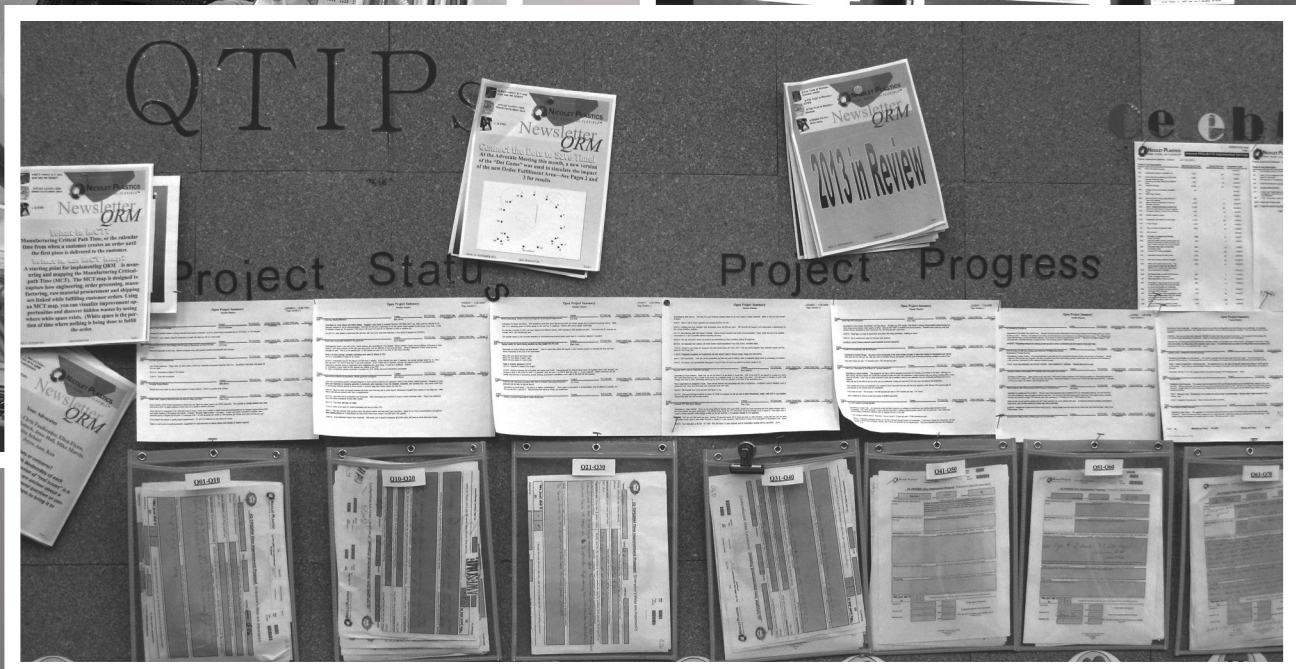


What Would You Do with An Extra Week of Time, Compliments of Nicolet Plastics



The QRM Center is a university-industry partnership dedicated to improving manufacturing competitiveness through research and implementation of lead time reduction principles.

We Manufacture Time!

Nicolet Plastics uses QRM to exploit strengths, turn weakness into opportunity

by Kathleen Watson

"Change is a way of life. It is an opportunity, not a threat," says Bob MacIntosh, CEO of Nicolet Plastics Inc., a small plastic-injection molder nestled in Northern Wisconsin's Nicolet Forest.

Openness to change enabled MacIntosh, along with key player CFO Joyce Warnacut, to seize new opportunities in a foundering economy. With employee cooperation and support, they have transformed Nicolet from a firm struggling to adapt to a changing economic landscape to an enterprise that has emerged thriving, with the financial metrics to prove it.

plastic-injection molded parts were able to reduce overall costs by capitalizing on the low wage rates of an abundant overseas labor force. But low- to moderate-volume plastics companies were unable to take advantage of the overseas shift, partly because of shipping time and costs, and partly because offshore workers lacked the technical skills to create products as complex as those Nicolet was manufacturing.

