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MODERN MATERIALS HANDLING

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Deon Wagner, director of warehouse operations, Oriental Trading Company

Oriental Trading Company Controls its warehouse 16

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Oriental Trading

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Company gets its warehouse under control

The large, direct-to-consumer retailer's new warehouse relies on a sophisticated warehouse control system to pick up to 400,000 items a day.

By Bob Trebilcock, Executive Editor

"We work hard to make the world a better place to live, work and play."

So goes the motto at the Oriental Trading Company (OTC). As the nation's largest direct-to-consumer retailer of value-priced party supplies, toys and novelties, OTC is best known for products associated with fun and games. Perennial bestsellers like whoopee cushions reflect the play. The company's 750,000-square-foot distribution center in LaVista, Neb., reflects the hard work.

When the facility went live in 2007, OTC transitioned from a conventional, paper-driven DC to a highly automated facility that manages more than 30,000 stock keeping units (SKUs). In 2010, the facility picked and packed 78 million units a year. On its best day, the LaVista facility handled 404,000 items.

Oriental Trading's WCS creates a wave of 100,000 items to fill 10,000 orders. Once picked (bottom right), orders are assembled by a tilt tray sortation systems which routes the required items to a packing station (top left) where associates pack orders for delivery.

"We believe we're in the top five in the United States for unit volume being shipped out of a single facility," says Deon Wagner, director of warehouse operations.

To hit those numbers, OTC implemented:

- a 250,000-square-foot fulfillment area featuring a three-level mezzanine,
- voice recognition technology to automate picking,
- a sophisticated double-density tilt tray sorter and conveyor system that feeds 600 packout stations, and
- a secondary sortation system to deliver packages to carrier trailers.

The engine behind those improvements is a warehouse control system (W&H Systems, whsystems.com) that has taken on many of the functions more typically associated with a warehouse management system (WMS).

In addition to controlling conveyor and sortation systems, the warehouse control system (WCS) optimizes picking and packing waves, sends pick information to voice picking, and directs the packout operations. The WMS, meanwhile, is primarily in charge of inventory management and communication with the host system.

The result has been an impressive 45% increase in productivity and a 60% reduction in pick errors. Accuracy has improved from 99.25% to 99.9%.

What's more, the system as designed can manage up to 50,000 SKUs. "Our strategy is to grow our business by increasing the number of products and product categories we offer our customers," Wagner says. "This facility will let us continue that strategy."

Party on

Founded in Omaha in 1932, Oriental Trading was one of the nation's first wholesalers of value-priced novelties and gifts. It became a major supplier to the U.S. carnival trade in the 1950s before expanding in the 1970s by using catalogs and direct marketing to target consumers, retailers and businesses.

In the 1980s, OTC launched its first toll-free telephone number and seasonal catalogs brought continued growth. As the Internet grew in popularity in the late 1990s, OTC began to reach out to customers on the Web.

Today, the company employs 3,000 associates and mails nearly 300 million catalogs a year. OTC has been recognized as a Top 50 Internet Retailer, a Top 50 Catalog Company, and has also won awards for corporate citizenship and social responsibility.

OTC continues to grow by adding new items to existing categories and by adding new products. That growth strategy led to the need for a new facility. When planning began for LaVista, the existing 600,000-square-foot facility in Omaha was maxed out.

"In our old facility, we had a capacity for about 24,000 SKUs," says Wagner. "We simply didn't have the room to add the new SKUs that our merchandising team wanted to bring in to continue to grow our business."

There were other challenges as well. OTC's growing Web presence resulted in more customer orders for out of season products offered all year long on the Web compared to catalog customers who typically ordered from whatever items were offered in the book.

This led to a decrease in productivity. A typical order consists of six to seven line items and 14 units that were being picked across 24,000 possible SKUs. With those order profiles, the paper-driven, pick-to-cart fulfillment processes in the old facility were manual and physically taxing. "Our WMS was able to optimize pick paths," says Wagner. "But given the breadth of SKUs, our pickers were walking 7 to 10 miles a day." And, turnover was high.

The combination of physical constraints and the physicality of the job led to the design of the new facility. "We wanted to support SKU proliferation with a pick zone that could hold up to 50,000 SKUs," Wagner says. "And we wanted to drive pick density in our picking processes to minimize travel distances and pick times."

Items are picked to totes from a number of different picking zones and then conveyed to one of the sorter induction areas, where they are placed on the tilt tray sortation system.

