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# WISCONSIN WEEK

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## Wisconsin Idea

### Custom solutions keep manufacturers competitive

By Sandra Knisely  
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Every weeknight when the lights come up on the set of “The Tonight Show with Conan O’Brien,” the staff at Electronic Theatre Controls (ETC) can point to the television screen and say “we did that.”

Based in Middleton, ETC is an entertainment and architectural lighting equipment manufacturer that has lit the stages of Broadway, Disney parades and local theaters.

As a global company, ETC produces lighting fixtures for many countries, each with different voltage and connector standards. To find a way to efficiently produce a variety of fixtures, the company turned to the UW-Madison Center for Quick Response Manufacturing. The center is a partnership between UW-Madison and more than 50 member companies dedicated to researching and implementing quick-response manufacturing (QRM) principles, methods and tools.

The QRM philosophy was originally developed by UW-Madison professor emeritus Rajan Suri, from the Department of Industrial and Systems Engineering in the College of Engineering. QRM focuses on reducing lead time (the amount of time needed to develop and deliver a product) by evaluating the entire manufacturing process. This includes order processing, purchasing, design, the shop floor, shipping and after-market service. Faculty and students at the center work with manufacturers to develop new principles to create tailored solutions for businesses that help them dramatically reduce lead times.

Industrial and systems engineering professor Ananth Krishnamurthy took over as director of the QRM center in January 2008 when Suri retired. Krishnamurthy completed his Ph.D. in industrial engineering under Suri’s mentorship and has been affiliated with the center for more than a decade. He supervised industry projects, led research activities and spoke at numerous QRM workshops and conferences. Krishnamurthy is also the director of the UW-Madison Manufacturing Systems Engineering (MSE) program, an interdisciplinary master’s program that combines engineering and business courses. The QRM Center provides extensive support to the MSE program.

The center conducts cutting-edge research on strategies to improve manufacturing competitiveness and works in partnership with several businesses operating in low-volume, high-mix manufacturing environments. Through graduate student-led projects, conferences and employee training sessions, the center helps to transfer university research to industry resulting in tangible benefits to their bottom lines. In the 16 years since its founding, the center



Ananth Krishnamurthy (second from right), associate professor of industrial engineering, and three of his students tour the production facility of the RenewAire factory in Madison with company representative Chuck Gates (right). RenewAire is among several companies that have partnered with the UW-Madison Center for Quick Response Manufacturing to research and implement quick-response manufacturing principles, methods and tools.

has completed more than 400 projects with more than 200 company partners, most of which are based in the Midwest and range from small, local manufacturers to large, national corporations.

An example is P&H Mining from Milwaukee, which manufactures custom mining equipment, including shovels, draglines and drilling products. The company designs and engineers each product to meet its customers’ specific needs. As a result, each P&H customer order varies in quantity and manufacturing complexity; QRM offers specific principles to address this complexity.

“We were visiting lean manufacturing factories, but the philosophy wasn’t the best match,” says P&H plant manager Bob Mueller. Lean manufacturing is a traditional approach that establishes production flow in high-volume, low-variety environments.

Mueller and project manager Kathy Pelto led the efforts to implement QRM principles at P&H Mining, while QRM center faculty conducted employee-training sessions. When the company purchased new shop equipment, the P&H team ensured the equipment was set up according to a QRM workflow, which groups employees working on a particular product into a cluster, or cell.

QRM principles helped reduce P&H Mining lead times by 66 percent, resulting in significant cost savings. According to Mueller and Pelto, key to this success is how well P&H Mining employees embraced QRM.

“Workers plan their own work, which leads to more fulfillment after a day on the job,” Mueller says. Pelto adds that the shop workers, who are unionized, feel a sense of ownership for the products since they are part of the process almost from start to finish, rather than seeing a product only at

one point in the production process.

QRM principles also are making a difference for Madison-based RenewAire, which is a leading producer of energy-efficient ventilation systems. RenewAire became a QRM partner in 2002, when the company was experiencing rapid growth. Like P&H Mining, RenewAire didn’t find lean manufacturing to be a good fit for its variable environment.

“We struggled mightily with variable customer demand, and it was a huge relief to find a central methodology we could build plans around,” says RenewAire president Chuck Gates. “QRM allowed us to move from bunker mentality to a mindset of empowerment.”

