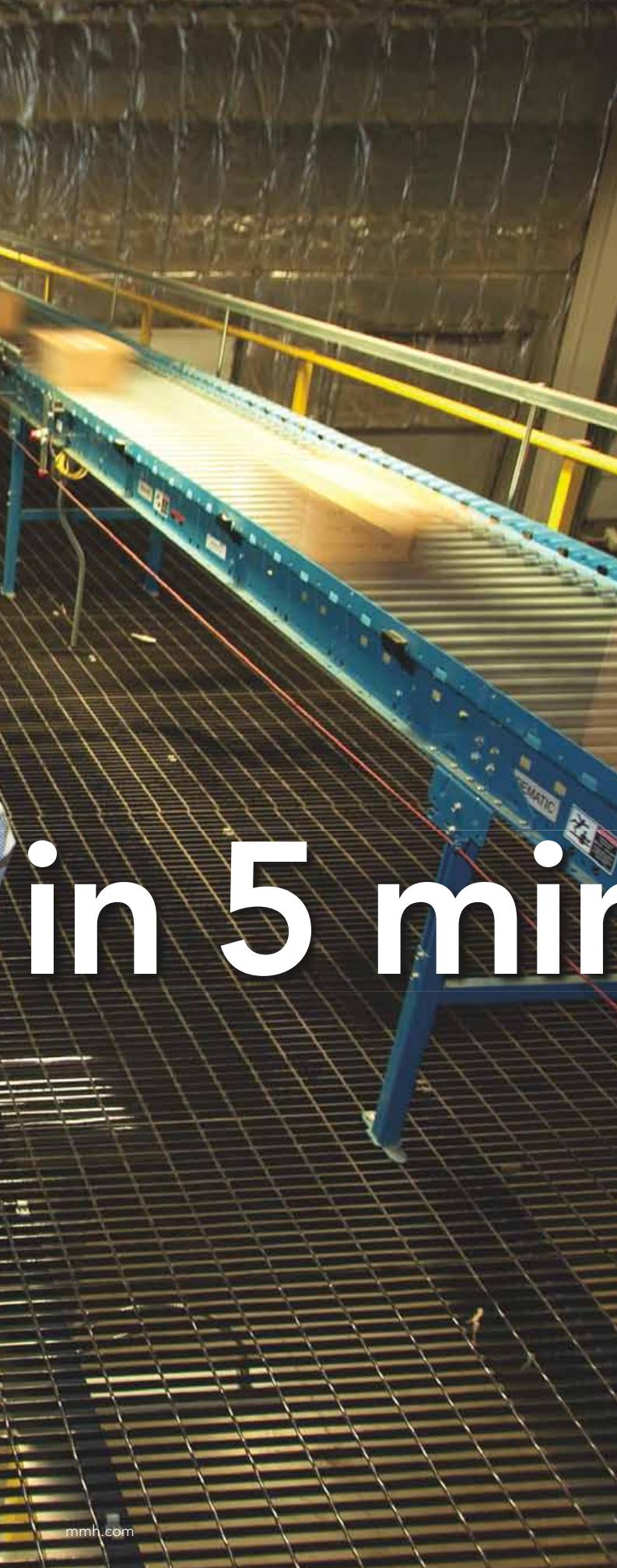




JCPenney: Out the door

A new crossdocking center can move 165,000 cases a day from the receiving dock to the shipping dock with 99.9% accuracy.



By **Bob Trebilcock**, Executive Editor

The shortest distance between two points is a straight line.

In many respects, that sums up the operations at JCPenney's sixth U.S. Retail Logistics Center (RLC), opened in July 2007 in Lathrop, Calif., not far from Oakland. Up to 95% of the cases received at the facility are crossdocked straight from the receiving dock to the shipping dock with just two touches in between: Once to unload them onto a conveyor at the receiving dock and once to load them into a trailer at the shipping dock. In between, software and automated materials handling equipment handles the rest. And when that product is received at one of Penney's 13 regional store support centers, in all likelihood it's crossdocked again to a store.

in 5 minutes

"We're able to process a carton in five to six minutes, depending on which door it's coming out of and which doors it's being sorted to on the outbound side," says Tim Wood, Penney's engineering and optimization director.

The 436,000-square-foot facility uses 20,000 feet of conveyor and a 938-foot long, single-unit sliding shoe sortation system (Dematic, 877-725-7500, www.dematic.us) to process 165,000 cartons per day through the facility with 99.9% accuracy. The system is one of the longest single-unit sliding shoe sorters in the world.

The new system, however, is about more than speed. Several unique features optimize the utilization of the equipment inside the four walls of the RLC, including:

Tim Wood, engineering and optimization director, JCPenney

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After incoming cartons are received at the dock (top), they enter the conveyor system (bottom).