Explode and assemble

The solution was a highly integrated and flexible picking methodology that OTC refers to explode and assemble. The system brings together an order management system, WMS, WCS, conveyor and sortation system, and voice recognition technology to find the optimal way to pick and assemble a wave of 8,000 to 10,000 orders.

To understand the new system, it helps to look at how orders used to be processed. In the old system, the WMS created batches of 9 to 20 orders around a system-optimized path. Associates picked complete orders from a master pick ticket directly to shipping containers on a cart. Since pickers were completing an order, several associates might visit the same location to complete their batches.

When the batch was complete, the picker scanned a bar code on the master pick list. At that time, the inventory was updated. Given that a batch could take 40 minutes, any given location might be out of stock for a significant period of time before the system knew to replenish that location. "The system was very inefficient given our order characteristics," Wagner says.

The explode and assemble methodology takes a different approach. Orders still begin at the WMS. The system creates a wave that consists of 8,000 to 10,000 orders and 100,000 units to be picked. That wave is then passed to the WCS. Since the WCS has a more granular view of the workload in the facility, including what's happening on the sortation system and at the packout stations, it determines the best way to execute the wave based on the profile of the orders, the location of items and the workload on the sorter.

It works like this: To explode the orders, the WCS creates four picking and packing subwaves from the original wave; picking assignments are assigned to an induction location on the double-density tilt tray sorter, and orders are assigned to a chute leading to one of 600 packout locations.

The WCS plans the work based on several criteria. First, it looks at which items will consume the entire contents of a case. Those tasks are sent to a case break area. The idea is that associates will pick by location rather than fill all the items of an individual order. That way, a location is only visited once for each wave, cutting down travel time. By condensing items in a three-floor mezzanine, travel time is further optimized.

"Our associates have gone from walking 7 to 10 miles a day to less than a mile, which has been a huge win for our pickers. We've had a significant reduction in turnover."

— Deon Wagner, director of warehouse operations, Oriental Trading Company

While they are picking, associates are directed by the voice system to pick to up to 16 different totes until a case is consumed. Filled totes are held in a pick module until the sorter is ready for a subwave. At that point, the associate releases a tote to the takeaway conveyor, which sends it to an induction point.

That's the explosion piece of the equation. For the assemble part of the orders, the tilt tray sorter identifies all of the items for a single order and sends them to a packout chute. After an order is packed into a shipping container, it is conveyed to an automatic tape and sealing sorter. There it is scanned again and the WCS determines whether the carton is 100% complete; if so, it is sorted to an automated tape-sealing machine and continues to the shipping sorter. If there are exceptions, it is conveyed back to a packout station to be completed. The WCS remains in control right up until the packages are sorted into the carrier trailers.

Smooth transition

Wagner says the transition from manual processes to automation was relatively seamless. "Our associates have gone from walking 7 to 10 miles a day to less than a mile, which has been a huge win for our pickers," Wagner says. "We've had a significant reduction in turnover."

What's more, associates are cross trained on a variety of jobs to ensure that the facility can execute to the wave plan. The implementation of a labor management system along with a pay for performance program has also led to worker acceptance.

But the most important benefit may be the ability to support 50,000 SKUs in the future. "We now have a facility that will support our future growth," says Wagner.

Explosive order fulfillment

Oriental Trading's unique picking solution handles up to 400,000 items per day.

By Bob Trebilcock, Executive Editor

Oriental Trading Company
LaVista, Nebraska

Size: 750,000 square feet, including 500,000 square feet of storage and 250,000 square feet of fulfillment; OTC operates a second 600,000-square-foot facility in Omaha

