



## Success Story: Cardinal Glass

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### *Cardinal Glass Sees Lean Rewards Clearly*

#### Profile

Location: Amery, Wisconsin  
Headquarters: Eden Prairie, Minnesota  
Years in Business: 11 years in Amery; company established in 1962  
No. of Employees: 135 in Amery  
Products: Laminated glass products for windows that offer safety and security, temperature control, UV control, sound dampening, storm protection and architectural design elements.  
NWMOC Projects: Lean Certification Training, Lean Workshops, Value Stream Mapping, 5S and Total Productive Maintenance



*Barb Goodlet, Production Planning/IT Manager at Cardinal LG – Amery, WI*

#### Situation

Barb Goodlet was new to Cardinal Glass in 2002 and new to the manufacturing industry. When she received a Lean Certification Program brochure in the mail from the NWMOC in 2004, it piqued her interest. She had heard about "Lean" and its benefits, so, with the support from General Manager Mike Wothe, she attended NWMOC's Lean Certification Program.

#### Project

For her final Lean project, Barb chose the Stock Lamination Lines at the Amery facility, which was experiencing a heavy growth curve at the time. (Made-to-Stock accounts for 60-65% of their monthly output.) Barb soon realized that they did not have enough data gathered on their processes. As they gathered the necessary data, Barb and her five teammates discovered that the through-put of the lamination lines could be significantly improved to meet surging customer demands. This could be accomplished by reducing set-up and changeover times and establishing and maintaining a steady, sustainable flow. They formulated the theoretical run rates for the various laminated stock products and then set their goals on achieving 70% of those run rates. Within 6 months, that goal was attained, and through-put on stock increased by 34% with a 2% decrease in direct man hours. Laminated glass requires 2 to 4 hours of "baking" time in a large industrial "oven" called aclave. Oftentimes, work in process (WIP) got backed up waiting for aclave. The addition of a thirdclave reduced the wait time and the WIP between the lamination lines and inspection/packing by 78%, thereby eliminating a major bottleneck.

While awaiting the opening of an additional Cardinal lamination plant in Ocala, FL, the Amery facility flexed to successfully double output over an 18-month period in late 2005 through 2006. Lean principles have also assisted in resizing the facility as customers from the Southern U.S. market were moved to the Ocala, FL, plant.

Barb and Amery LG's Systems Analyst/Programmer Steve Brown developed and implemented a new production software system that obtains live feedback from the production floor processing centers. The system eliminates paperwork and provides real-time data-collection capability. Screens at each workstation graphically display the components and processing required for each "unit." The system simulates the routings and Lean flow of product from scheduling to shipping. Additional modules are currently being designed that will completely integrate the system, which has also been deployed at their Ocala facility. This duplication and standardization of software systems between the two facilities enables business to transition seamlessly from one to the other if needed.

Two Sr. Production Planners (responsible for raw component and finished goods management) have attended lean training as well as nine additional managers and employees.

“Our workforce is confident in the benefits of lean and the new production software system. Change has become the standard here, and the production floor employees now push us,” Barb Goodlet noted.

The Lean journey at Cardinal Glass continues as they apply lean tools to additional areas of the plant including inventory management, packing/inspection lines, and raw glass cutting.

*“The lean tools we learned have been invaluable. You may not have felt your impact beyond the state of Wisconsin, but the principles that we employ at Amery have also helped us set up our sister plant in Ocala, Florida, with the same lean tools, measures and production systems. Indirectly, you’re helping us in Florida as well.”* – Barb Goodlet, Production Planner, Cardinal Glass.



*Glass Lamination at Amery Facility*

## Results

- Increased square footage of stock output by 34% with man hour decrease of 2%.
- Reduced WIP at all resources by over 50%
- Increased accuracy in Production Scheduling
- Reduced days of raw glass inventory by 66%
- Reduced days of interlayer inventory by 63%
- Successful doubling of sales in 2005 – 2006, controlled resizing in 2007-2008
- Realized \$215,000 in cost savings
- Reduced wait time for packing/inspection process from 17 hours to 4 hours.
- Established Supplier-Partner relationships with primary vendors and participated in collaborative planning. This allowed for improved availability of product and cost savings for them. The cost savings were leveraged during price increase negotiations.
- Established new Lean Performance Metrics
- Stock through-put increases required no capital expenditures.