- Precision merge gapping allows the system to sort with 2 inches or less between cartons rather than the conventional 10 to 12 inches. That enables Penney to get more throughput from the same operating speeds as a conventional sortation system.
- The sortation system diverts cartons parallel to the sorter, rather than at an angle, again allowing for more throughput, but also resulting in less damage to cartons.
- Air-cooled linear induction motors provide quieter, energy-efficient sortation.

Outside the four walls, the facility adds an extra layer of security to Penney's supply chain by broadening the retailer's crossdocking capabilities, and using a second port.

Building the better crossdock center

Headquartered in Plano, Texas, with more than 1,100 department stores, over 150,000 associates, and \$18.5 billion in revenue in 2008, JCPenney is one of the country's leading retailers. Penney offers an array of national, private and exclusive brands that reflect

the company's commitment to providing customers with style and quality at a smart price. The company's private brand retailing accounts for nearly 50% of its merchandise mix.

The Lathrop DC is one of six RLCs in Penney's distribution network. Ninety percent of the merchandise received at the RLC comes from overseas in containers; the remaining 10% is from local suppliers in the area, which is merged in with the container merchandise at the RLC's receiving docks. Merchandise cross-docked from the RLCs goes to one of 13

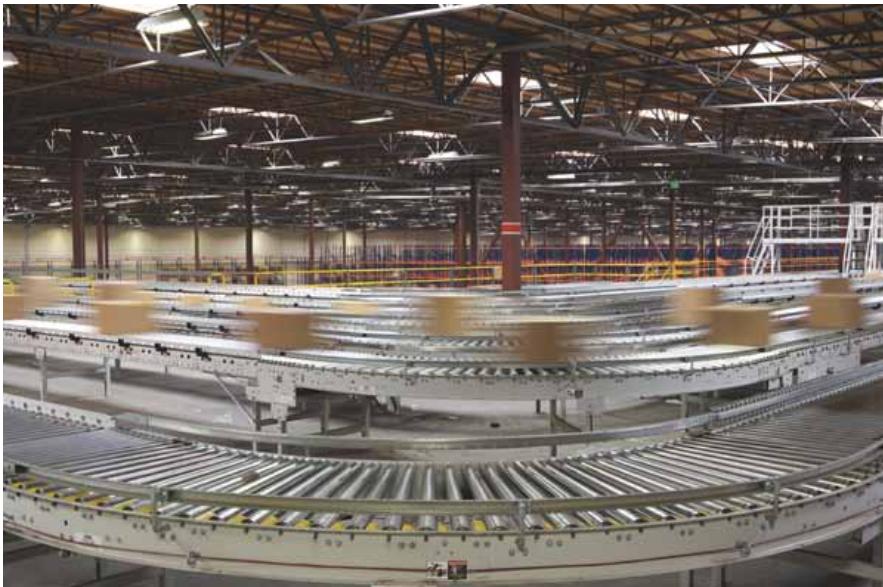
regional Store Support Centers (SSC), each servicing 60 to 130 stores. When product arrives at one of the SSCs, it is once again crossdocked to an individual store. "We have been crossdocking for 30 years, and this new facility broadened our capabilities," says Wood. "Only a small percentage of our merchandise goes into temporary storage."

Planning for the new RLC began four to five years ago. Prior to the Lathrop DC, Penney received all West Coast container shipments at its Buena Park RLC in Southern California, arriving through the Port of Long Beach. That facility, as well as a third-party logistics (3PL) provider working with Penney in southern California, was stretched to its limits as the company grew internally, adding up to 50 new stores a year, and more merchandise arrived from overseas.

"We were struggling with capacity issues in our facility, and our 3PL's operations were stretched across four or five buildings," says Wood. "We wanted to bring all of that under one roof."

In addition, Penney wanted to mitigate the risk to its supply chain. Rather than build a second facility in Southern California, the new DC was located in the Bay Area near Oakland. "That gave us port diversification," says Wood. "If





Penney can adjust the speed of the conveyor based on the volume of product that has to be processed.

something should ever happen to shut down the port in Southern California, like an earthquake or a strike, we can still receive goods on the West Coast.”

The added capacity and port diversification also allowed Penney to process goods faster, reducing the overall transportation time for direct imports.

Once the decision was made to build, Penney established two important criteria for the new facility. First, it had to be able to handle at least 150,000 to 200,000 cartons per day over two shifts; in addition to installing the new equipment, the building needed to be modified with the addition of 8 feet to accommodate more shipping doors.

Second, it had to be built fast, within six months. “We had a very short time horizon because we wanted the facility up and running to handle peak season, which begins in August,” says Wood.

Penney secured a lease for an existing building in March, and the new DC went live in July.

Super sortation

With the focus squarely on crossdocking, the centerpiece of the new RLC is its high-speed sortation system.

