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Warehouse of the Month
By the book distribution

By David Maloney, Senior Editor
Modern Materials Handling
April 1, 2003

The bell has rung, everyone please take your seat. Class is now in session.

Today we will learn about one of the most difficult of all products to distribute—books. They are heavy to handle and dense to store. Most publishers must also carry a large number of titles, requiring the tracking of a multitude of individual stock keeping units (SKUs) within a facility's active inventory.

Textbooks require the same exactness as popular titles, except that they tend to be heavier than the typical best-selling novel. Remember lugging around an armload of schoolbooks? Just imagine handling over 100,000 such books everyday. That is the task of McGraw-Hill's new distribution center in Ashland, Ohio. This facility is designed to process orders with textbook precision.

Open only since January, the new building is automated for efficiencies. It has already achieved accuracies of 99.5% with much greater throughput capacities than the buildings it replaced. Labor demands have also been reduced.

'We have a similar size workforce as one of our old buildings but now we can manage three times the volume,' says Loren Blankenship, senior director of operations.

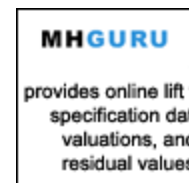
The new facility was necessitated by capacity constraints at McGraw-Hill's five other distribution centers, the need to reduce costs, and recent acquisitions such as Tribune Publishing. Two DCs came along with Tribune, including one just a few miles away from the new facility. It was a manual operation that proved inefficient for future fulfillment demands. The other DC was in Seattle. Blankenship worked there and recalls that it had some automation, but was not efficient because it lacked a warehouse management system (WMS).

'It was like a Cadillac with a Yugo engine,' he says. 'We have a great appreciation for the WMS we now have here in Ashland.'

That WMS, a homegrown system first implemented in 1987, permits wireless order processing. It is an essential ingredient to McGraw-Hill's customized order fulfillment. A single book of an obscure title is handled just as easily as a full case of the top-selling textbook. The building and equipment is also structured to deal with the seasonal nature of the schoolbook business.

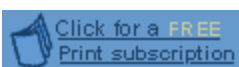
'Some 60% of our revenue comes in the summer months,' says Gary Salters, senior vice president of order fulfillment. 'We had to design our building for service during that window.'

A highlight of that design is the clever use of a sliding shoe sorter that performs double duty



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(Automation). Di-verts on one side of the bi-directional sorter serve the split-case module while other cartons are directed down to shipping lanes on the opposite side of the sorter.

Such automation was a change for workers who were previously at the nearby manual warehouse.

'We are light years from where we were,' says Salters. 'We had to teach people to work in this environment.'

Salters adds he expects it will take several more months before the facility is completely up to speed. The building currently distributes textbooks and supplemental teaching materials for kindergarten through high school grades.

Bound for storage

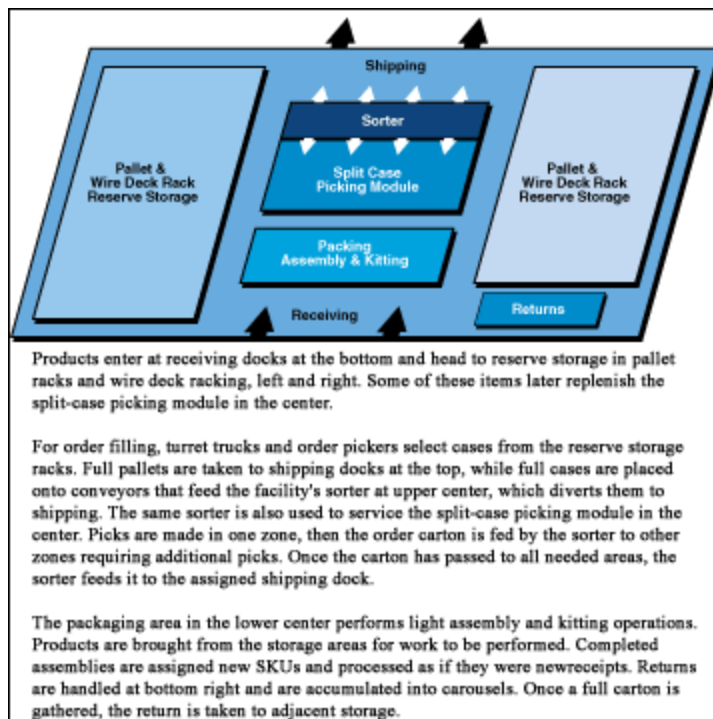
A large number of products arrive as full pallets. A bar coded license plate is created and applied to each load in receiving. This is then scanned for the WMS. Each SKU that is new to the building is also cubed and weighed.

On average, two container trucks also arrive daily. These hold products from Asia that are not palletized and may contain as many as 800 different SKUs. Cartons are removed and verified, then manually stacked onto pallets by receiving personnel.

All product first flows through reserve storage before it is allocated to picking.

'Accurate information on inventory is our first priority,' says Salters. 'We confirm 100% of our putaway using paperless cycle counting programs before we do any picking.'

Lift truck drivers confirm the SKU and quantity of the received pallets before transporting them to pickup and delivery (P&D) stations located at the end of the reserve aisles. They scan the load to determine which station is required for the drop off. After delivery, a turret truck driver gathers the load, scans it, and is informed by a radio frequency (RF) terminal which of the 118,000 storage locations has been assigned. Reserve storage consists of narrow-aisle racks for full pallets and wire deck racking for housing individual cartons.