"I knew our business was complex," he confirms. "We had hundreds of tools, hundreds of material and color combinations. We accepted practically every order



Company Profile

Founded 1986
Privately held
Located in Mountain, Wis.,
in Chequamegon-Nicolet
National Forest
Custom injection-molded
plastic parts, assembly
operations
45,000-square-foot
production facility
65 employees
ISO 9001:2008 Certified

Products and Services

Tooling design and
development
Offshore tooling coordination
Injection molding
Tooling maintenance
Parts decorating
Secondary machining and
assembly
Point-of-use delivery
Vendor-Managed Inventory

Markets Served

Industrial
Medical
Construction
Furnishings
Transportation

www.nicoletplastics.com

"We should have been paying closer attention to our customer base. It had not occurred to us that we maybe shouldn't try to be all things to all people. We needed to be more selective, deciding on our ideal market, and then working hard to better serve a smaller number of customers." — Bob MacIntosh

"In 2009, some industry trends in plastics reflected the trend of major multinational firms: increasingly moving production offshore to get away from rising costs at home," MacIntosh says.

Companies producing high-volume, minimally complex

that came our way. We took every opportunity to build a tool, just to keep our guys busy. I sensed that if we could control our complexity, we would be unique in the marketplace."

Sales dropped by 36 percent in 2009, forcing deliberation about

“QRM looked like our best shot at controlling and managing the complexity we had created over the past 23 years.” — Bob MacIntosh

a change of direction. “We began to realize that in order to remain competitive in that environment, we’d have to exploit our strengths and turn weakness into opportunity,” MacIntosh says.

Manufacturing complex injection-molded parts requires sophisticated scheduling practices, efficient material management and a skilled workforce. In hindsight, MacIntosh says, “Rather than focusing on keeping busy, we should have been evaluating our equipment and ERP system; our labor, training, and workforce-development practices.”

“And we should have been paying closer attention to our customer base,” he adds. “It had not occurred to us that we maybe shouldn’t try to be all things to all people. We needed to be more selective, deciding on our ideal market, and then working hard to better serve a smaller number of customers.”

MacIntosh began searching for manufacturing philosophies that supported the needs of Nicolet’s low-volume, high-mix manufacturing niche.

QRM emerges in search for alternate manufacturing approach

He doesn’t recall exactly when or where he first became aware of Quick Response Manufacturing (QRM) — possibly a magazine article — but when a QRM seminar

brochure arrived in the mail, it caught his attention. He suggested that Warnacut and Nicolet’s production manager attend the two-day event in Madison.

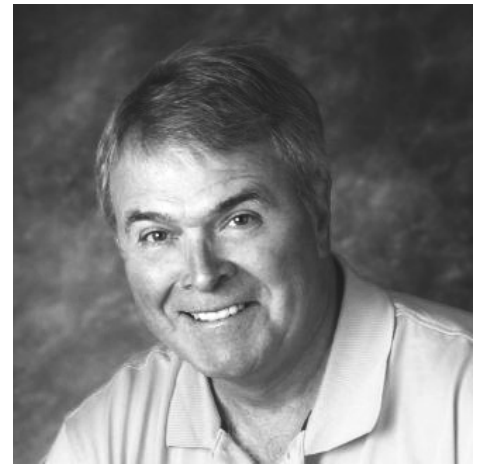
Warnacut hadn’t been with Nicolet long, but she recalls that the company she’d recently left was successfully using practices similar to QRM, “although that’s not what it was called,” she says.

“QRM looked like our best shot at controlling and managing the complexity we had created over the past 23 years,” MacIntosh says. “Joyce became one of our strongest believers and did much of the work creating our new business model.”

Past manufacturing practices complicated tackling challenges head-on

Between 2001 and 2008, MacIntosh had bought out three partners. “The impact of the buyouts, coupled with the 36 percent reduction in sales, wiped out most of the equity on our balance sheet,” he says.

But raw material purchases gradually dropped — the result of smaller orders — and the amount of finished-goods inventory Nicolet was accustomed to maintaining diminished. Combined, the cost reductions began to resolve the issue of cash flow that was needed to support enacting the changes Nicolet wanted to begin making.



Bob MacIntosh, CEO

As an example of how Nicolet operated pre-QRM, MacIntosh explains, “If a customer normally bought 100,000 parts in a year, we would make 100,000 parts as soon as the first order arrived, even if the number of parts initially requested was for only a portion of that estimated total quantity. We kept extra unordered parts in inventory.”

