interfaces*, Vol 30, May/June 2000, p. 95.

⁷ Rothenberg, Sandra, “Lean, Green, and the quest for superior environmental performance.” *Production and Operations Management*, Vol 10, Fall 2001, p. 228.

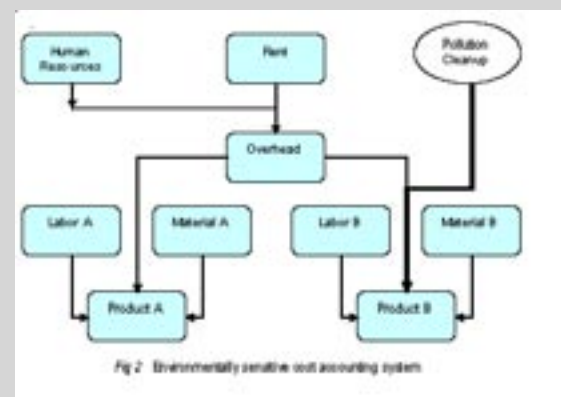
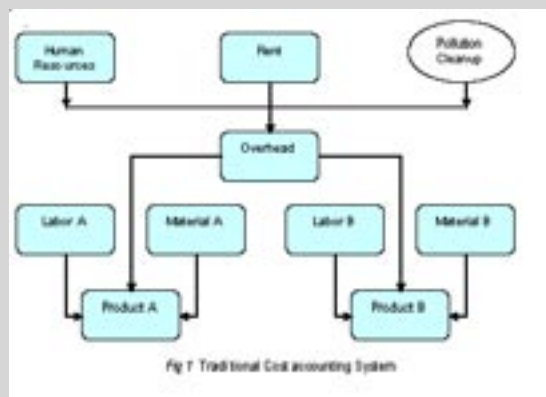
⁸ Soltero, Conrad and Waldrip, Gregory, “Using Kaizen to reduce waste and prevent pollution,” *Environmental Quality Management*, Spring 2002.

⁹ Ibid.

Managerial Accounting - The “Green” Bottom Line

While it may be considered one of the drier parts of operations management, the internal accounting methods a company uses can have a large impact on the performance of the firm. Internal accounting is the method by which corporate goals are elucidated and the benchmark by which good decision making is encouraged. By making the managerial accounting incorporate environmental costs, we are able to influence the benchmarks and thus the

develop ways for reducing these costs. This is the level at which most companies already operate. However, it is important to note that the total costs must be identified. It is not enough simply to track the capital costs of environmental remediation or pollution control. The labor and maintenance involved must also be considered.



decision making of the company. Internal goals and achievements are measured by managerial accounting, and therefore incentives are based on the measures set-up in this accounting system. How could a plan to reduce the environmental impact of a firm succeed without proper incentives?

In Bennett and James’ book, “The Green Bottom Line,” environmentally oriented accounting practices are discussed from both a financial and non-financial standpoint. In assessing a company’s financial performance, the authors suggest tracking expenses from three different aspects:¹

Organizational

On an organizational level, the flows of energy and production-oriented materials (such as water) need to be tracked. The levels of these inputs, as well as the costs of their disposal, can then be monetized and the economic performance tracked. Once this has been put in place, it becomes more feasible to assign costs to individual products as well as

Supply Chain

From the second aspect, the supply chain, the authors recommend using a Life-Cycle Cost Assessment. This assessment focuses on the monetization of all environmental costs and consequences for a product throughout its lifecycle. The significance of this process is that it addresses the often-neglected disposal costs and avoidance costs. Note that at this level the individual costs of pollution control or remediation are assigned to the product. This is a step at which most companies fall short. By lumping all pollution control costs into general overhead, they are not properly assigned to individual products. This gives an erroneous estimation of production costs for the products as some are overestimated and others are underestimated. A chart borrowed from Bennett and James’ book, “The Green Bottom Line” illustrates how this happens. (See fig 1 and fig 2 above). In this particular case, the cost of cleaning up pollution, which is only generated in the production of product B, is

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initially allocated to general overhead and divided between products A and B. By shifting this cost to Product B only, a better picture of the costs of both products is achieved.

Environmental Externalities Costing

The third cost perspective accounts for the environmental consequences of a project or ongoing operations. Costs can be the cost of prevention, the cost of clean-up, or even fines associated with environmental damage.

