Zebra Enterprise Solutions

The Path to Peak Supply Chain Performance

Linking ERP with an automated wireless parts replenishment solution gives the concept of continuous improvement real meaning.

For nearly two decades, some of the world's best minds have been devoted to the practice of supply chain management. Still, a large percentage of manufacturing companies struggle to optimize supply chain operations. In fact, IDC Manufacturing Insights, a leading industry analyst firm, recently concluded that there is currently $900 billion of waste in global manufacturing supply chains.

There are many reasons for this staggering level of inefficiency, starting with the simple fact that running a supply chain with numerous moving parts—material, equipment, people, etc.—scattered about the globe is a complex undertaking. In recent years, manufacturers have made great strides in improving supply chain performance through the adoption of lean manufacturing and other cutting-edge management principles. Yet the ultimate goal of a low-cost supply chain that delivers the perfect order on time, every time remains elusive for many manufacturing enterprises.

Achieving that goal requires something that many early lean practitioners opposed: using information technology to automate those well-crafted lean processes. Companies that follow lean principles like building to actual customer demand—rather than adhering to forecasts—and bringing material to the plant only when needed, as opposed to keeping large stockpiles on hand, operate with extreme efficiency when business conditions are stable. Customer demand is predictable, raw material prices are stable, and suppliers are always reliable, making it easy to map and execute streamlined production processes.

Global Business Realities

In reality, however, few manufacturers—especially those operating global supply chains—ever see such stable business conditions.

Most contemporary manufacturers operate in a world in which change is the only constant. Customer demand changes weekly, commodity prices fluctuate daily, and

an unforeseen global financial crisis forces previously dependable suppliers out of business with little or no notice.

In this environment, simply running a lean operation is not sufficient. In the current business climate, manufacturers need to take lean principles a step further. They must build a level of flexibility into their lean processes, providing the ability to respond quickly—and appropriately—to constantly changing business conditions without ratcheting up operating costs.

That flexibility comes through deployment of IT systems that not only quicken the pace at which business processes are executed, but also can analyze if those processes are working well enough to support the company's current business goals. Ultimately, these systems should give a manufacturer the necessary information to revise business processes before they start to impair the company's overall performance.

One area in which IT systems can significantly enhance a manufacturer's flexibility is the parts replenishment process. Automating parts replenishment is especially effective in industries such as automotive, aerospace, and industrial manufacturing—where large numbers of parts are routinely moved to production lines in just-in-time fashion.

In these plants, forklift drivers typically move parts from storage areas to the production line. The challenge is making sure the right parts—in the right quantities—are always moving to the right locations at the appropriate times. With most companies in these industries now operating global supply chains, they also face the added challenge of keeping suppliers informed of the proper times for delivering parts to the plants.

In companies that employ lean principles, a kanban process generally is used to manage the flow of material both into and around the plant.

In a kanban-based Material Flow operation, production workers place cards—or some other recognizable item, such as an empty parts bin—in certain locations to let the forklift drivers know when to deliver more material.

WhereCall buttons replace manual signaling tools, such as kanban cards in the Material Flow Wireless Parts Replenishment solution from Zebra Enterprise Solutions.

Automated Replenishment System has Transmission Plant Running Smoothly

GETRAG
Precision. Passion. Partnership.

An automated implementation at the GETRAG Ford Transmissions plant in Cologne, Germany, is a prime example of how the Zebra Material Flow Wireless Parts Replenishment solution can bring a sense of order to even the most complex manufacturing environments.

This plant makes six varieties of transmissions for global automotive brands including Ford, Mazda, and Volvo. Total production volume exceeds one million transmissions a year, with units shipped to car manufacturers in Argentina, China, Europe, Japan, South Africa, Taiwan, the Philippines, and the U.S. Serving this broadly dispersed—and diverse—customer base requires the constant movement of many different parts to the assembly area. That movement must be well orchestrated to avoid the delays associated with excess movement, or the cost associated with storing excess work-in-process inventory. That's where the Zebra Material Flow Replenishment solution comes in.

The entire solution at GETRAG Ford consists of:

• A wireless messaging infrastructure of 220 active RFID WhereCall buttons, each of which is associated with a specific part number;
• A network of 12 wireless location sensors (antennas);
• Five ruggedized, mobile PCs mounted on forklifts; and
• The Material Flow Replenishment software application.

The software application, which is available in 15 languages, runs in German at this facility. GETRAG Ford also has adopted the Supplier Portal so its suppliers can be promptly notified of when they should deliver more parts to the plant.

When an assembly worker presses a WhereCall button to request parts, the exact time of the request is recorded and it is then prioritized according to the rules that GETRAG Ford established. When forklift drivers review requests, they are told exactly where to go to pick up the appropriate parts and exactly where to deliver them.

This setup helps maintain a synchronous flow of material across the GETRAG Ford supply chain, resulting in reduced inventory and higher productivity, according to Ralf Vierkotten, supervisor of logistics and material handling, GETRAG Ford Transmissions.

