QRM Assures a Bright Future for Lighting Specialist Phoenix Products

The QRM Center is a university-industry partnership dedicated to improving manufacturing competitiveness through research and implementation of lead time reduction principles.
QRM Challenges Mindset, Cuts Lead Times, Boosts Profits

by Kathleen Watson

When a company’s CEO has a background in economics and accounting, and he holds both CPA and CFA designations, you can bet that firm’s financial metrics get close and constant scrutiny.

A member of Phoenix Products’ executive team since 1994 when he started as CFO, Scott Fredrick became COO in 1998 and was named CEO in 2002. He has been the guy with his eye on the bottom line and a key driver of change in the company’s manufacturing processes and products.

Phoenix evolves to lighting focus

Founded in 1892 as Phoenix Printing, the company evolved to become Phoenix Products by changing its focus and expanding its offerings. Now best known for durable, dependable lighting, Phoenix serves two primary sectors with a high mix/low volume product line: maritime markets, Phoenix has made the transition from traditional manufacturing to Quick Response Manufacturing, allowing operations to move from a 98,000-square-foot building to its current 68,000-square-foot facility on Port Avenue in Milwaukee.
“We sensed we needed to do some things differently, but we couldn’t find the time to pursue it.”
— Scott Fredrick

Despite the flurry of activity, abundance of parts and excessive overtime, there were days when the loading dock was bare, devoid of overdue finished goods. Planning meetings to schedule production often were close to an hour long as staff struggled to expedite late orders. Productivity was falling, and lead times were out of control, according to Fredrick. Factory overhead was running 14.5% in relation to sales. By 2004, he knew something had to change. And change it did.

Discovering QRM

Fredrick’s introduction to QRM came through a business publication that featured an article by Rajan Suri, the UW-Madison professor emeritus of industrial and systems engineering who developed its principles and practices. The methodology, which seemed at first to be counterintuitive and contradicted many longtime practices in place at Phoenix, intrigued Fredrick. Soon after, he attended a half-day overview of QRM, coming away enlightened, inspired, and encouraged.

Phoenix joined the QRM Center in 2005 at the expanded level, which provided the company with opportunities to participate in applied research projects conducted by students affiliated with the center. The collaboration has become an ongoing relationship that continues to produce results any enterprise would consider enviable.

Widespread training, student projects launch QRM

Fredrick invited Suri to conduct in-house QRM training, and some staff traveled to Madison for daylong or two-day workshops. Inside the

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company, there was both one-on-one and small-group training to reiterate QRM concepts and show how they applied to Phoenix.

But training went just so far. “We sensed we needed to do some things differently,” Fredrick says, “but we couldn’t find the time to pursue it.” The first team of what Fredrick describes as “smart, analytical, available, and motivated” students arrived in 2005.

Contrary to the conventional practice of fabricating parts in big batches on a single machine setup — and running machines nonstop — operators learned to produce only what was needed for existing orders. The new approach suggested by students eliminated overruns that took up space and risked being damaged or lost during storage.

Plus smaller runs advance parts quickly downstream to the next stage of production, helping ensure order completion by the requested delivery date. “The direct cost, which is easily measured, definitely goes up by producing only the number of parts you need,” Fredrick says, “but the indirect benefits come by making timely deliveries and winning more business.”

In addition to producing smaller batches, QRM stresses the importance of creating spare capacity. Phoenix fine-tuned its work centers to operate at 75% capacity rather than previous levels of up to 95%. The presumed efficiency of avoiding multiple setups and their inherent labor costs was countered, according to Fredrick, by decreases in indirect labor, in expediting emergency shipments, and in overtime.

“The shop floor was no longer flooded with WIP from running multiple batches for orders not yet due,” Fredrick explains. “And if a smaller order came in, it didn’t have to enter the standard queue; it could use the 25% capacity of the waiting machine.”

“Minimizing the number of machine setups an operator needed to make in a day or week — another practice traditionally expected to keep per-unit cost down — had the opposite effect,” he adds. “WIP increased, and our labor costs rose — especially overtime.”

Operators eventually developed quick-changeover techniques to streamline setup, helping to further compensate for the increase in number.

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RESULTS

- Production lead time dropped from 14 to 3 days
- Lead time reduced 50–66% across major products
- Overtime costs reduced by 75%
- Inventory turns increased by 46
- Revenue-per-plant-hours increased by 27%
- Employee turnover dropped from 24% to 3.5%

CELL MEMBERS WELCOME OWNERSHIP

Before the student project that consolidated existing cells, assemblers frequently moved in and out of cells, resulting in a lack of a sense of ownership; cell employees relied on non-cell members to help meet cell goals; and work within the cell was scheduled by office staff not located in the cell.

When the cells were consolidated, they were staffed with dedicated assembly team members, resulting in a more engaged workforce; cell members had responsibility for inventory, receiving, setup, tooling, quality, safety, and documentation; and cell members met daily to establish goals and schedule their own work.
Creating machine capacity and outsourcing some product components that were delivered as needed yielded a shop floor free of clutter and excess WIP, greatly reducing the need for warehouse space. “Why have money tied up in inventory when those funds could be used for marketing, training, and other investments that yield positive results?” Fredrick asks rhetorically.

**Students move on to cells, material handling, workflow**

After successful initial projects, Phoenix again partnered with QRM Center-affiliated students to study the assembly process. The company already had established nine assembly cells that were based on the QRM principle of grouping similar product families. Considering Phoenix’s product mix, students recommended reconfiguring assembly operations and the workforce into four larger cells.