As QRM took hold, Nicolet began focusing on fewer customers, electing to serve only those whose needs aligned with the way the redesigned company wanted to do business: shorter runs of more-highly customized parts. “By changing our customer base, we didn’t have to purchase materials in the quantities it takes to produce big orders,” MacIntosh explains.

Three-phase action plan supports goals and objectives

Preparing to implement QRM at Nicolet started by creating goals and objectives. Warnacut led that task, and she followed up with a three-phased plan to tackle the companywide transition to Quick Response Manufacturing that she and MacIntosh agreed was their key to future success.

Customized workforce training creates highly skilled, cross-functional employees

Because Nicolet Plastics is a small organization — about a dozen production employees operate each of three shifts — the cellular organization on which QRM methodology is based has been modified to a team concept. “Each team functions as a cell, as each shift of employees completes all necessary molding operations,” Warnacut says.

One of the tenets of QRM is to have a cross-functional workforce,

Goals and Objectives

- Reduce total lead time (from order placement to delivery) of injection-molded parts from 21 days to 7
- Reduce finished goods inventory
- Develop the ability to respond to unexpected changes in demand without degradation of service
- Develop a cross-trained workforce to achieve flexibility
- Create a cross-functional Quick Response Office Cell (Q-ROC) for customer service, scheduling, purchasing and shipping
- Reduce white space (the component of overall lead time when a job sits idle)
- Reduce time between last-shot (last good piece molded for one order) and first-shot (first good piece molded for next order) by 50 percent

“Before QRM, our workforce had been very traditional for a plastics manufacturer. We assigned people to specific jobs with titles such as mold hanger, material handler, process technician, production technician.”

— Joyce Warnacut

“Before QRM, ours had been very traditional for a plastics manufacturer,” Warnacut says. “We assigned people to specific jobs with titles such as mold hanger, material handler, process technician, production technician. We recognized that developing a multi-skilled workforce was key to our plan for change.”

To better adhere to the cross-training principle of QRM, Warnacut worked with human

resources and production employees to develop a matrix that outlined required skills for each team as well as the training that would be needed to achieve credentials for that skill group. “The matrix also helped identify gaps between our target skills mix and what skills actually existed,” she says.

Taking into account the human element of motivation, incentives were designed to recognize and reward employees for the time and effort invested expanding their skill base. A training coordinator joined the company to oversee the skills-credentialing process and to maintain the training materials and audit program. (An employee is credentialed by passing a test and proving, in writing and through hands-on demonstration, that a skill has been mastered.)

Three-phase Plan

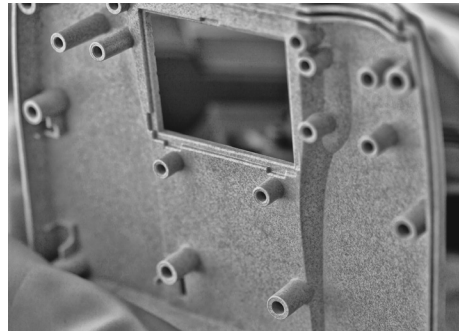
- **Phase I** Education and analysis: create customer service Quick Response Office Cell; develop material plan
- **Phase II** Implementation: reduce lead time by 7 days; increase flexibility through skills matrix and cross-training; reduce time between last shot and first shot
- **Phase III** Continuous improvement: Reduce lead time by another 7 days; continue to improve last-shot to first-shot time; reduce steps and time to enter data into shop-floor computers by replacing stationary PCs with press-side portable tablets; introduce QRM concept to assembly processes

Results

- Velocity increased by magnitude of 3X
- Finished goods inventory reduced by 60%: \$500,000 in 2008 to an average of \$200,000 in 2012 as sales doubled
- Finished goods inventory turns: increased from 11 to 25 times a year
- Lead-time reduced by 7 days (halfway to goal)
- Scrap hours reduced by 45%



Wheel for a portable welding machine



Component of a case for a metering device that monitors sound levels and air quality in industrial settings



Glide used in wire systems for chairs made for a commercial furniture manufacturer

“Our matrix has progressed from showing skills functionally aligned by job description to an open concept; there is no job description, only skill levels and the number of ‘apples,’” Warnacut says. “Apples” refers to the company’s Apple Rewards Program, for which CEO MacIntosh’s name was the inspiration. (Macintosh, of course, also is a type of apple.)