"We are operating leaner than ever before," Vierkotten says. "Production-line employees no longer need to leave their workstations to help search for parts or to help material control determine the correct part; all they have to do is push a WhereCall active RFID button, and the system notifies all the required parties— from the line side to the forklift driver to the internal warehouse—that more parts are needed. This 'intelligent' automated system supports our lean manufacturing processes as we benefit from real-time inventory consumption and can execute replenishment orders just in time."

In terms of actual performance metrics, Vierkotten says the Material Replenishment Flow solution has delivered the following benefits:

• Up to 20 percent improvement in labor productivity;
• A one-third reduction in daily forklift trips;
• A decrease in on-hand inventory from local suppliers from seven days to two days, resulting in a $750,000 savings in inventory carrying costs;
• Improved utilization of floor space for storing parts;
• Better visibility of plant floor demand; and
• A near complete elimination of downtime due to parts shortages.

Based on the success of this initial implementation, GETRAG FORD Transmissions plans to expand the use of the Zebra Material Flow Wireless Parts Replenishment solution to other facilities.

Fostering Continuous Improvement

Most companies that employ this method instruct production workers to signal for a new delivery when the current batch of material they are using gets below a certain level. The idea is to keep the production line moving continuously, which is one of the key tenets of lean manufacturing.

Invariably, however, there are hiccups when a manual kanban process is unleashed in a real production environment.

"Any type of manual replenishment process is inherently inefficient," notes John Fulton, product manager, Material Flow for Zebra Enterprise Solutions, a supplier of technology for tracking and managing inventory and other industrial assets. "In the worst cases, there is no systematic way for assembly workers to notify forklift drivers of when to bring more parts. Often, drivers are sitting around waiting for someone to call or wave them over."

In addition to being inherently inefficient, a manual kanban process seriously inhibits a company's ability to apply continuous improvement—a major lean tenet—to its parts replenishment operation.

"Kanban is a live, real-time solution that tells you when parts are short," Fulton says, "but it doesn't give you a way of analyzing your process. There is no data being collected to tell if a particular line is consistently running out of the same part. If you have those types of issues, you have no way of resolving them and improving the process."

Most manufacturers rely on ERP systems to manage the bulk of their business processes—including the flow

of material —but few manufacturers get full value out of those systems. Recent research from the industry analyst firm Aberdeen Group found that, on average, companies use only 28 percent of the functionality available in their ERP systems. Many manufacturers are hamstrung when it comes to getting full value from an ERP system because they are working with older systems that lack the ability to send data across functional areas within an enterprise or out into the extended supply chain.

Zebra Enterprise Solutions has developed an application that works in concert with ERP systems to support —and enhance—lean parts replenishment processes.

Zebra's Material Flow Wireless Parts Replenishment solution integrates seamlessly with a manufacturer's existing ERP system. It uses information stored in the ERP system's master data repository—such as part numbers, daily usages and inventory locations—to determine the optimal times and routes for moving material from internal storage areas and/or external suppliers to the assembly line.

This around-the-clock visibility into the company's global supply chain allows for altering parts replenishment routes and schedules, on the fly, to keep up with fluctuating customer demand.

Zebra's Material Flow Wireless Parts Replenishment solution is a fully integrated information technology platform consisting of hardware and software for managing the movement of material, as well as the middleware for connecting with and extracting pertinent data from an ERP system.

The solution uses RFID technology to handle material request signals.

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Zebra Enterprise Solutions ROI Calculator helps Document the Business Case for Automating the Material Replenishment Process

If you have doubts about whether a wireless parts replenishment solution is worth the investment, Zebra Enterprise Solutions has a tool for you.

Zebra can plug your company's data into its Material Flow Wireless Parts Replenishment ROI Calculator and generate a realistic estimate of the financial impact an automated parts replenishment process will have on your organization. Several supply chain professionals have used the results of this process to make a business case for adopting Zebra's Material Flow Replenishment solution to skeptical corporate executives.

"The Material Flow calculator is a proven methodology for validating the results of a project," says Joe Zarb, president of Consensure, the management consulting firm that helped Zebra develop the calculator.

The calculator is not a black box that merely crunches numbers and spits out answers. It's more of a process that entails observing a company's existing material replenishment processes, creating a model for applying some recognized industry best practices to those processes and evaluating the impact of the changes.

"The ultimate goal is to move the company to a state that reduces labor and material handling costs, as well as things like safety stock carrying costs, line stoppages, and rework," Zarb says.

Zebra Enterprise Solutions follows the same specific steps when applying the calculator to any company's situation, Zarb says. The steps include asking a series of questions to determine if the company should even consider an automated material replenishment system. Some companies will need to do more to simply organize their processes before automating them, while other companies may have already instilled enough automation into their existing processes that they don't need another solution.

"We do all this to make the business case for the solution," Zarb says. "If a company's processes are working quickly, efficiently, and they have the flexibility to change them as business conditions warrant, they probably don't need the solution. But if they have gaps, we can help them."

