

## QRM Helps Put Freedman Seating Company in the Driver's Seat



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

# Using QRM to cut lead time, enter new markets, and boost profitability

by Kathleen Watson

Freedman Seating Company has operated for 120 years, developing new products to parallel the evolution of transportation in the United States. From upholstered seats for horse-drawn buggies to sleek seating for today's high-speed trains, Freedman has kept pace with each new method of moving people around and between towns and cities.

A solid record of satisfying customers with quality products and on-time delivery has earned Freedman a reputation as a premier supplier of seating for a variety of vehicle types: airport and hotel shuttles; package-delivery trucks; and buses serving the school, luxury tour and public transportation markets.

In 2005, Freedman seized an opportunity to enter a new market: seating for heavy-duty transit buses that serve large metropolitan areas such as New York, Chicago, Houston and Los Angeles. A sole supplier had a virtual monopoly on this market, and its customers — some of them already Freedman customers for other seating types — were unhappy with long lead times. They felt taken for granted, and they wanted better service and innovative new products.

Freedman embarked on a joint venture with holding company USSC Group, an entity that also

wanted to cultivate business in the heavy-duty transit market. Freedman established operations in its Chicago facility to gain inroads into this new sector; however, it didn't take long to realize that the path was not going to be as smooth as anticipated.

"We thought we could just overlay our existing manufacturing model on this new market," company president Craig Freedman says. "But lead times went up, sales went down, cash was dwindling and loans were rising. We came to realize that we were involved in two separate, distinct industries."

## **New 4ONE line's customization not good fit with existing products**

Metal components for Freedman's small- and mid-size bus customers don't change much or often, so stocking some parts has been a reasonable practice. But the new 4ONE line, as it is called, brought multiple custom features and more stringent specifications; manufacturing it has required a different approach.

"We struggled for a couple of years," says Production Director Gerardo Hernandez, a 19-year Freedman veteran. "At the end of 2008, we undertook a companywide initiative to implement Lean. We got



## **Company Profile**

Founded 1893 by president's great-grandfather  
Family-owned and -operated  
Headquarters and production:  
Chicago, IL  
350,000-square-foot manufacturing facility  
600 employees (2 shifts)  
1,500 seats produced daily  
13 sales offices U.S., Canada  
\$80 million annual revenue  
ISO 9001:2008 Certified

## **Products**

Seating for Transportation Industry:  
Bus seating  
Rail seating  
Truck and van seating  
Specialty seating

## **Markets Served**

OEMs  
Bus distributors  
Federal and state governments  
Municipalities

## **Manufacturing Processes**

Laser Cutting  
Finishing  
Welding  
Upholstering  
Sewing  
Assembly

[www.freedmanseating.com](http://www.freedmanseating.com)

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— Craig Freedman

a good start through 2009 and were making some progress, but the new 4ONE product line had made our business more complicated.”

“Lean is good when you have repetition,” Hernandez says, “but Lean didn’t address the issues we were having with 4ONE. We were dealing with seating that was more customized, falling into the high-mix, low-volume category. We were struggling with inventory issues and knew that we had to modify our material-control system.”

As committed to personal development as he is to continuous improvement on the factory floor, Hernandez was in the midst of adding a certificate for operations management to his credentials in 2010 when he heard about QRM — Quick Response Manufacturing. He decided to attend a workshop in Madison, Wis., to learn more. On his return, he told Craig Freedman that QRM looked promising.

“I was tired of spending money on consultants to help us with Lean,” Freedman says. “We needed to be able to do more ourselves. We partnered with the QRM Center and had students come to our plant to help us analyze our problems and develop solutions. Our employees worked alongside the students, learning about QRM and how to apply it to their jobs.”

### **Combining QRM, Lean ensures continuous improvement**

There was no need to make an either/or decision about Lean vs. QRM; they can work together simultaneously to produce results. The “War Room” just off the production floor illustrates with charts, diagrams, lists and photos the multitude of improvement projects planned, in process and accomplished at Freedman. “These help show everyone what goes into planning, what the goals are, the ongoing progress for each project — and finally, lessons learned,” Hernandez explains.

Details of the company’s Lean 5S program are juxtaposed with its QRM Transit Welding Cell Expansion Project as well as its Leadsman and Supervisors Gap Analysis, to mention just a sampling. Some postings appear in both English and Spanish, reflecting the company’s ethnically diverse workforce.

