

Lean Enterprise: Up North Minnesota Showcase

Four companies share progress reports.

Ed Polin and Lea A.P. Tonkin

Be careful what you wish for, 'cause you might have some headaches figuring out how to deal with the consequences. Take the situation at Nortech Systems Inc. in Bemidji, MN, for example. Some manufacturing folks might envy their whopper sales increases during the past few years. But would they be ready to deal with the onslaught of new business? Nortech Systems' associates shared their "lessons learned" about the experience during the recent AME "Lean Enterprise — Up North Minnesota Showcase Tour" event. After heading to Bemidji and Thief River Falls, MN, participants also heard about lean practices from employees at FSI International, Digi-Key, and Arctic Cat.

Nortech Systems, Inc.: Searching for Flexibility to Meet Customer Demands

Contending with 80-100 percent annual sales growth, "enormous" WIP buildup, late deliveries, mega-inventories, and long cycle times during 2001 reinforced the notion that there simply had to be a

Up North Minnesota Showcase Companies

Arctic Cat Inc., Thief River Falls: Employees design, engineer, manufacture, and market a full line of state-of-the-art snowmobiles and all-terrain vehicles (ATVs) under the Arctic Cat® brand name.

Digi-Key Corporation, Thief River Falls: A fast-growing electronic component distributor, Digi-Key has been rated number one in overall performance for nine consecutive years by Beacon Technology for Electronic Engineering Times.

FSI International, Inc., Chaska: The company is a leading global supplier of processing equipment used at key production steps to manufacture microelectronics, including semiconductor integrated circuits and thin film heads for the computer hard drive industry. Approximately 300 people work at FSI in Chaska.

Nortech Systems Inc., Bemidji Division: Product lines include wire harness assemblies, cable products, fiber optic products, and flat ribbon assemblies. Approximately 270 people work at the facility; of this number, about 215-220 work in production.

better way of doing business, said General Manager Gary Hedstrom of Nortech Systems Inc., Bemidji Division. "We got to the level where we needed to make changes — we had too many issues with cus-

tomers and inside," he said. Products at Nortech Bemidji include wire harness assemblies, cable products, fiber optic products, and flat ribbon assemblies.

"Our challenge was that we

had multiple teams building product on the production floor," Hedstrom continued. "Certain teams built certain types of products, and they were the only ones who knew how to build those products. We needed to cross-train our employees so they could build any type of products. We needed flexibility to make products based on changing customer requirements."

Vowing to streamline production and customer service, Nortech Systems' customer manufacturing coordinators, staff and engineering groups, and production managers sat down together for brainstorming sessions. "We decided how to get ourselves out of this situation, and we put a plan on paper, based on lean principles, by January, 2001," said the general manager.

Cross training for production associates was one of the key plan elements. The plan started with several staging areas — over time reduced to one. This reduction resulted from control issues with excessive areas for WIP that emerged as Nortech progressed through the change process.

"In the past, customer service would take orders and release them the next day, not necessarily based on customer want dates," said Bemidji Manufacturing Manager Anne Schummer. "Our staging area was based on the want date of the customer — a whole different mindset." Another change: Only complete work orders are released to the floor.

Fork (and a Few Bumps) in the Road

"We set up a training table in the shop to help people learn how to make these different products," Schummer continued. "We had in-house trainers who cross-trained all associates on company time.

"We needed flexibility to make products based on changing customer requirements."

Gary Hedstrom

The training took up to 80 hours per employee, depending on their knowledge base. The intent was to offer all production employees the opportunity to be successful. At the same time we were keeping up with increased business. We were in an overtime mode."

Bemidji Nortech Systems also established a holding area directly coupling production and customer service people. "This area is used for any product that has issues after a work order is released to the production group, whether it is a customer change, rework issue, or an inventory issue where we run out of a material (such as terminals)," said Schummer. This holding area also gives the customer service department an opportunity to talk with the customer on issues with their product prior to the due date. In turn, any problems with materials shortages, rework, etc. could be handled more quickly than in the past.

Thanks to these changes, every team received a limited amount of WIP every day based on customer orders. "What you took for the day, you finished that day," said Hedstrom. "This led to some flow and lean manufacturing ideas. Instead of two people working on a kit building 100 items, you may have five people dividing up the job (and getting the job done more quickly)."