When all these costs are properly accounted for, they can be associated with their respective products and activities. Organizations can then choose to discontinue particular activities, focus their improvements on particular activities or decide to expand their activities, depending on the results. The use of proper managerial accounting for the environmental impact can have a huge effect on properly directing other methods and activities,

Green Product Development

The pressure on the environment and on natural resources calls for a need to reconfigure manufacturing technology towards environmental friendliness in terms of reduced resource use and reduced environmental impacts in their complete life cycle - from raw material extraction, through production and use to the final disposal or recycling. Manufacturers across the globe are actively flagging the motto of 3R's (Reduce, Reuse and Recycle) and have integrated the approach with their product development methodology to maximize the utilization of available resources and simultaneously create an eco-friendly identity.

such as lean manufacturing or product design, towards the areas which need the most improvement.

¹ Bennett, Martin and James, Peter; "The Green Bottom Line," Greenleaf Publishing Ltd. Wiltshire, UK 2000.

MTM Tours The Kohler Factories

Students and staff in the MTM program had the opportunity to visit Kohler Company on February 20. In addition to its porcelain basin production facilities, they were able to tour the motor and generator production lines. From this tour, MTM students could observe the unusual constraints facing some companies in developing their manufacturing process. Of particular interest was the effect that extended drying times and high rework levels had on inventory levels in the porcelain production segment. With long drying times, large amounts of inventory get built, and the lead time for units is longer than desirable. Alternatives are limited, however, but Kohler is experimenting with the use of technology to speed up this time.

In contrast to the large amounts of inventory and work-in-process in the basin department, the small motors and generator lines were more efficient. Kohler has shifted its production to multiple assembly lines, with batching only taking place in the testing department. In addition, work on finished product inventory reduction has started to show positive results in terms of floor space. It is hoped that lower inventories will allow Kohler to reduce its overall lead times and cut down on costs. Following the tour, students enjoyed a relaxing dinner at The Horse and Plow, a restaurant which is part of the country club complex owned by Kohler.



The Role of Higher Education in Sustainable Manufacturing



With increased global resource consumption tied to both population and standard of living gains, businesses and economies will become increasingly constrained by and dependent upon ecosystems. Thus, competitive advantage in the coming years will be rooted in practices such as pollution prevention, design for environment, life-cycle costing, risk assessment and, most importantly, sustainable development.

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” The World Commission on Environment and Development, 1987, p. 43.

As business decision makers who will have significant impact on the future world, executives and managers will have to consider the environmental impact of their decisions. They will need to develop new business strategies to effectively meet the challenges associated with creating sustainable societies and organizations, and to gain a competitive

advantage in the emerging green world. Thus, if the next generation of business leaders is to excel at managing enterprises for greater competitiveness, it will need the knowledge and skills to tackle not only the financial but also the social and environmental challenges faced by today’s corporations.

Business schools have a significant impact in shaping future leaders. They provide the foundation for the analytical reasoning, strategic thinking, and decision-making frameworks used by business leaders the world over. How the green concept integrates with business education will, in return, affect decisions made by these future leaders.

The roles higher education institutions can play span four domains according to the U.S. Coalition for the Decade of Education for Sustainable Development (<http://www.uscdesd.org>):

1. Promotion and improvement of high quality, relevant basic education
 - Continuous review and updating of curricula and teaching/learning materials to reflect the latest scientific understanding of sustainability;
 - Conduct the scholarship and problem-based scientific research necessary to generate the new knowledge needed for sustainability in collaboration with local communities.
2. The reorienting of existing education policies and programs
 - Strengthen the interface between research findings and decision-making using evidence-based data; Integration of different knowledge systems—indigenous and modern, local and global, cross-disciplinary for sustainability.
3. Development of public understanding and awareness
 - Encourage all educational institutions to include in their activities—in house and outreach—a strong component of reflection on values and norms with respect to sustainable development;
 - Promote inter-cultural exchange of experiences in education for sustainable development.

4. Specialized training programs

- Impart the knowledge, values, attitudes and skills needed to empower people to bring about the changes required to achieve sustainability. Provide life-long learning opportunities to teachers, other professionals, and all citizens.

In the Beyond Grey Pinstripes Survey - 2003, conducted as a collaborative effort between the World Resources Institute (see www.wri.org) and the Business and Society Program at The Aspen Institute (see www.aspenbsp.org), the authors contacted 560 universities in an effort to analyze their teaching, research, and extracurricular activities on responsible social and environmental management between the fall of 2001 and summer 2003. For the first time in four Pinstripes studies, this year's report gave schools extra credit for incorporating instruction on both social effects and environmental management into a wide range of MBA courses, instead of treating them only in separate classes.