“With larger cells, people became a team with a sense of ownership over the product and process, and this was a huge change in psychology,” Fredrick notes. “They were more engaged, absenteeism decreased, and turnover dropped dramatically — from 24% at the start of QRM...
“A big project such as redoing the Port of Los Angeles can account for more than 10% of a year’s sales and elevate labor demands.” — Scott Fredrick

implementation to 3.5% just three years later.”

Phoenix now has a Fabrication Department that performs multiple functions and ultimately feeds components to four product-family assembly cells.

In some cases, implementing QRM requires a capital investment to duplicate equipment for cells performing similar functions. Phoenix needed only to relocate existing equipment. “Our transition to QRM did not involve major machinery investments,” Fredrick notes.

The Phoenix-QRM collaboration continued as students focused on material-handling and storage strategies, tightening the process and improving data accuracy. In yet another project, a student team examined workflows, recommending adjustments that reduced nearly 90% of what had been chronic work stoppages.

Changes in mindset, adopting QRM practices slash lead times

In the first six years of QRM at Phoenix Products, the change in mindset and practices, combined with the involvement of students in on-site projects, enabled the company to cut production time for its best-selling product from its usual 14 days to just 3 days.

From 2011 through 2013, Phoenix engaged students in three more projects. One established a process to track how often parts were handled in ways that added value versus how much time parts sat between each assembly step. “We discovered that a particular fixture had a ‘touch time’ of six hours, but it took six weeks for the order to reach the loading dock for delivery,” Fredrick notes. Smaller batches were part of the solution.

Another project examined whether use of a laser cutter would be of value in fabrication cells, and a third analyzed the company’s dock area. Students worked with staff to identify bottlenecks and determine whether some warehousing space there could be used to establish cells for producing LED fixtures, a growing part of the company’s business.

Overall, Phoenix reduced overtime costs by 75%, increased inventory turns by 46, and increased revenue-per-plant-hours by 27%.

Customers are happier, and sales staff and employees are less stressed. Meetings for scheduling production, which used to be held twice weekly and lasted an hour, now are held once a week and last no longer than 15–20 minutes. Overtime, absenteeism and turnover are down, which Fredrick credits to greater employee ownership of and involvement in their jobs.
Product simplification enhances efficiency

Pre-QRM, Phoenix had developed a large selection of products, taking pride in meeting the needs of a variety of customers. “Over the decades, we had created our own problems by offering a smorgasbord of options,” Fredrick says. “The infrastructure required to support so many variations became untenable.”

“Trimming our product line, offering fewer options, and creating some higher unit-per-order thresholds meant fewer problems,” Fredrick says. “We still offer options, but we can produce them more efficiently with QRM.”

Union embraces QRM

Cellular manufacturing is a key element of QRM. Those who staff a cell order inventory and schedule labor for the functions performed within the cell. Cross-training is the foundation of flexibility; a welder can step into the role of punch press operator if needed, and vice versa.

Phoenix management has worked with the union to gain support for cross-training as well as for voluntary layoffs.

“During busy times, we have all hands on deck, often with overtime,” Fredrick explains. “During slowdowns, an employee can take a few days off and collect unemployment. The overtime and layoff option balance each other financially for the company and for the employee, helping Phoenix avoid bringing in temporary workers or resorting to a hire-and-fire environment.”

QRM helps expand flexibility and capacity

With the built-in flexibility QRM fosters on so many fronts, Phoenix still welcomes and can handle orders of all sizes. “A big project such as redoing the Port of Los Angeles can account for more than 10% of a year’s sales and elevate labor demands,” Fredrick notes. But with the discipline introduced by QRM and flexibility of the workforce, large orders don’t send anyone into panic mode, nor do they affect on-time delivery of existing orders.

Unlike the days of working overtime to stock shelves with unneeded components to avoid the expense of multiple setups, days at Phoenix now end with a collection of finished goods that will be shipped before the next morning’s shift arrives.

Although Phoenix Products has undergone a dramatic transformation since implementing QRM, it continues to serve its ever-expanding customer base in a facility 30% smaller than it occupied 15 years ago. Combined with lower operating costs, the space reduction complements efficiency improvements brought by QRM, all improving the company’s bottom line.

Phoenix Products lights the world, including this STS Crane in the Port of Oslo, Norway.
LED brings further change

The emergence of LED (light emitting diode) technology has further revolutionized the industry and enabled Phoenix to offer its customers even greater benefits.

Reduced energy consumption as well as reduced labor and replacement costs for long-lasting LED fixtures has catapulted this type of lighting to account for the majority of Phoenix’s business. Parts of the shop floor have been redesigned to accommodate the processes for producing LED fixtures and for stocking parts, the majority of which come from Asia, the leader in production of LED components.

Air conditioning has been installed in the plant to reduce the effects of heat and humidity on delicate LED components and to enhance worker comfort, and new static controls protect LED-board circuitry.

Maintaining its reputation for quality specialized lighting, reliability, and responsive lead times, Phoenix Products will continue to evolve, adapt, and grow, with QRM helping lead the way.

Phoenix floodlights illuminate the tallest flagpole in North America, which stands outside the ACUITY building in Sheboygan, Wisconsin.

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 25 years, the QRM Center has helped more than 300 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.