There was some reluctance to change old ways. Some employees

wanted to hang on and get jobs done the traditional way. Other associates and some customers questioned why they didn't notice improvements for some months. "It was tough. We were questioned about whether we were going down the right path, and about going back to the old ways," said Hedstrom. "What kept us going was that we were all working towards a goal. We needed to focus on our long-term objectives."

"On the direct labor side, there was some fear of being cross-trained on new stuff. Some people believed they could do could do best on limited tasks," said Schummer. "Our training table took away some of that fear, over time. But there was some questioning as WIP decreased."

As cycle times shortened and customer orders were filled more quickly, associates found ways to manage their processes more effectively. Much of the dissatisfaction disappeared. "Being able to control kits on the floor was important," noted Schummer. "Now employees can turn kits in two to five days; that was not possible before. Processes are way more manageable."

Existing employees continue to practice cross-training skills. "We used to hire and train people to work on one task — prep, terminate, plugger, etc.," said Schummer. "Now new hires learn all functions of assembly."

They're Making Progress, Planning Even Better Performance

Finding even better ways to handle low-volume, high-mix production (improving delivery performance and overall customer responsiveness) tops the "want" list at Bemidji, added Schummer. Most kits are less than ten hours' work, and many are less than two hours. Approximately 60-70 kits hit the pro-

duction floor each day. She noted that the purchasing department is working with suppliers on consignment inventories and having product one day away. This approach requires less manufacturing space for storage of those materials, less inventory, and better cash flow.

All of these improvement efforts add up: Cycle time decreased at Bemidji from 43.5 days to 6.9 days during the past two years. Meanwhile, WIP decreased from \$900,000 to \$250,000 a month and customer delivery rose from 75 percent on time to around 90-92 percent.

"We're still going to cut cycle time in half again," predicted Hedstrom. "We are continuing to look at new ways of setup reduction as well as starting the process of implementing a 5S process. Building and buying different kinds of tools, installing some equipment allowing more automated setup, and managing better on the front end of setups to get ready for the next people are some of the things we will do."

Hedstrom and Schummer offered "lessons learned" from their transformation:

- Make a plan; stick with the "big plan" but be willing to modify as needed so you can make it work within each of your facilities.
- Benchmark "best practices" of other companies.
- Communicate effectively (and often) about changes and performance against goals, accepting responsibility for results. Put together simple charts on cycle times, delivery performance, etc. and show small successes along the way.
- At some point, needed change cannot be an option.
- Celebrate successes — pizza parties, giving fruit and cookies

to employees, etc. can recognize gains.

Nortech Systems employees also participate in a gainsharing program. Quarterly payouts are based on plant-level performance.

"We will continue looking for continuous improvement (CI) and implementing lean practices," said Hedstrom. "We need to keep pushing ourselves to decrease cycle time and rework, etc. — to be better each day. Customers can not be charged for 'waste.' If you stop doing that, somebody else will be talking to your customers."

Outsourcing: FSI International, Inc. and Nortech Systems Inc.

One of Nortech Systems' customers is FSI International, of Chaska, MN, another participant in the workshop. FSI provides processing equipment used in the production of microelectronics. After identifying cable assembly production as a candidate for outsourcing in early 2002, the company tested quotes from a number of companies and "found they were all lower-cost than our internal production cost," said Jeff Papke, materials manager. Papke and Lisa Kotval, senior buyer and project manager for the cable assembly outsourcing project, offered "lessons learned" during the AME event.

The existing cable assembly operation at FSI had 15 people working on two shifts, plus support organization assistance. Leadtimes ranged from two to 12 weeks. Cost, leverage, and leadtime were areas targeted for potential improvement through outsourcing.

Kotval and Papke identified the following supplier criteria for the outsourcing project: turnkey subcontract manufacturer; turnkey design

capability (including test plan); quick turn (one-day production capability); low-volume/high-mix expertise; a proven quality system; close design proximity; and e-documentation ready. Their RFQ (request for quotation) responses from three sources indicated the potential for significant cost and cycle-time savings in cable assemblies.

FSI chose Nortech Systems for the supply agreement; Nortech's leverage with component costs provided a cost advantage and leadtimes averaged 3.3 weeks. The three-year agreement (at the end of this term, it becomes evergreen or perpetual) prioritizes using up FSI stock and features a pricing formula on all parts, family/group pricing on tabbed parts, annual cost reductions and leadtime decreases, and forecast accuracy from FSI.