“Since we were able to start with a greenfield facility, we wanted a crossdock system with more flexibility in the volume and throughputs because the volume goes up and down, depending on the time of year,” says Wood.

Central to that approach is the ability of the system to constantly adjust speeds based on:

- How much volume is coming through this sub-system upstream of the merge;
- How much volume is coming off of the sorter;

- And how much volume is en route from the pre-merge through the sorter.

“The system will automatically vary the speed as it senses more freight coming through the doors, or we can manually set the system to run at a certain number of cartons per minute if we know it’s a slow day, or a day with heavy volume,” says Wood. “Since there’s a correlation between operating speed and wear on the conveyor, this allows us to maximize our throughput while conserving energy and reducing the maintenance required on the system.”

The conveyors use belts exclusively, instead of rollers, which increases package control and enables precision gapping and high-speed parallel-divert sliding shoe sortation.

Because the packages are closer together, the sorter can run at a slower speed, yet handle the same volume of packages that another sorter would handle having to run at a much faster speed—20% higher speed to be exact. Consequently, Lathrop’s sorter can process the same number of cartons

Precision gapping allows the system to sort with as little as 2 inches or less between cartons.





at 540 feet per minute (FPM) as compared to the industry standard of 650 FPM, and with a more gentle handling because of the lower speeds.

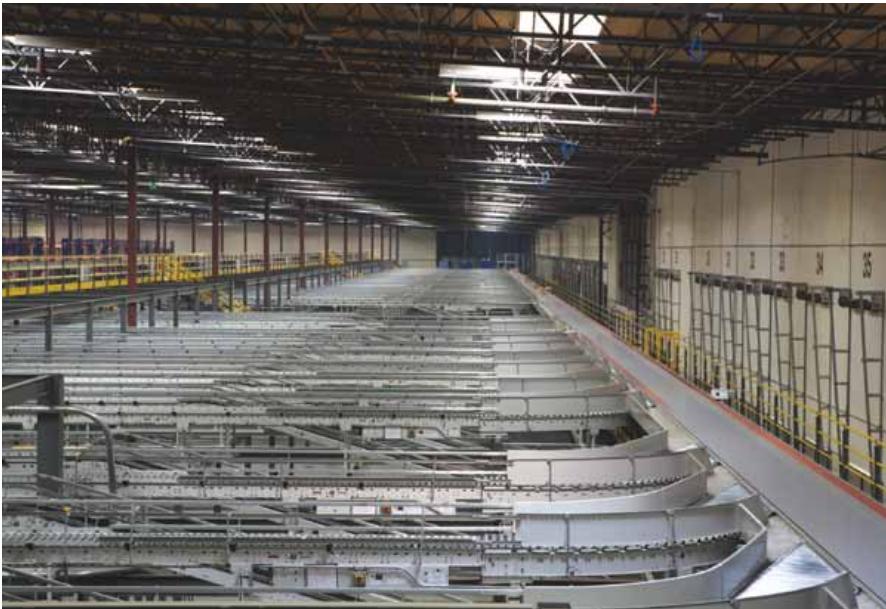
Another important feature is the **Penney's sorter is over 900 feet long, one of the longest single unit sorters in the industry.**

While most cartons are crossdocked, a small percentage are palletized and racked for short periods.

use of 50 linear induction motors distributed across the system. "Most conveyor systems have one big motor driving the system," explains Wood. "Our

system is designed to use a number of smaller motors so that even if we lose one or two, the system will continue to operate." In the two years since the system went live, adds Wood, the facility has never had down time because of a motor issue.

Energy conservation, reduced maintenance, increased capacity and port diversification. Put them together, and they add up to crossdocking success. "The DC performs exceptionally well," says Wood. "After two years, we've had no difficulties and we're serving our needs into the future." 



