KITTING AND AUTOMATIC IDENTIFICATION:

COMPUTERLAND'S SEAMLESS BLEND OF MANUFACTURING AND DISTRIBUTION

As a way to enhance customer service and lower costs, ComputerLand has applied manufacturing techniques to what others view as service functions.

by Clyde E. Witt, senior editor

ComputerLand's Indianapolis Distribution Operation, along with material handling equipment distributor and systems design firm, Advanced Handling Systems, Cincinnati, Ohio, received our annual Value Added Award in 1991. The two companies have again combined to create a unique manufacturing center that is a logical extension of that distribution center.

The new 20,000-square-foot manufacturing cell configures computer systems for customers, work traditionally done outside of a warehouse environment. The result of doing this work at the location where parts are stored means faster, more accurate system design for the customer. For ComputerLand it means better quality control and reduced costs.

The reasons for combining distribution and manufacturing under the same roof were many, says Jerry Keslensky, vice president, research and development for ComputerLand.

"Configure-to-order manufacturing is probably the most difficult type of manufacturing because it is highly customized and requires a flexible system," Keslensky says. "Our approach has been that this configuration of computer systems is a value added service for our customers. We do not apply a 'service depot' mentality to the process."

What ComputerLand has done is apply manufacturing techniques such as continuous flow manufacturing and economies of scale, along with more engineering review and quality assurance to functions others regard as add-on services.

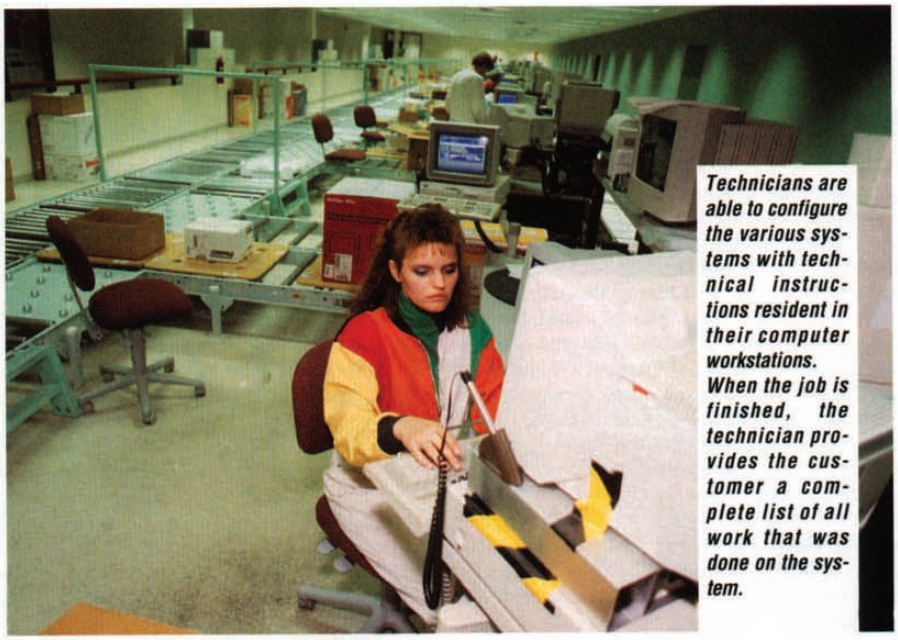
One of the things that made creating a manufacturing cell within the distribution center possible was the fact that manufacturing uses many of the same parts from inventory that customers were buying as finished goods.

Keslensky explains: "What had been one customer's finished goods was another's raw materials for building a customized system. So our idea was to seamlessly integrate distribution with configure-to-order manufacturing, then move those finished products back into distribution for shipment with no increase in labor in the distribution center."

Flexibility of kitting is controlled through RFID. Readers are located beneath the special plastic rollers at each decision point.

Kitting with RFID

To achieve this seamless integration, radio frequency identification (RFID) was chosen as the way to control and track the kitting operation. The goal was to be able to process one-of-a-kind orders with the same level of efficiency found



Technicians are able to configure the various systems with technical instructions resident in their computer workstations. When the job is finished, the technician provides the customer a complete list of all work that was done on the system.

in processing hundreds of like orders. They wanted flexibility to route product throughout the facility and to interrogate the various parts of each kit at many different decision locations.