FSI's transition team for the outsourcing project included a project leader, a buyer, SQE (Supplier Quality Engineer), manufacturing engineering, planning, a Nortech Systems representative, production management, and other functions. The team met with assembly workers and other affected groups to communicate about the transition and prepare a detailed schedule, web access to FSI drawings, documentation/design review, etc. FSI provided an on-line link into its change management process so that Nortech would become an active participant in new design projects and design changes. They also transferred work instructions, test fixtures, and cable assembly requirements to Nortech and planned for the disposition of cable assembly inventories. "We worked to refine internal documentation so that it was accurate well in advance of the start date," Papke said. FSI's data preparation elements are shown in Figure 1.

FSI's Data Preparation for the Transition Process

- Prepare a list of cable assemblies.
- Determine forecast based on the current production schedule.
- Determine cable assemblies needing documentation updates.
- Create information records.
- Create source lists.
- Change the material master.
- Determine the transition date.
- Firm shop orders one month prior to the transition date.
- Change from make to buy in the material master.
- Create purchase orders (POs) for cable assemblies.
- Provide an inventory list to Nortech Systems.

Figure 1.

When the cutover to Nortech Systems began April 15 of 2002, several "wrinkles" marked the transition. FSI's volume of new products overwhelmed Nortech's systems and "drastically affected our production schedule," said Papke. The supplier's cycle time to accept new orders varied from one to six weeks. Purchase order (PO) placement was delayed at FSI, back orders rose for a time, internal production at FSI was restarted in a few cases, and cultural resistance to the change emerged.

One by one, these issues have been addressed (with continuing attention to challenges as they arise). A planner, engineering, and quality representatives from Nortech worked with materials people from FSI to streamline order entry, manufacturing engineering processes, and new product introduction processes. Concerns about

flexibility and quality dissipated as the outsourcing project progressed. FSI workers from cable assembly were eventually moved to other open positions in production.

Lessons learned from this project, reported Papke and Kotval, included:

- Use value stream mapping (VSM) to look at the buyer and supplier processes (helpful, for example, in tracing and reducing the order fulfillment process).
- Explain the transition earlier to employees; communicate effectively with all employees, not just functional managers and personnel affected by the change.
- Establish parallel capability for a longer time to allow for correction of issues and the changing mix of business. "We had a large customer change their product requirements, which forced a

change in more than 300 cable assembly requirements during the transition process to Nortech," said Papke.

- Prepare a spreadsheet indicating the types of wires used, etc., when developing a system to ensure all parties' design tools are compatible.
- Provide adequate training on e-documentation. FSI provides a portal for order information (linked with its MRP system) and for documentation (linked with its Doc Control system), but only a couple of people at Nortech initially understood how to use the software. "We needed to have Nortech's planner looking at the forecasts in the portal to help plan their supply chain. Suppliers can drill into the reports on-line to view open orders, change-requests to orders, supplier performance metrics, industry data (projections for change or growth), a forecast report for all their components for up to a year in advance, and other information," according to Papke.

Digi-Key Corporation: Customer Focus

Keeping customer service in mind in all business activities helps rapidly-growing electronics distributor Digi-Key Corporation, Thief River Falls build sales and customer satisfaction ratings. Sales last year topped \$375 million. The company's commitment: "To meet or exceed our customers' expectations with quality products and superior service, ultimately resulting in exceptional value," according to Russ Fischer, vice president of sales.

Approximately 180,000 line items in stock (220,000 line items available through the Internet) and 1.2 million shipments a year keep

things hopping at Digi-Key. Responsiveness, availability of product, and increasing website offerings are among key elements of customer service. Shipments can be made within 20 minutes of order receipt. Forty-eight percent of orders are handled by phone, 20 percent by fax, and the rest are Internet sales (Internet sales continue to expand).

Arctic Cat: Partnering for Continuous Improvement

Arctic Cat Inc. has formed a partnership with Northland Community and Technical College in

Fergus Falls to create a formal continuous improvement program called "The Race." Training to prepare for The Race was given in mistake proofing, problem solving, waste elimination, setup reduction, data collection, safety/liability, and 5S (housekeeping).

Employees are rewarded for moving Arctic Cat toward objectives in productivity improvement, quality and safety improvement, implementation of 5S, and waste elimination. Arctic Cat has completed more than 125 improvement projects with a potential for significant savings.

Ed Polin, materials manager at Nortech Systems Inc., Merrifield, MN is a member of AME's North Central board.

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