The study concluded that the highest-rated schools offer on average four times as many courses on social and environmental subjects as the other schools. They are also home to academics who are researching such topics as the sustainability of emerging markets and new standards of corporate governance. For example, George Washington University offers an Environmental Policy & Management MBA, which consists of six required courses, including sections on the social and environmental impact of corporations. Michigan is home to two professors cited by the Pinstripes survey. It offers 12 electives on socially and environmentally responsible management, plus conferences on themes such as "Corporate Governance & Sustainable Peace." Stanford University has 33 electives dealing with socially and environmentally responsible management, including one called "Ethics & Global Business." Students run Future Alumni Consulting Teams (FACT) to help local nonprofit and public-sector organizations. York University students can choose from among three specializations that focus on doing well by doing good—business ethics, business and sustainability, and nonprofit management & leadership. This Canadian school's professors often publish on such subjects.

What UW-Madison Is Doing to Train the Managers of Tomorrow in Green Manufacturing.

University of Wisconsin-Madison is one of the participating institutions for sustainable business education. The business school helps match interested students with internships in large corporations, government agencies and nonprofit organizations that focus on environmental and social responsibility. In addition, UW-Madison provides elective courses such as Environmental Strategies and Sustainability and Environmental Risk Management.

Courses offered by UW-Madison School of Business:

GB 600 – Environmental Strategy and Sustainability
GB 711 – Ethics, Values and Sustainability
GB 365/765 – Sustainability and the Corporate Response
RMI 365/765 – Environmental Risk Management

Student Organizations:

BASE – Business Action for Sustainable Enterprise
Net Impact – MBA organization

Other Resources:

Gaylord Nelson Institute for Environmental Studies
(www.ies.wisc.edu/)

The Center for Sustainability and the Global Environment (SAGE)
(www.sage.wisc.edu/pages/about)

Quick Response Manufacturing (QRM) Conference on Accounting and Performance Measurement

The QRM workshop, held on March 10, comprised about 70 attendees, including industrial representatives, students and UW-Madison faculty. The workshop began with an introduction by Professor Rajan Suri, director of the QRM Center, and a brief presentation by Professor Ella Mae Matsumura of the School of Business. The presentation focused on the key questions pertaining to the hows and whys of transitioning from traditional performance measures to new measures that are better aligned with QRM.

The next speaker was Paul Allen, director of finance for CARE at GE Datex-Ohmeda who presented alternative methods to absorption accounting that support QRM. His opening remark began “The definition of insanity is doing same things over

and over and expecting different outcomes.” Allen said the philosophy is applicable to accounting practices in companies which definitely need to be reviewed – if not changed. Discussing the benefits of a QRM accounting method over the traditional standard costing system, he advocated a practical approach to accounting, performance measurement, and quality control. He added that companies, small or large, should consider non-financial measures as complementary metrics to quantify manufacturing profits and quality. Remarking on the traditional thought of “what’s useless to us is useless to everyone,” Allen explained the impor-

tance of appropriate goal setting and performance measures. He also added that Datex follows the policy of constantly developing new products to enhance customer satisfaction and incorporates the same motivation in its financial measurements and planning.

The last speaker of the day was Francisco Tubino, director of Chilean-based GPI Consultores, who discussed the pitfalls of using traditional costing approaches with QRM. His discussion went over the lack of connection between lead-time reduction

obtained through QRM and the quantitative benefits achieved. He connected the two by applying “The Power of Six,” which attempts to chart reductions in cost in relation to reduction in lead-time. “The Power of Six” is a formula based on a series of empirical observations in cost reductions from lead-time

reduction. The formula, at its simplest, is that the ratio of the lead-times after divided by the lead-times before is equal to the ratio of before and after costs raised to the power of six. After introducing his theory, he discussed a project undertaken by his consulting firm. The project linked the reductions of manufacturing costs to reductions in lead-time and established “The Power of Six” as a derived cost benefit of implementing QRM and achieving specific lead-time reduction targets. The significance of this theory is it provides a very simple method of linking cost savings to lead-time reductions in order to promote corporate adoption of QRM practices.



MTM Students Participate in the G. Steven Burrill Technology Business Plan Competition

Two MTM students, second-year Yoshiro Fukasaku and first-year Victor Munsen (see cover photo), put together an impressive business plan for the seventh annual G. Steven Burrill Technology Business Plan Competition held in April. Their core idea was to produce electricity from landfill gas and market this to energy providers.