Apple Rewards at core of innovative cross-training approach

Extra compensation for employees who acquire new skills is at the heart of the Apple Rewards incentive program.

“Skills are evaluated on relative difficulty, training, and how much on-the-job experience is required to master each skill,” Warnacut explains. For every 10 apples earned, the employee receives an additional 50 cents an hour. By learning multiple new skills, thereby adding to both their and their team’s value, workers have earning potential of up to \$9 an hour beyond the entry-level rate.

“Employees need encouragement, coaching and development plans in order to make the changes necessary for QRM to work,” Warnacut confirms.

She also took steps in developing QRM training to ensure what she calls “making it real” to Nicolet Plastics. “We used Rajan Suri’s second book, *It’s About Time, The Competitive Advantage of Quick Response Manufacturing*, covering a chapter a week. We developed an internal customized study guide to help our employees see how the concepts relate directly to Nicolet’s business,” she explains.

A customized 10-point quiz links key QRM principles to Nicolet’s operations. “We keep QRM visual with boards of QRM metrics — MCT (Manufacturing Critical-path Time), scrap hours, changeover time — and we keep it fresh with regular newsletters and refresher training. We hold all-employee meetings three times a year, and QRM is a regular topic,” she adds.

Cost accounting replaced by Value Stream accounting

A highly significant aspect of Nicolet’s ability to implement and make such strides with QRM is

its accounting approach and how Warnacut as CFO has taken a different path. She quotes business guru Eliyahu Goldratt, who proclaimed, “Cost accounting is enemy No. 1 of productivity.”

“We now focus on how the process produces the results rather than focusing on using the results to evaluate the process,” Warnacut says. “We measure improvements, and we use metrics that motivate eliminating the white space to achieve lead-time reduction.”

She points, for example, to the waste in cost accounting practices

Joyce Warnacut, CFO



“Our matrix has progressed from showing skills functionally aligned by job description to an open concept; there is no job description, only skill levels.”
— Joyce Warnacut



Storing tools and dies adjacent to presses on the mezzanine level of the plant saves operators setup time.

that dictate collection, accumulation and analysis of transactional data that doesn't add value; and to the time spent calculating and reporting on traditional metrics that incentivize over-production and inventory, which run counter to QRM's approach.

"Standard cost accounting is reactive, not predictive," she says, "and it distorts product profitability. In a low-volume, high-mix environment, it will not accurately reflect the situation for every machine, labor and product mix situation."

"What you measure matters," she emphasizes. "For us, time-based metrics are what count. We look for improvement trends rather than a set goal." And she issues this reminder: Standard cost accounting is not required by GAAP, generally accepted accounting principles.

"We manufacture time!" Nicolet now boasts

When MacIntosh began to see results, he wanted to spread the word in everyday terms, yet with as much impact as possible. He considers time a precious commodity, a valued resource, and he wants others to know that he recognizes and values theirs.

So he stresses that when you make Nicolet your plastic-parts supplier, you get not only the parts you need; you get the gift of time — at least an extra week, by his

estimates — to use for other things because Nicolet ships orders so quickly.

The principles and practices of Quick Response Manufacturing now permeate Nicolet Plastics. "It took time," Warnacut says. "We're a small company, so we almost had to transition everything at once. We could not have picked just one shift to implement QRM without the other two being affected and involved."

A Q-ROC — Quick Response Office Cell — was Nicolet's first

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experiment with the cell concept and cross-training. It was designed to eliminate the movement of a new order through multiple locations and the time required by that disjointed process.

The cell brought together in one office individuals responsible for customer service, scheduling, purchasing and shipping. Results were a streamlined order-acceptance and -acknowledgement process, a purchasing plan that eliminated weeks of time for securing purchased materials, and ridding the ERP system of a built-in allotment “cushion” for this group of functions.

It took nearly a year after the Q-ROC formed to begin applying QRM in the rest of the company. Implementing cell scheduling was the most difficult, according to Warnacut. “Using the concepts of visual capacity signals and push-pull from POLCA [a material-control system with color-coded cards that direct work into cells based on available capacity], we developed a cell scheduling board to help ensure the most effective use of capacity. It dictates that jobs not start until all resources are available to finish the job, which prevents having it stop downstream to wait for missing parts or materials.”