Wire embedded in the facility floor guides the vehicle within the narrow aisle to the assigned slot. The driver then deposits the load and enters a check digit number located on the rack into the RF unit to verify putaway.

Picking is based on first-in/first-out allocations and occurs in two main areas—the reserve racks and the split-case module. The WMS determines the products needed for each shipping

schedule and begins making picking and replenishment assignments.

Gathering knowledge

Once cycle counts are completed, full pallets of products selected for both single customers

and as part of a batch pick are performed. Turret trucks, directed by onboard RF terminals, select the pallets from their narrow-aisle storage racks. Those loads destined for individual customers are taken to drop off stations where counterbalanced trucks retrieve the pallets and take them directly to pre-assigned staging areas at the docks.

The remaining picks are pallets that will be broken into a number of orders to fill case requirements of customers needing that book title. These loads are picked by turret trucks in the same manner and taken to the delivery station at the end of each aisle. The counterbalance trucks then gather and transport the loads to a conveyor where customer-specific labels are manually attached to each case. The conveyor feeds a sliding shoe sorter where each case is directed to a pallet build station in shipping.

'We try to batch as much together as possible,' explains Salter. 'The more we can flow into the mix, the more efficiencies we create.'

The next task performed in the processing cycle is replenishment of the split-case picking module.

'What we do with replenishment is get the house ready everyday before we move in,' says Salter.

Order pickers select cases needed for split-case processing from reserve areas (including the wire deck racking) according to instructions on their RF terminals. Each case is also given a label as it is pulled from the racks. The loads are left at the adjacent delivery stations, where counterbalanced trucks gather the mixed SKUs and take them to the flow racks and shelving of the split-case module. The labels inform the driver of delivery points. Items are manually loaded into the module, as workers scan each case and are informed of the specific rack assignment. They enter a check digit to confirm putaway.

Once picking replenishment is completed, the orderpicker operators begin gathering full cases required to fill customer needs. These are labeled and inducted onto the conveyor in the same way as the split-pallet cases are handled. The cases are conveyed to the sorter and diverted to shipping.

Next to be selected are loose-pick items from the split-case module. Products are chosen from zones utilizing pick and pass processing. The WMS determines the required carton size based on the cubing information gathered earlier. Empty cartons located at the end of the module lanes are manually erected. A label displaying the books or materials required for that order is applied. The worker in the first zone reads the label and picks the needed products. The carton is gravity conveyed down the module lane so that other items may be added as required.

The carton is then inducted into the facility's sorter. This is the same sliding shoe sorter that serves shipping. If additional picks are required from other lanes, the carton is sent to one of the 13 diverters on the picking side of the sorter. An order may pass through the sorter several times until all split-case picks are completed.

Once all items have been gathered, the carton then passes over an in-line scale where it is weighed. The result is checked against the expected weight. If it is out of tolerance by more than three-tenths of a pound, it is diverted to a quality assurance area (QA) to be checked. An additional 10% of all orders are also diverted to QA as part of the company's quality control practices.

Following weighing and verification, empty cartons are diverted to a pack area where void fill is added and each carton sealed. The carton is once more inducted into the sliding shoe sorter before being diverted to one of the 15 shipping docks. Two are used to fluid-load items sent through parcel carriers, while the other lanes feed the manual pallet build stations. Once all items have been gathered, the pallets are loaded onto outbound trailers.

'Our goal is to ship orders within 24 hours—the same day if possible,' says Salter.

While still ramping up, the facility is already showing the benefits of its efficient design.

By the numbers...

26,000	Stock keeping units
20,000	Cartons processed peak
54,390	Pallet storage positions
63,942	Wire deck storage positions
12,440	Carton flow rack locations
31,884	Shelving pick locations
2,880	Locations in four carousels
25,000	Linear feet of wire guidance

'We had the usual teething problems,' adds Blankenship, ' but things are going very well

now. We are meeting our schedules, bringing labor costs down, and creating metrics for our operations. And proactive preventative maintenance keeps us up and running.'



Click on the icon to read Web-exclusive material on returns and kitting at McGraw-Hill.

Benefits at a glance

Increased capacities

Greater throughput

Reduced labor costs

Accuracy increased

Improved peak processing

McGraw-Hill Ashland, Ohio

Began operations: January, 2002

Products distributed: textbooks, educational materials and kits

Facility size: 602,000 square feet

Throughput: 20,000 cartons peak

Stock keeping units: 26,000

Employees: 180

System Suppliers

Conveyors and sorters: Automotion, 708-229-3700, www.automotionconveyors.com

Design consultant: TransTech Consulting, Inc., 614-751-0575, www.transtechconsulting.com

Turret trucks, order pickers: Raymond Corp., 800-235-7200, www.raymondcorp.com

Lift trucks: Crown Equipment Corp. 419-629-2311, www.crownlift.com

Horizontal carousels: White Systems (FKI Logistex), 908-272-6700, www.whitesystems.com

Storage racks: Interlake Material Handling, 630-245-8800, www.interlake.com

Shelving and flow racks: Western Pacific Storage Systems, 800-732-9777, www.wpss.com

RF scanners: LXE, 770-447-4224, www.lxe.com

Fixed scanners: Accu-Sort Systems, 800-227-2633, www.accusort.com

Cubing system: Quantronix, Inc., 800-488-2823, www.cubiscan.com

In-line scales: Mettler-Toledo, 614-438-4511, www.na.mt.com

Void fill system: Sealed Air Corp., 201-712-7000, www.sealedair.com

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