With help from the QRM center, RenewAire established two focused target markets: residential and commercial customers. The company then created teams to directly serve both customer groups from order to delivery, so instead of specializing in one production task, employees specialized on their particular customer.

The results were tremendous. “Between 2003 and 2008, revenue has increased 130 percent,” says Gates. “Lead time for residential products has been reduced from 10 days to one. Lead time for commercial sector products was 25 days and now is 10 days.”

These kinds of results challenge the misconception that manufacturing is too expensive in the United States and must be outsourced to other countries. According to Krishnamurthy, labor costs generally make up only 10 to 20 percent of total manufacturing costs, so reducing labor costs by outsourcing overseas may save only 5 or 6 percent of total costs. These meager savings also come at a price: time.

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### Reaccreditation creates vision for campus

By Dennis Chaptman  
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The enormous, campuswide task of examining the university’s mission and charting a course for its future has resulted in a 10-year institutional reaccreditation.

The reaccreditation, which does not require further follow-up, was made by the Higher Learning Commission, a commission of the North Central Association of Colleges and Schools.

“This two-year process of self-study gave us a chance to articulate our values, define our mission and establish a strategic plan to move the university forward together,” says Provost Paul DeLuca. “This was an inclusive community effort. It gives us an organic plan and allows us to align our goals campuswide.”

Accreditation is the primary means of assuring accountability and improving the quality of higher education institutions. It is required to receive federal and state funding and is essential for private-sector financial support. UW-Madison has been continuously accredited since 1913.

But this process went well beyond that need to demonstrate how the university meets the accreditation criteria. The 2009 reaccreditation process created a shared vision and a strategic framework to guide campus decisions and establish thoughtful priorities for the future.

Nancy Mathews, who led the campus’s reaccreditation effort, says that more than 6,000 people were engaged in the effort, and more than 300 participated in the work of theme teams. Their work results in a 317-page self-study that informed the reaccreditation process and provided guidance for the university’s future.

“Because of the way we conducted the self-study, using exceptionally inclusive and transparent processes, we created a rare moment in time where there was alignment across campus and widespread buy-in to a shared vision for the future,” Mathews says.

A site visit by a team assembled by the Higher Learning Commission was held from April 27-29. The team’s consultant evaluators, the majority from peer institutions, were highly impressed. They found the self-study reports to “contain impressive, thought-provoking creativity, analysis and integration of ideas



DeLuca

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and possibilities.”

Their report recognized the university for its energetic effort to reinvest in facilities, its strong culture of extramural support, and its ability to recruit and retain a “faculty of the highest caliber, with many enthusiastic for interdisciplinary work.”

The team also found that the emphasis on outreach through the Wisconsin Idea helps solidify the university’s excellence.

“The powerful Wisconsin Idea continues to shape and illuminate vision and mission at the University of Wisconsin-Madison and proves adaptable to changing times,” the report states.

The team noted Chancellor Biddy Martin’s assertion that “UW-Madison is one of the highest quality providers of the education and research on which future economic, social and cultural progress depends.”

According to the team, Martin’s statement was born out by the self-study, the campus and its constituents.

“Team members applaud this outstanding public research university for its range of significant accomplishments and progress and its continuing commitment to world-class education, research and public engagement,” the team said.

In closing, the report advised UW-Madison to “continue on its course of engaged and goal-driven progress and anticipates that, 10 years on, the next Higher Learning Commission team will again be witness to an institution that has continued to grow in stature and excellence.”

Mathews says the evaluation captured the campus culture, noting the strengths and traditions that set UW-Madison apart. She said that while the team found no serious concerns about the university, they did offer a number of recommendations for consideration, among them:

- Enhance administrative and financial flexibilities

- Continue to seek creative solutions to compensation challenges to recruit and retain world-class faculty, staff and students

- Refocus and align diversity and climate initiatives

- Continue to assess student learning

- Increase coordination of international initiatives

- Explore ways to redefine, reward and promote outreach scholarship

- Continue to advance interdisciplinary scholarship and promote complex problem-based approaches and

- Explore opportunities for growth in continuing education.

In addition to reaccreditation, the two-and-a-half-year process also produced a strategic framework intended to be a living document, informing campus decisions and policy.

The chancellor, in a letter acknowledging

the team’s report, said that the university was pleased with the assessment, especially during a time when public higher education faces challenging times.