“A lot of our learning was by trial and error,” MacIntosh says. “After identifying what needed to change, we tried to provide our employees with the tools to accomplish the objectives.”

A number of buzzwords emerged from the change in philosophy and direction. “Fast, Fluid and Flexible,” a Nicolet trademark, implies delivering

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customized products in significantly less time than competitors (Fast); adjusting to fluctuations while providing quick response at every stage of customer interaction (Fluid); and maintaining the ability to change on a moment’s notice without having those changes translate to a degradation of service (Flexible).

Velocity, another addition to the Nicolet lexicon, refers to the company’s ability to achieve operational speed while moving in the right direction, with a special focus on how rapidly goods move through the production process. “High velocity improves productivity and working capital; it improves cash flow; and it helps improve margins, revenue and market share,” MacIntosh explains.

The QRM journey continues

Nicolet’s QRM transition is by no means complete. A Q-Tips program — QRM Time Improvement Proposal — keeps suggestions flowing. Forty-nine suggestions for time-reduction in one area or another had been submitted before the first half of 2013 was over. Employee suggestions acted on by August 2013 are saving an estimated 2,934 hours. Other Q-Tips implemented in 2013 should result in trimming another 1,500–1,800 hours, and the program continues to gain momentum. Warnacut credits Nicolet’s companywide mantra for the high level of participation QRM fosters: “See it, own it, solve it, do it.”

Human Resources Manager Ann Kronn, front, with, from left: Vice President of Engineering Services Doug Baril, President/CEO Bob Macintosh and Chief Financial Officer Joyce Warnacut



"We're reorganizing our plant and forming our first true manufacturing cell," Warnacut reports. "The cross-training we have done is paying off; when we see bottlenecks developing, we move quickly to get people in place to remedy them."

She points out the advantages of bringing assembly and production operators together in one order-fulfillment area. "We're eliminating travel time between functions, but more significantly, we're benefiting from the communication, feedback and ideas generated from having all operators work in proximity to each other."

The first quarter of 2014 should be marked by the announcement of seven-day lead times. "At the start of our journey, we were at 21 days. We now have eliminated 14 days, a 67 percent reduction!" Warnacut boasts.

"Our achievement with lead time reductions for our current customers and prospects has clearly differentiated Nicolet Plastics from other plastic-injection molders," MacIntosh says. "We have been able to develop partnerships with clients based on the value that we deliver, not on the price we charge."

Nicolet's focus on complex industrial and medical components and assemblies has meant fewer customers — from 74 in 2009 to 60 at the end of 2013 — but higher profits.

"Quick Response Manufacturing is a journey," MacIntosh says. "Nicolet Plastics is committed to continuous improvement and relentless pursuit of lead time reduction. We have made significant achievements since 2009, but we're happy to say that we're not done yet. Meanwhile, we sure like where we're going."

Awards and Recognition

- New North Workplace Excellence Award
- Finalist for Wisconsin Manufacturer of the Year 2011; Finalist again in 2012 for Workforce Development and Small Business categories
- Manufacturing Leadership (ML 100) Award: Operational Excellence
- 2013 Supplier of the Year by Krueger International

Center for Quick Response Manufacturing (QRM)

Established in 1993, the Center for Quick Response Manufacturing at the University of Wisconsin-Madison is a partnership between industry, faculty and students, dedicated to the development and implementation of lead time reduction principles.

For almost two decades, the QRM Center has helped more than 200 companies of varying sizes from a wide array of industries reduce lead times in all aspects of their operations to become more competitive in the global marketplace. The Center can point to a respectable track record, with several member companies realizing lead time reductions exceeding 80%, cost reductions of up to 30%, and on-time delivery improvements to over 99%.

For more information, check www.qrmcenter.org, join our QRM LinkedIn group or contact us directly at 608-262-4709.



Center for
**Quick
Response
Manufacturing**

University of Wisconsin-Madison

3160 Engineering Centers Building
1550 Engineering Drive
Madison, Wis. 53706

EMAIL qrm@engr.wisc.edu

PHONE 608-262-4709

WEB www.qrmcenter.org