The handful of Freedman staff who have attended QRM workshops in Madison act as trainers for others, helping employees learn in a hands-on fashion as projects are planned and executed. Hernandez stressed that internally, they determined they would move at their own pace. “We didn’t dedicate personnel to work exclusively on change,” he says. “It emerged from areas where the need was greatest.”

### **Students bring industrial engineering know-how, fresh perspective**

Four student teams have traveled to the plant, assisting on the shop floor as well as in the office. A key part of their analysis has been the QRM metric known as MCT: Manufacturing Critical-path Time. MCT differs from Lean’s value stream mapping in that it tracks every minute of every step of an order from the time the customer creates it through delivery of the first piece of that order to the customer.

MCT measures both hands-on activity — how long someone actually is working on some aspect of the order — and how long it sits untouched, waiting for the next step. Touch time adds value; wait time robs value, extending overall lead time.

Prof. Ananth Krishnamurthy, head of the QRM Center, visited the manufacturing facility to talk with executive management about QRM. He walked them through

*Craig Freedman, President*





Gerardo Hernandez,  
Production Director

a simulation of POLCA (Paired-cell Overlapping Loops of Cards with Authorization), the material-control pull system that works in conjunction with a high-level MRP system. Job progression is based on production cell capacity and each order's ship time. POLCA prevents bottlenecks and the buildup of inventory not needed for orders at hand, which can translate into significant savings of time and money.

**First successful QRM project serves as model for others**

Freedman began implementing QRM with the 4ONE product line. An early and highly successful project — one that was planned before students became involved —

dealt with modifying how multiple steel components are laser-cut for 4ONE seats. “We had been using one laser to cut batches of everything that was needed for a variety of orders, parts and seat styles,” Hernandez explains. “If there was an engineering change, we would end up with an excessive amount of scrap and waste.”

In addition, lead times for orders waiting to be laser-cut had stretched into the two-week range.

Hernandez and a team of employees created a dedicated metal-working cell that combined laser-cutting, deburring, press-brake, welding, tube-bending and finishing operations for all seat frames of the entire 4ONE product line. “It made more sense to align

these parts from 15 days to just two days. It also helped reduce the overhead and space needed for work-in-process and inventory, as parts were fabricated only as they were needed.

Student assistance in the design of cells for specific product families followed, although Hernandez says that cells have been modified to meet the variations and grouping of parts that make sense for Freedman's multiple seat designs.

Achieving lead-time-reduction goals has required investing in more equipment — not unusual in a transition to QRM. There now are four laser cutters throughout the plant: three for cutting flat stock and one for cutting tubular steel. To contribute to efficient cell function,

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these operations for a family of seats rather than repeat them in separate areas,” Hernandez says.

Establishing this dedicated operation reduced lead time for

machines for press-brake, punch-press, welding and deburring operations also were duplicated. But the investment has yielded multiple benefits.

For example, to make room for the new equipment, about 10 components for the FoldAway seat now are bundled in kits that fit on one skid, as opposed to having four or five full skids of parts lined up for assembly. The floor space made available by this practice has eliminated significant WIP inventory, thereby cutting costs, accommodating new machines, and saving time assemblers used to

Results	2008	2010	2013	5-year Improvements
Lead Time 4ONE	6 weeks	3 weeks	1.3 weeks	71%
On-Time Delivery	91.2%	92.4%	92.96%	2.0%
Hours Worked per \$1k Shipped	13.25	11.80	11.05	16.80%



*Family 3PTA: Multifunction seat for school bus transportation*



*Gemini: Newest seat model for heavy-duty transit bus market*



*Aries: Top-selling seat for heavy-duty transit bus market (4ONE line)*

spend walking from skid to skid to gather the right components.

Creating kits also reduced forklift use. “We don’t have the forklift traffic we did before,” Hernandez points out, “so our plant is safer, and there is less potential for damage from the extra handling involved with constantly moving parts around. Order components stay together, and we’re saving time and space by moving fewer parts shorter distances on hand carts.”

Noting that QRM emphasizes producing just what is needed for current orders, Hernandez says of the reorganization and transition to cells: “We wouldn’t have had room to create cells before, because the floor was full of inventory. Now everything we build leaves the plant pretty much right away — 1,500-plus seats go out the door every day.” “Reducing inventoried parts also has had a huge impact on cash flow,” he adds.