“We are grateful to the team for its reflections on ways in which public institutions such as ours can and must strive to maintain access, increase diversity and continue

to serve the public while also contributing to advancements in science and technology and the arts and humanities,” she wrote.

Mathews emphasizes that the success of the effort is attributable to the commitment and passion of those who contributed to the entire effort across the campus.

“As the university moves forward with its implementation of its strategic framework that evolved from the reaccreditation process, I encourage us to continue to embrace the shared governance approach that we used — not only to honor our tradition — but also to ensure that we continue to collectively realize our vision,” she says.

The report, self-study and other information can be found at <http://www.greatu.wisc.edu>. For more on the strategic plan, visit <http://chancellor.wisc.edu/strategicplan/>. □

**UW-Madison should “continue on its course of engaged and goal-driven progress ... 10 years on, the next Higher Education Commission team will again be witness to an institution that has continued to grow in stature and excellence.”**

— Reaccreditation report

## Study: Early voting may decrease turnout

Although states are moving quickly to put in place election procedures that allow for early voting, allowing people to cast ballots ahead of Election Day often results in lower turnout, according to research from a team of UW-Madison political scientists.

However, in states such as Wisconsin, which also allow voters to register at the polls, the effect on turnout is more muted, the research showed.

Although about 30 percent of voters cast ballots before election day in 2008, the buzz that builds around Election Day — the key to bringing less-dedicated voters to the polls — isn’t as strong when voting activity is spread out over the last weeks of the campaign, the report shows.

One in five Wisconsin voters cast absentee ballots in 2008, prompting the Government Accountability Board to study whether early voting should be offered here. Wisconsin voters may vote by absentee ballot without giving a reason, but the practice isn’t considered early voting because ballots aren’t placed or cast in a voting machine.

The early voting research was conducted through a collaboration between the UW-Madison Department of Political Science and the state of Wisconsin’s Government Accountability Board, which works with municipal officials to administer state elections. □

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“When you ship from overseas, the products sit on a boat for three to four months, so you have to machine months worth of inventory ahead of time, which may be obsolete by the time it gets here,” says Krishnamurthy. “Sourcing from overseas also limits your ability to adapt to demand changes and introduce the latest designs into your product. This could lead to loss of potential business opportunities.”

These are valuable openings for manufacturers that would like to compete based on their ability to manufacture custom products quickly — the QRM center is helping companies take advantage of these opportunities.

“The strength of American manufacturing is in small- and medium-sized manufacturers. That’s where the innovation really takes place, and by supporting these companies we provide a valuable service,” says Krishnamurthy.

Gates appreciates the help.

“Small to medium manufacturers make up the majority of manufacturing output in the United States,” Gates says. “So this sector is absolutely vital to our economic health as a nation. QRM methodology makes it possible to offer a wide variety of products delivered in a short amount of time — in effect giving the customer what they want, when they want it. This gives U.S. companies an advantage.”

The partnerships between manufacturers and the QRM center are mutually beneficial. Several partners have hired QRM students, including P&H Mining, which has hired two graduates full time and others as interns to continue their academic-year projects into the summer. “Every year the students are really high caliber,” says Mueller.

ETC hired Alex Stoltz 11 years ago after he graduated from the MSE program and

worked on a QRM center student project.

“I really understood the philosophy of lead time reduction, and ETC was just getting into it when I started here,” he says. “We’ve hired another engineer from the program and another is currently enrolled. It’s really been a win-win relationship for ETC, MSE and the QRM center.”

ETC regularly participates in student projects, and after each one the company implements some of the project recommendations. Overall, ETC has reduced lead times by more than 30 percent and has seen cost savings by reducing scrap, handling and rework.

In addition to the student projects, the QRM center hosts international conferences and seminars to introduce a wide range of businesses to the benefits and possibilities of QRM. These events not only train industry professionals, but also help identify research issues of industry relevance. Learn more about the center’s activities and upcoming events at <http://www.qrmcenter.org>.

Krishnamurthy is looking forward to expanding the center’s national presence as he and his team continue to help businesses embrace QRM. “We recognize that in the future, more and more manufacturers will be required to offer a high variety of customized products at short lead times,” Krishnamurthy says.

“At the QRM center, we are at the forefront of identifying theories that would define manufacturing competitiveness in the future and helping businesses implement these theories. As we pull out of these tough economic times, companies that are well equipped to meet these challenges will succeed and the QRM Center is proud to help them chart their success.” □

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