Products handled: Party supplies, arts and crafts, toys and novelties

Stock keeping units: 30,000

Units handled: 78 million units handled in 2010 with up to 404,000 on peak days

Employees: 750 to 1,100 depending on the season

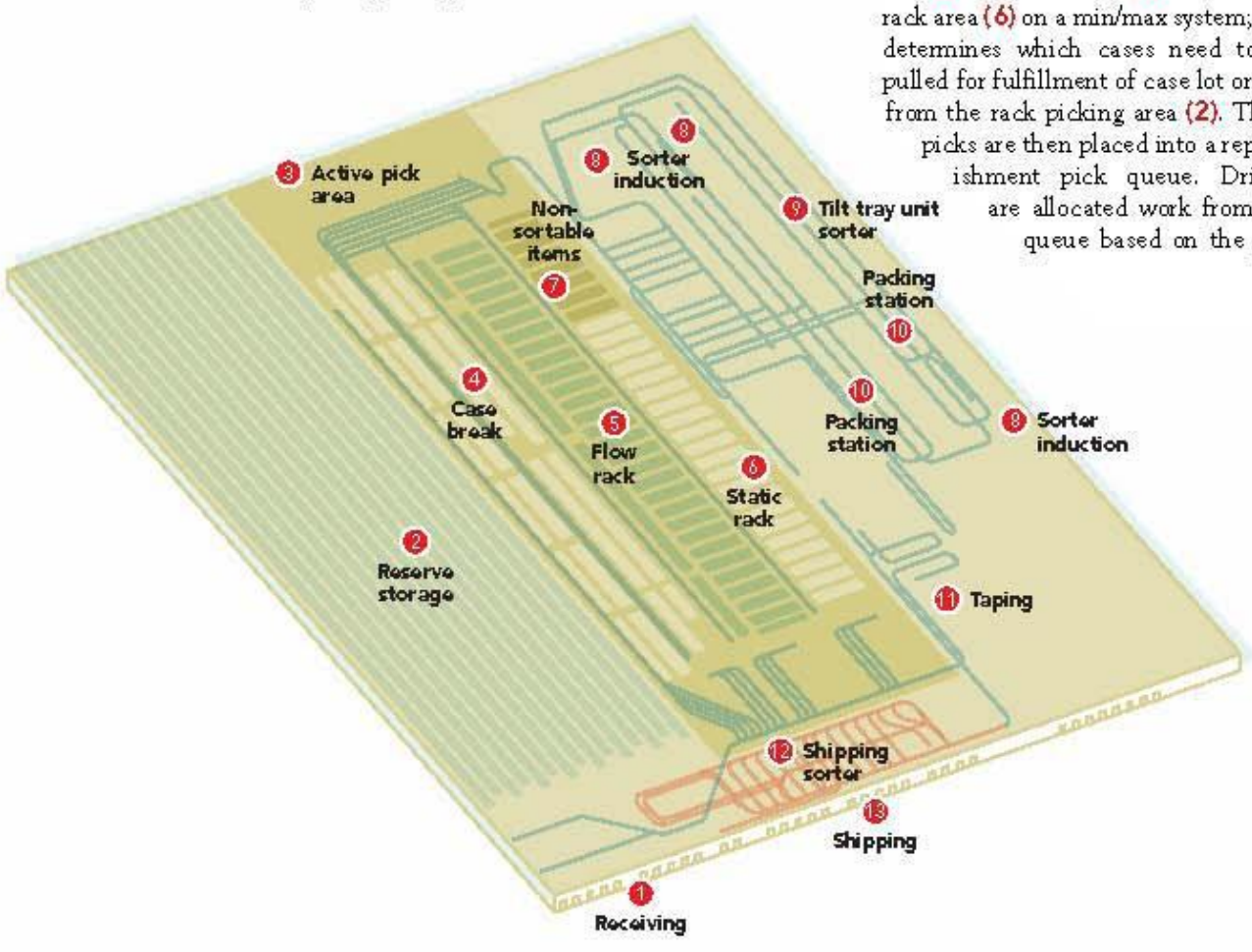
Shifts/Days: 3 shifts/5 days with occasional sixth day during peak periods

To fill orders, associates send thousands of items to a unique tilt tray sorter that then assembles the orders at the packout stations.

Receiving: Inbound containers are floor-loaded and typically contain 30 to 40 different items. At the receiving dock (1), containers are unloaded and cases are sorted to pallets by item number. Once a pallet is full, a license plate bar code is applied to the pallet and scanned to update inventory in the warehouse management system (WMS). Each product is then inspected in a quality assurance area, and weighed and measured at both the selling unit and case level. That information is used later in a packaging algorithm that selects the right box for an order as well as for calculating the weight and cube for rate shipping.

Putaway: There are more than 100,000 pallet locations in the reserve storage area (2). Pallets are staged in a putaway and drop (P&D) location at the end of each aisle, based on the final putaway location that was selected by the WMS. A turret truck operator is directed by an RF device to the P&D location to retrieve the pallet and deliver it to a storage location. Inventory is tracked by the license plate tag and scans from location to location. Both turret trucks and orderpickers operate on a wire guidance system in reserve storage.

Replenishment: After an allocation is run, the WMS determines how many cases of each item need to be delivered to the active pick area (3). Cases can be put away in a case break area (4); flow rack area (5); and a static rack area (6) on a min/max system; and determines which cases need to be pulled for fulfillment of case lot orders from the rack picking area (2). These picks are then placed into a replenishment pick queue. Drivers are allocated work from the queue based on the pro-



file that they are set up in. Profiles can include specific aisles, equipment types and priorities. Drivers are then directed to a location and pick a specific number of cases for an item. They apply identification labels to the cases and scan these labels to associate a case with a carton identifier.

