

## The Kanban E-evolution

By: David Drickhamer

*Electronic kanban systems automate the pull-based replenishment methodology without forsaking lean manufacturing's commitment to simplicity.*

For many U.S. factories that attempt to implement lean manufacturing cutting costs is not an option. They face life threatening price competition from overseas suppliers and must do something dramatic if they have any hope of remaining competitive. Lean's waste-reduction techniques and process-improvement focus can lower inventory levels, reduce working capital, and speed order fulfillment, giving these manufacturers a fighting chance.

But making the cultural transformation from a batch-oriented production operation that builds to a forecast, to one triggered by customer demand is not for the faint of heart. Anything that makes it easier, therefore, should be embraced. That's the fundamental argument of proponents of electronic kanban (e-kanban) systems.

"Some lean gurus will tell you that you don't need technology, and they're anti-technology," says Ralph Rio, director of research for lean manufacturing at ARC Advisory Group (Dedham, Mass.), a research and consulting firm. He bluntly refutes that viewpoint, "They are stuck in 1978 when Taiichi Ohno wrote his book on the Toyota Production System."

### Sign for the Times

"Kanban" is Japanese for "sign" or "signboard." Used in production operations, it denotes a signal for production to begin, or for material to be moved. Many manufacturers that have embraced pullbased replenishment systems to manage some portion of their raw material and work-in-process inventory use kanban cards, pieces of laminated cardstock attached to the front of bins or other storage containers. Material handlers pick up and deliver the cards between workcells and storage areas to signal to the next process upstream that it's time to send more parts, and what quantities are required.



1. SupplyWorks software runs on a handheld bar code scanner that generates parts replenishment orders to suppliers, eliminating manual order entry.

These card-based systems can work well within a factory. For those operations that have extended their pull-based systems to suppliers however, using physical cards to communicate replenishment needs presents some challenges.

One issue is lost cards. Some major auto suppliers, reports Rio, lose 1 percent of their cards per day. That means 1 percent of their replenishment signals are lost, which results in stock outages.

"People put them in their pockets, they take them home, throw them in garbage cans or lose them. That creates problems for buyers and purchasers," confirms Butch Elliott, the corporate lean manufacturing manager for Commercial Vehicle Group (CVG). Based in New Albany, Ohio, the company manufactures seating and other interior components for trucks and other vehicles. He says many managers don't realize how much time buyers actually spend going to the plant floor and calling people to remedy problems caused by missing cards (or extra cards).



2. An example of an electronic kanban "control panel" from Datacraft Solutions provides an overview of the status of every kanban in the system. A buyer or material planner can easily see which kaban needs attention.

"I know it takes a long time because I used to be in overseas components at Toyota in their production control department in Georgetown, Ky.," says Elliott.

Although the incidence of the lost cards varies from plant to plant, it's the first problem an e-kanban system solves. These systems can be part of a company's enterprise resource planning (ERP) program, or they may be Internet-based applications that automate the transfer of the kanban demand signal—via a bar code scan and other methods—to an upstream supplier.

Once the signal is transferred, these systems give manufacturers and their suppliers the ability to monitor the status of any given replenishment order. CVG is currently piloting an Internet-application from eBots, Inc. (San Jose, Calif.).

"Even the most vocal proponents of the traditional Toyota Production system, with manual cards and manual heijunka boards for level loading, are seeing that when you extend to your external suppliers, that visibility isn't there," says Gene Cranford, who heads sales and marketing for eBots. (A "heijunka" board or box is a tool used in conjunction with kanban cards to level the mix and volume of production within a production facility.)

Essentially what an e-kanban system does is formalize the communication process and eliminate many of the manual errors that arise from faxing kanban orders or e-mailing spreadsheets to suppliers, which is how many companies send kanban signals to their vendors. There's no rekeying or paper handling, the signal goes from a bar code on a bin to an electronic order to a supplier, usually applied against a blanket purchase order. This overcomes the primary limitation of using cards to manage supplier kanban: physical distance. It's effective whether suppliers are located across the country, or across the ocean.

"We started changing our supplier base to overseas and it really helped the communication with those overseas suppliers," says Bill Keyes, manager master scheduling for ASCO (Florham Park, N.J.). "As soon as one of our material handlers scans a box, an e-mail is sent to the supplier, so they automatically know when we've used it. A PO [purchase order] will automatically be created overnight so they'll get the PO the next day, but in the meantime they know we need them and can start their production."

A division of Emerson (St. Louis), ASCO makes products for electrical and fluid power applications. It uses a collaborative kanban system from eBots to help manage the parts that it sources from overseas, such as coils, valve bodies and forgings. The system has given suppliers better order visibility, which has improved on-time delivery performance.

"Because it smooths our demand out, it also has improved our service levels because we don't give our suppliers such a spikey demand," says Keyes. Previously, a material requirements planning (MRP) system running once per week would send messages to the overseas suppliers on a weekly basis. "If we use inventory up on Monday, they would not have known that we need more until the following Monday. Now that it's on e-kanban, they know the same day we use it that we will need more and exactly how many."