Thirteen other entries focused on a medical diagnosis device, lighted ice in hockey rinks, hearing diagnosis software, a car-swap system, an accessory to enhance the value of notebook computers, integrated communication software, specialized home grocery delivery, a process to develop hydrogen fuels for cars, a wireless parking meter system, synthetic large molecules to enable biotechnology re-

search, a fishing net to prevent losses of large fish, a sports training device, and portable algal toxins detector.

Two winning teams, Spine Dr. (a medical diagnosis device) and Auris Solutions, LLC (hearing diagnosis software), were automatically included in the Wisconsin Governor's Business Plan Competition, which held its final competition in June.

The G. Steven Burrill Technology Business Plan Competition has been co-sponsored by the Erdman Center for many years and past MTM student participants include Mike Wirth and Jamie Lang (MTM '03) and Vivek Dubey (MTM '03).

Letter from the Editors

One day, as we - the editors of MTMatters - contemplated our virtually complete lack of interaction with our readers, we came upon the idea of creating a "Letters to the Editor" section. Unfortunately, we have never received any letters from our readers, putting us in quite a quandary. Undaunted, we decided we could at least initiate communications and write a letter to you, our faithful MTMatters readers.

In our newly discovered freedom to communicate, we began to wonder exactly what our readers want to know and what sort of information needs to be communicated. At the exact moment we pondered this question, a letter arrived—a letter to the editor. We were enthused, and immediately fought over the right to open this miraculous letter, accidentally shredding it to hundreds of miniscule pieces. As we were again without a letter, we imagined what our one enterprising reader wanted to know. What had this curious reader asked in his/her letter? We could only guess, but we thought our reader wanted to know where we get all the great ideas for this newsletter.

This quarter's topic was easier than ever. This is our planet, and those of us on the newsletter staff at MTMatters intend to live at least 50 more years on it. The impact that manufacturing processes have on the environment, as well as methods of mitigating this impact, is very significant, and the concepts of sustainable manufacturing have become very important. The idea of reviewing some of the more popular manufacturing improvement processes and delving into the literature to bring you greater knowledge about ways to help our planet seemed like not only a great newsletter theme, but practically a mission in and of itself.

If you have questions or comments, the staff of MTMatters would be happy to address them in upcoming issues. Please feel free to write us at the address listed on the back cover. Please address all correspondence to "Newsletter, c/o Carol Aspinwall," or email Carol at caspinwall@bus.wisc.edu.

We look forward to hearing from you.
The Editors

Focus

on a

Board Member

Michael Klonsinski
Wisconsin Manufacturing
Extension Partnership (WMEP)

How did your relationship with the MTM program start?

My relationship with MTM began through a number of channels. First, one of the WMEP staff was a student of Urban's [Erdman Center Director Professor Urban Wemmerlöv] and became aware of the program. Second, I am in a TEC (The Executive Committee) group with Dan Olszewski [fellow Erdman Center board member] and he recognized that MTM's educational goals were very much in line with what WMEP tries to do with manufacturers. Third, we had been involved with the UW in projects with Professors Rajan Suri (Quick Response Manufacturing) and Raj Veeramani (UW E-Business Consortium). Through them, we found out more about MTM. Finally, we had wanted to establish a stronger working relationship with the UW-Madison School of Business programs and MTM looked like the best fit.

What role does WMEP play in relationship to manufacturing and business development in Wisconsin?

WMEP provides technical expertise and business assistance to small and mid-size Wisconsin manufacturers. WMEP manufacturing specialists work hands-on with these firms to help them put in place strategies such as lean manufacturing and quality systems so that they can compete in the

tough manufacturing environment of today. We partner with other institutions, like the University of Wisconsin, to bring those resources to Wisconsin manufacturers. We are a non-profit organization specifically focused on keeping and growing manufacturing in the state.

Last year, WMEP assisted over 450 Wisconsin manufacturers and client firms that reported over \$124 million in retained or increased business, \$33 million in reduced operating costs, and 1,307 jobs saved or created. It is a great business to be in—rewarding results, great customers, excellent staff, and never the same problem twice.

What is your background and education?

I have a BS in Industrial Engineering ('82) from the University of Wisconsin-Madison, a Master's in Business Administration from the University of Texas-Austin (IS management concentration), and post-graduate work in government at the UT, as well. I worked in manufacturing management at Texas Instruments, directed the state of Texas' Office of Advanced Technology where I put in place policies and programs to advance technology development and adoption. I started the Texas Manufacturing Assistance Center (the Texas MEP) and then returned home to Wisconsin in October 1997 as executive director of the Wisconsin Manufacturing Extension Partnership.

MTM Alumni — Where are they now?



Hongbing Qin
(MTM 2000)
Contract Consultant
Cisco
Houston, Texas

What are your current job responsibilities?