### **QRM cuts order-processing time almost in half**

Customer Service Director Christy Nunes was involved with the teams that were making improvements with QRM and Lean on the shop floor, and the positive results convinced her that there was potential to use some of the same tools to reduce lead times in office operations. “Orders came in, and we would have 80% of

the information, but we wouldn’t hand it off because it was too cumbersome to add it later,” she says.

So as one student-guided project was underway on the shop floor, Christy worked with staff and a second UW student team to revamp order-entry and –processing. “We set a goal of a 40% reduction in lead time, which we defined as starting with order entry and ending with completion of manufacturing drawings, bills of material, routings and scheduling — everything needed before an order was ready to be released for

production that sharing an office would prevent delays that were tied to gathering and processing information.

“It was not easy,” Christy admits. “People liked their offices, they liked the bond they had developed with co-workers. They were comfortable.” Eventually, staff from customer-service, engineering, sales, bill-of-material, production scheduling and CAD technicians agreed to collocate.

Although moving closer to the shop floor and establishing new relationships was not embraced at the start, “After a time, they saw the benefit,” Christy says. “Prior to collocating, when a question arose about a design, no one wanted to ‘go upstairs’ to ask; they would proceed on their best judgment. Now that everyone involved with designated customers shares the same space, there is no more guessing. We can

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production.”

The students tracked, measured and analyzed all aspects of processing an order, including wait time, hand-offs, and even meetings. Their analysis resulted in a recommendation to use the QRM principle of collocating functions to create a Q-ROC — a quick response office cell. Using the QRM principle of collocating functions, Christy convinced those whose involvement is essential to getting an order ready to move into

*Christy Nunes,  
Customer Service Director*



have quick conversations that result in better overall communication and a better process flow — and fewer meetings.”

“Efficiency has improved so much that as business has grown, we haven’t had to add staff,” Christy says. “Although we’ve cut our lead time from 32 days to 19, the same number of people are processing 40% more orders,” a testimony to the value of collocation and cross-training.

And cross-training translates to increased skills, which is reflected in the value a staff member brings to the company and is rewarded at performance-review time.

### **QRM projects have just begun**

This, of course, is only the beginning of Freedman’s QRM story. The challenge of material control is requiring an approach different from kanban. “Everything is custom-designed, engineered-to-order and assembled-to-order,” Hernandez says. The pull-based principle of kanban isn’t efficient or cost-effective in this new environment.

POLCA was implemented for the FoldAway product line toward the end of 2011, with great results. “We had not been used to running without inventory. But with smaller batches of parts, if we find that something doesn’t line up or match as is should, we can make adjustments before the problem reaches the customer,” Hernandez says. He expects to continue to fine-tune the process and extend it throughout the plant, adapting it as necessary for Freedman’s other seating designs.

“And we’ve learned that we sometimes have to move equipment more than once,” he adds. “A cell arrangement that makes sense for one product might have to be reconfigured for a new product.”

“You could say that QRM is never-ending, but we don’t want it to end,” Hernandez adds. “Everyone is familiar with it, and we’ll continue to use both QRM and Lean to reduce our lead times and improve our operations.”

Nunes has additional office cells on her radar screen, and she’d like to explore how QRM can help other aspects of Freedman’s

business — accounting, for example.

On the Lean front, every department is committed to completing one RIE — rapid-improvement event — a month using Lean’s 5S principles. “The department reviews customer feedback, looks for bottlenecks, and reaches consensus about what the project should be,” Hernandez explains.

The experience of adding the 4ONE line has convinced Hernandez that QRM is vital when it comes to expanding the company’s offerings. “Getting up to speed with 4ONE was a bigger challenge than we thought it would be,” he admits, “but with QRM, we know we’ll be better prepared to integrate the next new product.” Freedman’s share of the heavy-transit business has increased from roughly 10% to 40%.

Craig Freedman is convinced that QRM is key to his 120-year-old family business maintaining its competitive advantage. “QRM has made a huge difference in cutting the overhead that comes with long lead times and excessive inventory,” he says. “People at the QRM Center have been great to work with.”

## **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 more information, check [www.qrmcenter.org](http://www.qrmcenter.org), join our QRM LinkedIn group or contact us directly at 608-262-4709**



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