System suppliers

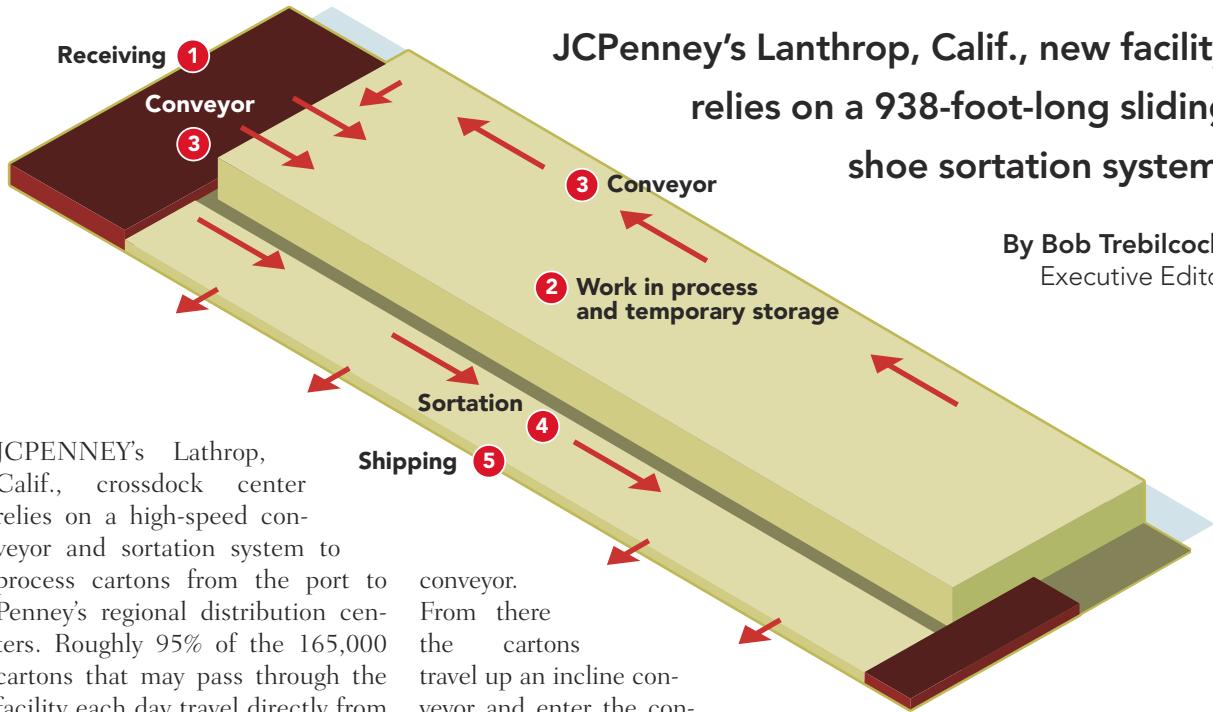
SYSTEM INTEGRATOR, CONVEYOR AND SORTATION: Dematic, 877-725-7500, www.dematic.us

LIFT TRUCKS: Crown Equipment, 419-629-2311, www.crown.com

WMS: RedPrairie, 877-733-7724, www.redprairie.com

OVERHEAD SCANNER & DIMENSIONER: SICK, 800-325-7425, www.sickusa.com

Extreme crossdocking



JCPenney's Lanthrop, Calif., new facility relies on a 938-foot-long sliding shoe sortation system.

By Bob Trebilcock, Executive Editor

JCPENNEY's Lanthrop, Calif., crossdock center relies on a high-speed conveyor and sortation system to process cartons from the port to Penney's regional distribution centers. Roughly 95% of the 165,000 cartons that may pass through the facility each day travel directly from the receiving docks to the shipping docks in about five minutes. The remaining 5% are palletized for temporary storage. "Five percent doesn't sound like a lot," says Tim Wood, engineering and optimization director. "But when you're handling 165,000 cartons, that's still about 750 pallets a day."

Receiving: Penney begins tracking shipments from its overseas consolidators and receives an advance shipping notice (ASN) when containers arrive at the port. That allows the retailer to prioritize the order in which containers come into the facility based on the needs at the stores. By the time a container arrives at the receiving area ①, the warehouse management system (WMS) knows exactly what is coming in and how it will be allocated. Cartons are unloaded from the container onto an extendable belt conveyor. Each carton is assigned to a specific store and given a UPC code while still on the

conveyor. From there the cartons travel up an incline conveyor and enter the conveyor system ③. Once they are on the conveyor, an overhead bar code scanner automatically scans a label on the carton. That determines whether the carton will be crossdocked to one of 50 outbound shipping dock doors or to a work processing area.

Putaway and shipping: Cartons that will be crossdocked continue on one of eight conveyor lanes to a pre-merge, where they narrow onto three lanes. At a main merge, the three lanes merge to one before they are inducted into the sorter. From there, they enter the 938-foot-long sliding shoe sortation system ④. The system then sorts them to the designated shipping door ⑤. The cartons travel down another incline conveyor to an extendable conveyor that reaches into an outbound trailer. Cartons are then floor loaded in the trailer.

Some cartons will be temporarily stored, based on when the merchan-

JCPenney Lanthrop, Calif.

- SIZE: 436,000 square feet
- THROUGHPUT: 165,000 cases per day capacity
- SHIFTS: two shifts, five days
- EMPLOYEES: 100

dise is required in the stores. Those cartons are conveyed to a work in process and temporary storage area ② on the distribution center floor. There, cartons are palletized by associates and then stored in pallet rack.

Once there is an order for the stored product, a lift truck driver is directed by the WMS to a pallet rack location. The cartons are manually placed on the conveyor ③ in the work in process area. They then follow the same path as cartons coming out of containers. **M**

Daniel Guidara