Currently, I work at Cisco as a contract consultant to develop some Voice over IP Network (VoIP) courses for Cisco's training partners. VoIP is very hot nowadays in the market. The main benefit is for enterprises to converge their traditional separate voice, data, and even video networks into one network. Then, the enterprise not only can cut operation costs, but also gain competitive advantage by introducing new services and products into the process. My job is to develop courses for Cisco's newly launched products. Originally, this part of work was outsourced to Cisco learning partners. Recently, Cisco changed its strategy to develop more and more courses in house. Course development is a very complicated process. It will involve people from business units, channel partners, product development and publishing product teams. It's a challenging job for me. So far, I am enjoying it.

What major projects have you been working on? Results?

I have worked at Cisco since November, 2003. Before that, I worked as a network consultant at Schlumberger Sema Network and Infrastructure Solutions. There, I experienced a three-year long organization change before I left the company.

Fortunately, I attended one of Urban's [Erdman Center Director Professor Urban Wemmerlöv] classes on Change Management while I was in the MTM program.

I have completed several large networking consulting projects. I want to mention two here. The first

one was during the dot-com boom. One company bought another company to expand its business. The direct result of the acquisition was to merge their networks worldwide. It took one and half a years to get this done. The second one was to split the previous mentioned company from the bought company after it tried three years but failed to integrate their businesses. This time, it took half a year to complete. Funny? Yes, everything went back to the original place. Even worse is that the original buying price was \$5.5 billion, and the selling price was \$1.5 billion three years later. What did I gain in the process? Besides the feeling of wasted time, I was technically a novice when I started in 2000, and I became a technical expert in the networking industry two years later.

What future goals do you have?

My near-term objective is to rotate in different business environments to get more business experience. I look for interesting business opportunities all the time. I expect to start my own business, finally. The last couple of years weren't a good time to pursue entrepreneurship activities. However, as the economy is recovering now, the situation probably will change.

How do you think the MTM helped in your career success?

The MTM program helped me a lot to survive in a tough situation. As I mentioned, I liked Urban's Change Management class very much. I didn't expect to learn some new technology or skills in that class, but to expose myself to those issues and questions. I guess, sooner or later, you will see them.

The Erdman Center for Manufacturing and Technology Management is the “Home of the MTM Program”

Manufacturing and Technology Management is a cross-functional area of study that is concerned with the development, implementation, and improvement of processes, technologies, and management systems for the purpose of designing, making, and delivering goods and services in an efficient and effective manner that brings value to the customer. This MBA program leverages the students’ backgrounds in engineering and science in generating new skills in product/technology development, business and manufacturing process improvements, IS implementation, and the strategic use of technology.

MTM graduates’ career goals include leadership positions in operations, supply chain, product and technology management, business development, and consulting. They have been placed in a variety of large and small organizations. Employers include Abbott Labs, Accenture, Celerant, DaimlerChrysler, Deere & Co, Deloitte Consulting, Delphi, Eaton, EPIC Systems, General Motors, Harley-Davidson, i2, Intel, Johnson Controls, JohnsonDiversey, Novartis, Philips Broadband Networks, Promega, Rayovac, Samsung, Schlumberger, Sonoco, Sorrento Lactalis, TRW, ZS Associates, and others.

The MTM Program is administered by the Erdman Center and guided by an Academic Advisory Board comprising faculty from the School of Business and the College of Engineering. Also linked to programs is an Industrial Advisory Board with members drawn from 20+ organizations.

For more information on the MTM Program at the University of Wisconsin-Madison School of Business, please go to www.bus.wisc.edu/erdman.

Note: On July 1, 2004, the MTM program changed its name to OTM - Operations and Technology Management.

The MTM Newsletter



The Newsletter is produced by the graduate students in the Manufacturing and Technology Management Program under supervision of Center Director Urban Wemmerlöv. The objective is to inform professionals, faculty, and students of the Erdman Center activities and events in the field of operations and technology management.

Editors/Reporters: Xiaodong Yin, Victor Munsen, and Shradha Pathak.

The Erdman Center for Manufacturing and Technology Management

Director Urban Wemmerlöv
Associate Director Carol Aspinwall
Program Assistant..... Mollie Anderson

University of Wisconsin-Madison
School of Business
4284 Grainger Hall, 975 University Ave
Madison, WI 53706-1323
Phone: (608) 263-2563
FAX: (608) 263-3142
E-mail: ErdmanCtr@bus.wisc.edu
Web: www.bus.wisc.edu/erdman