Those who qualify for help, and agree to seek it, are asked another series of questions to evaluate their current situation. "We docu-ment the current state, and the future state. We then quantify benefits and validate those benefits by comparing them to case studies of companies who were in similar circum-stances before automating their material replenishment processes," Zarb says.

The next step is developing a model of the hardware, software, personnel, travel, and training that would be necessary to imple-ment the Zebra Material Flow Replenishment solution at that particular company.

"We frame costs versus benefits to calculate an ROI over a five year period," Zarb says. "Once a model for a new operation is built, it typically will show an ROI of 350 percent to 400 percent over a five-year period. That means the company is recouping $3.50 to $4.00 for every dollar invested in the Zebra Material Flow Wireless Parts Replenishment solution."

If those numbers alone are not enough to get companies to make the investment, Zarb offers this warning: "We do see a high rate of return from investing in this solution, but there also is a high cost associated with delaying."

When the system is installed a series of devices known as WhereCall buttons are placed at each assembly area. When an assembly worker presses a WhereCall button, it transmits a signal to an antenna located in the ceiling of the plant. The antenna, in turn, relays the message to the software application.

The system message—which includes the location of the worker sending the parts request, the parts they need, where the parts are stored, and in what priority they should be delivered—is sent to a specified list of Material Handlers assigned to those parts and locations. The Zebra Material Flow Replenishment software, upon receiving the RFID call, displays the prioritized delivery instructions on industrial-hardened PCs that companies typically mount on the forklifts that are used to move material around plants.

These hardened PCs are equipped with touch screens, making them easy for material handling workers to access as they move around the plant. When forklift operators log into the Zebra Material Flow Replenishment application, they are presented with a list of part requests that are color-coded so the drivers know which ones they should respond to first. These instructions also can be sent to handheld Microsoft Windows Mobile wireless devices.

Setting the Right Priorities

"Not all parts are on the same time schedule," Fulton says in explaining the reason for color-coding the requests. "If you have a small part that typically comes 5,000 to a pack, and a larger part that comes 10 to a pack, the second part is going to need replenishing more often. So, when a request for that second part is sent to the system, it will automatically move up the priority list more quickly."

Zebra employs consultants who work with its customers before the system is installed to determine which parts should be given priority over others.

This pre-implementation consultation also can include an examination of the best routes for moving specific parts.

Measure, Analyze, & Adjust

"We can model a typical route through the facility—taking parts from a storage area, putting them on a cart, and moving them to a work cell or assembly line in a particular sequence," says David Phillips, director of sales engineering, Zebra Enterprise Solutions.

"We can create models that cover a single facility, multiple facilities that are part of a single enterprise, as well as suppliers' facilities," he adds.

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— John Fulton, product manager, Material Flow, Zebra Enterprise Solutions.

If supplier facilities are included, Zebra advises adopting the Supplier Portal that is an optional component of the Material Flow solution so kanban-style replenishment signals can be sent to suppliers on a regular basis.

Once a model is adopted—complete with routes, kanban sizes, and priority levels for all parts—the Material Flow Replenishment solution uses those rules for sorting parts requests until the company decides to change them.

Decisions to change the rules come through the company's continuous improvement program, which the solution also supports. "Continuous improvement requires that you first measure the performance of a process, then analyze, adjust, and measure again," Phillips says. "The Material Flow Replenishment solution is designed to do all of that. Individual facilities, business units, or entire enterprises can look at data holistically and determine if they are deploying the proper amount of labor, equipment, and other resources to support the business."

A leading global car manufacturer credits the Zebra Material Flow Wireless Parts Replenishment solution with taking the lean manufacturing program at one of its North American plants to a new level.

"After realizing more than 12 percent efficiency gains from implementing the Material Flow Replenishment solution in one part of our factory, we expanded its use so that we now manage 750 parts across a span of more than 1.5 million square feet," says the automaker's material flow project manager. "With access to real-time data and analytics-rich reports, we have everything at our fingertips to make intelligent decisions and change business processes on the fly."

That's exactly what all manufacturers need to stay competitive in this increasingly volatile business environment.

Zebra Enterprise Solutions, a division of Zebra Technologies Corporation, extends Zebra's reach beyond passive RFID by employing state-of-the-art software and hardware solutions to locate, track, manage, and optimize high-value assets, equipment and people across the world's largest supply chains. Whether tracking containers through a port, optimizing parts for manufacturing, or managing ground support equipment at an airport, the real-time asset management solutions from the combination of Navis, WhereNet, proveo, and Multispectral Solutions provide improved visibility and velocity to gain measurable business improvements. Utilizing products that are based on ISO/IEC 24730-2, Cisco CCX Wi-Fi, precision GPS, and UWB technologies, Zebra Enterprise Solutions offers a wide range of location solutions that are "application matched," enabling its customers to put the right asset in the right place at the right time. For more information about Zebra Enterprise Solutions visit **http://www.zebra.com/zes**

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