"We needed to establish seamless routing paths for a customer's system to follow through build-up, in what might, in fact, be a multi-step operation," Keslensky says. "We can choose those paths, on the fly, and route the components of a kit to any sequence of workstations without changing conveyors or anything else. Our computer control system determines what the next destination for a kit is and routes it automatically."

He notes that most of the configuration work is done at a single workstation, but having the flexibility to change stations and routing was important.

"Routing changes might be necessary if some problem develops during assembly," he says. "Possibly a part does not work or there is some part of the process that is required in different sequence than we originally thought. We can change the routing, on the fly, for that kit as well as all future similar kits."

And all of this had to be done economically, he adds. His research led him to the conclusion that RFID was the least expensive, most flexible routing process. Optical reading systems, such as bar code scanning, would require the placement of bar code labels in precise locations. It would also mean many very expensive laser scanners that completely "bathe" the label to extract information. According to Keslensky, the decision between hundreds of dollars or thousands of dollars for each interrogation point led him to RF tags.

Solving design problems

Once the major decision to go with RF was made, it became incumbent upon engineers from Advanced Handling to work out the details. Dave Tavel, systems sales engineer, says some unusual approaches were taken.

"We knew we'd be moving various size cartons throughout a system with inclines, turns, roller and belt conveyor. The RF tag readers [Indala Company] are located at each decision point. Those points are beneath the rollers on the line-shaft conveyor.

"To prevent any interference with the RF antenna we worked with the conveyor supplier [Ermanco, Inc.] and installed plastic, not metal, rollers at these decision points."

Finding a way to carry the product was not as easy as it might appear. Tavel says they could not find a tray or pallet flat enough or ergonomically light enough to handle the direction and elevation changes. Trays that were light enough or flat enough proved not to have the friction coefficient to hold the cartons.

"We finally had a local job-shop create a pressed-wood pallet, or tray, that is routed with circular grooves," he says. "These grooves are filled with silicon to prevent the cartons from slipping on the tray. The center of the pallet has a routed slot for the RF tag. There is also a pattern of strategically located holes to accept the ball casters when the pallet is lowered at the unload station."

Another concern with the conveyor was noise. Product would be constantly moving through a manufacturing area with low ceilings where ergonomics and distractions had to be considered.

To reduce the noise level, semi-precision bearings and special timing belt drives were used throughout the system. To make trays and heavy computer monitors easier to move, ball casters (Omtec Corp.) for positioning were installed at manual transfer points. And to heighten the work environment experience, an interior decorator was used to color coordinate the conveyor, workstations and color scheme throughout the manufacturing area.

"One of the hardest perceptions to manage, regardless of your business," Keslensky says, "is how the customer perceives added value. This manufacturing center is also a sales tool. We use it to show potential customers what we do and how we do it."

Building a better product

But no matter how good it looks, does it work?

"We've significantly improved customer service," Keslensky responds with obvious pleasure in his voice. "This manufacturing operation is the consolidation of a process that was being done in hundreds of locations around the country.

"It has shortened order cycle times and allowed us the economies of scale that improve levels of testing or building complex systems, for example. The use of flexible routing and automation has sig-

nificantly reduced the manpower and type of work people in this operation would have been doing."

The process begins with the customer's order for a computer system. ComputerLand distributes most of the major computer brand names, components, software and peripherals. An order might be for a single system or any number of like-systems. Previously (see *MHE* April 1991), the order was selected, sorted and shipped to a company-owned store or franchisee sales office. There, the system was configured (software, cables and components installed and checked) and delivered to the customer. In some cases configuration work was done at the customer's site.

"Our order selection process still looks much the same to people in the distribution center," says Denver Wischmeier, director, regional distribution operations. "The first step with orders to be configured is to have engineers check them for compatibility. A customer might want particular components that are not compatible with the selected software, for example."