Upon completing work in the queue or filling an order picker bed, the cases are taken to one of two takeaway conveyors. The cases are then conveyed to the active pick area (3) where they will be sorted on a belt sorter with divert arms to staging destinations within the active pick area, or to a case lot meter area where the cases will be shipped. As cases arrive in the staging destinations, stockers use RF devices to move the cases to active pick locations.

Picking: Pickers within the active pick area (3) process picks to fill a 100,000 unit wave. Each wave is broken down into four subwaves and a total of 16 sorts. Items can be picked from four areas: case break (4), flow rack picking (5), static rack picking (6) and non-sortable picking (not illustrated). Each of these pick methods is directed by the voice recognition system.

In the case break area (4), the entire contents of a full case will be consumed within a wave. The picker is directed to scan a case label on the case and then scan the UPC code from one item within the case. The voice system will then communicate to the picker which totes to place the items into. The case contents are placed into totes that are set up within a put module that has a location for each subwave and induction platform (8).

As the picker places items and quantities into the tote, they validate the pick by speaking a check digit for the location within the put module that the tote is in.

In the flow rack area (5), a picker is directed to a pick location and then to place picked units into totes that are set up on put carts. The picker verifies that he is at the right location by communicating the check digit that is associated to the location. The picker is then directed to pick a specific quantity of units and place them into the appropriate totes within the module on their cart.

In the static rack area (6), pickers also pick to a cart. Each picker will make two passes per wave in the static area. As totes become full of product, the picker stages the totes on staging conveyor and replaces that tote with an empty tote on the put cart. In addition, the pickers will stage totes on the staging conveyor when they complete a wave. As work is needed on the sorter the pickers are directed by the voice system to release totes from the staging conveyor to the takeaway conveyor that will convey totes to the appropriate induct platform (8) on the unit sorter (9).

Products that can't be placed on the unit sorter due to size or fragile nature are picked in a process similar to the static area process but are not staged on staging conveyor. Non-sortable products are delivered to the pack area (10) at the appropriate time.

Induct and sort: Totes from the pick area are conveyed to a tote sorter where they are sorted to one of the four induction platforms (8) on the unit sorter (9). Each induction platform has eight induct stations. The induct operators will each have totes directed to their station. The induct operator will then scan the tote, scan an item in the tote and place the item on the next available tray on the sorter.

The system displays how many of an item should be left in the tote and will count down that quantity on the screen as items are placed on trays. The inductor will continue inducting items until the tote is empty. As items are inducted, the unit sorter directs them to the appropriate pre-determined packout destination (10) for an order that requires that item.

Packing: The facility features 600 chutes, or packout destinations (10). Up to 12 orders can be assigned to each chute depending on the cube of the order. Once all of the orders assigned to a chute have been sorted, the packer scans the chute and is directed to set up a box for each order. The packer then scans each item and is directed to place the item into the appropriate box on the packout table. Once all the items in the chute are scanned, the packer will retrieve any non-sortable items that are needed for those orders and place them into the appropriate box. Finally, the packer will place the shipping label on the box, insert the packing slip and place the box on the takeaway conveyor. The takeaway conveyor routes the package to the pillow tape area (11) where bio-degradable air pillows are inserted for dunnage and the package is sealed. The package is then sorted (12) to shipping (13).

Shipping: Packages are routed to the shipping conveyor where they pass through one of two inline scales and overhead scanners. Each package is weighed and the order number/package ID is scanned to close the order and create a carrier manifest. The shipping sorter (12) then diverts the package down the appropriate chute based on carrier/service level and destination of the package. □

System suppliers

SYSTEM DESIGN, INTEGRATION AND WAREHOUSE CONTROL SYSTEM: W&H Systems, www.whsystems.com
WMS: Interlink Technologies, interlinktech.com
CONVEYOR/TILT TRAY SORTATION: Beumer, www.beumer.com
CONVEYOR/SORTATION: Intelligrated, www.intelligrated.com
VOICE RECOGNITION TECHNOLOGY: Lucas Systems, www.lucasware.com
PICKING RACK AND MEZZANINE: Unarco Material Handling, www.unarcorack.com
PALLET RACKING: Interlake Mecalux, www.interlakemecalux.com/Home.do
LIFT TRUCKS: Crown Equipment Corp., www.crown.com
BAR CODE SCANNING: Motorola Solutions, www.motorolasolutions.com
RADIO FREQUENCY SYSTEM: Psion, www.psion.com