### **Waste Not, Want Not**

Whether it's a manual or electronic system, from a lean manufacturing perspective the inherent cost savings and process efficiencies come from simply implementing kanban and other pullbased production techniques. But at some point, as a company tries to manage more and more of its direct material spending using this methodology, buyers, material planners, and supervisors begin to spend more and more non-value-added time managing the system.

"Once manufacturers get a taste of the benefits—the traditional benefits of lowering inventories and increasing turns— what they want to do is put more suppliers on, and then you get into the kanban paradox," observes Sam Bayer, president of Datacraft Solutions, Inc. (Durham, NC). "You have more signals. You have more suppliers. And you want to signal them more frequently."

Electronic kanban systems can solve this scalability problem, making it easier to apply the replenishment methodology to more and more part numbers and suppliers. Dj Orthopedics manages all of its direct material procurement from local, domestic and Asian suppliers, as well as internal production, via kanban. The company manufactures and distributes knee braces and other orthopedic devices at facilities in Tijuana and Vista, Calif. It has begun to implement an e-kanban system from Datacraft and is already seeing the benefits.



**3. Danahar Systems and Controls scans e-kanban bar codes on parts bins to automatically initiate replenishment orders through SupplyWorks MAX.**

"We don't accidentally fax something to the wrong number. We don't wait for people to pick up faxes and then take it to their order processing area. We can just scan the card and have it immediately show up in their hands as something that we need," reports Kevin Sumstine, who oversees material planning and logistics for the company.

Dj Orthopedics has even begun to use the e-kanban system to manage some of its production kanban signals between internal suppliers. The company's Mexican facility has 72 work-cells. Previously, the leader of each of these cells would manually send an e-mail message to its machine shop stating the part numbers and kanban quantities of the materials consumed that day. If every cell sent one message each day, someone in the machine shop would then have to take those 72 e-mails and develop a production schedule. The electronic system can manage those incoming signals, making it easy to sort them and optimize machine shop setup times.

When it comes to managing external suppliers, Sumstine says the system makes it much easier to measure performance. Unlike manual cards, electronic-kanban systems maintain records of all of the material handoffs and transactions. In the past someone at dj Orthopedics had to manually evaluate how well suppliers were meeting their negotiated delivery dates.

"You can generate reports that show how good they are at hitting due dates, how many times they are late, how many times they changed the quantity," he observes.

Like many of the supply-chain management software systems, electronic kanban is one of several replenishment methodologies supported by the Oracle (Redwood Shores, Calif.) E-Business Suite 11i.10 for manufacturing. When a card is scanned, it generates a sales order, which is transmitted to suppliers via email, EDI or a portal. As the order is accepted, manufactured and delivered, the virtual kanban card's status moves from "empty" to "in process" to "in transit" to "full" when the parts are received.

Such an electronic kanban system allows manufacturers to kick customer responsiveness up a notch. In any type of kanban system, the number of containers must be periodically adjusted according to actual customer demand and target inventory levels, a process that must be repeated more frequently for new products. In large factories—some of Oracle's customers currently use more than 12,000 cards to manage their incoming materials—this resizing effort can become a full-time job for a group of people, which is inherently wasteful activity.

Using the actual demand data collected when kanban signals are transmitted electronically, planning programs can quickly re-calculate the number of kanban containers for thousands of parts, and thereby help identify opportunities for lowering raw material levels even further.

"A lot of companies will set a strategy that says they only want four hours, or two hours, of material" on the shop floor, notes Richard Rogers, senior director of lean enterprise for Oracle's Industrial Business Unit. "They've fixed that inventory size, and the planning engine will go through and determine how many containers they need to supply two hours of inventory at that point and the impact on the storage location."

Like any operational improvement initiative, it's important to measure the performance of the current process before investing in any new equipment or software. Observers and proponents of e-kanban systems note that managers begin to seriously look into automating their kanban system when they begin to feel enough pain from using a manual process.

"The justification of the process was to eliminate a lot of the non-value added within the procurement function," says Tom Mathis, vice president of supply-chain management for the Danaher Sensors and Controls Group, a business unit of Danaher Corp. (Washington, D.C.). In March of 2004 the group began implementing a web-based, direct material replenishment system from SupplyWorks (Bedford, Mass.) that supports e-kanban. Since then it has been rolling the system out to each of its locations.

"We did some time trials and time studies to see where we were wasting a lot of time on work that was not benefiting the company in some way," Mathis recalls. "We were spending a lot of our time on expediting, chasing cards around."

Based on these studies, implementing an e-kanban system has helped the division cut the amount of non-value added procurement work almost in half, from 6,300 total "waste minutes" to 3,500 waste minutes. This has freed people to work on other initiatives that do benefit the company, including low-cost region sourcing, material cost reduction efforts, and various supplier development programs. This, in the final analysis, is how material managers should be spending their time, not shuffling cards.

### **E-Kanban Benefits**

1. Eliminates lost cards.
2. Reduces manual card handling and order-entry activities.
3. Clarifies communication with suppliers.
4. Enables real-time visibility of demand signals.
5. Speeds analysis of supplier performance.
6. Allows efficient analysis and adjustment of kanban quantities.



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