Product is picked in the distribution center. Pieces pass through a sortation system that routes them to a special workstation called tray load. At the station an operator scans the bar code label (Intermec laser scanners) on the carton and a bar code label on a special tray that also contains the RF tag. That carton is now "married" to that tray. The software knows which individual piece is part of which system kit, and what the routing of that kit should be, regardless of the sequence they are picked.

The tray is manually moved onto a conveyor that takes it to the manufacturing area. While all pieces of the kit are being assembled, the various parts (as many as four or five cartons) queue in an accumulation area before entering manufacturing. If there is an overload of work, or if the kits are picked late in the day, they enter a buffer zone in distribution. They will be released from this zone on demand by the assembly technicians.

"The software knows when a full kit has been assembled," Wischmeier says, "and routes the kit components into a workstation. This is real-time parts tracking. Work enters a station when the technician indicates his or her previous task has been completed."

The work area has special anti-static conductive flooring. The work benches (Production Industries) also have special static dissipation straps and ion fans to prevent any static electricity damage to sensitive parts. Wischmeier says most static buildup comes from the packaging material technicians have to handle.

As the pieces of the kit enter the workstation the technician removes them from the carton and places them on the bench. Original cartons for computer components are kept and used to ship the product after configuration.

"All of the information a technician needs to build a system is on-line," says Robert C. Kuntzendorf, senior vice president, operations. "Work areas are free of manuals. As the person puts the system together, he or she verifies the work on the computer monitor in the workstation. The prompt for each step is given on the screen. If more installation information is required, the technician can electronically query the system, like turning the pages of a book for more details."

Value added services

This interaction between technician and computer eventually results in a report that goes with the customer's system. The report includes everything the technician has done, as well as what equipment was installed with full explanations. The technician has the option of typing in notes that will be of use to the customer or to other technicians who may have to configure a like-system in the future. And at the end of the report the technician signs his or her name, a more reassuring touch than some indication that work was done by inspector number 123, Kuntzendorf says.

Each manufactured system, or kit, is assigned a reference number that allows it to be tracked all the way through the process to the final customer. This ensures that ComputerLand can detect problems in manufacturing down to the individual system. Additionally, ComputerLand creates a control reference specification number for complex systems so that these systems can be built again on request from a customer just by referencing the appropriate control number.

After a completed system is returned to its original cartons, the technician moves it onto the outbound conveyor. It re-enters the circulation process and moves back into the distribution center.

The product and its tray circulate to an unloading station. The operator removes the carton from the tray and slides it onto a takeaway conveyor. That conveyor is linked to the distribution sortation and shipping systems.

"Some of the large monitors and CPUs [computer processing units] weigh more than people should lift," says Tavel. "So we designed a way, using pneumatics, for them to lower the tray but keep the carton on the ball casters. No lifting is necessary. The operator uses foot pedals to raise or lower the rollers."

"In the past," says Wischmeier, "components went from the distribution center to the sales office for configuration, then on to the customer. Now, we distribute directly to the end user. Field representatives from the appropriate sales office meet the order at the customer's site and installation usually requires only cabling."

Routing flexibility of kits might be controlled through RFID, but computer software is the heart of this system, says Keslensky. ComputerLand did all of their own software work in the new manufacturing area just as they did in the distribution center. Conveyor control is accomplished through personal computers.

"What we've accomplished with our flexible routing system of the kits," Keslensky says, "is the ability to change routing on the fly. We can change our routing to change our assembly process. We can now decide we are going to build a particular product and these are the assembly steps it must pass through. We then assign that routing via the software and have, essentially, created a new assembly line."

He adds that this is a feature of the system they have not yet had to take advantage of.

This approach obviously takes a lot of training. Technicians are capable of configuring any system that enters their workstation. Training is provided by the various computer manufacturers as well as extensive training offered by ComputerLand. Wischmeier says there is also a lot of peer-to-peer training.

Keslensky adds that his company's experience and ability to implement complex systems for handling material and information have helped make this project a success.

"Probably the key to the whole thing was looking at a service process and approaching it with the disciplines and techniques that a manufacturing engineer would." **MHE**