Giant Eagle makes the case for mobile robots

Joe Hurley, senior vice president of distribution and logistics, Giant Eagle

THE BIG PICTURE
Cold storage: How to plan for unpredictability

INFORMATION MANAGEMENT
RFID the Macy’s way

EQUIPMENT REPORT
Dock logistics

SPECIAL SUPPLEMENT
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Raymond and Binghamton University collaborate on Capstone Design Course

IN COLLABORATION with Binghamton University’s Thomas J. Watson School of Engineering and Applied Science, The Raymond Corporation has sponsored a senior project for the Capstone Design Course to convert a gas-powered go-kart into an electric-powered go-kart.

With the guidance of Raymond engineers, students began the fall 2012 semester learning how the go-kart works as a gas-powered machine. The go-kart’s performance was benchmarked and evaluated by installing sensors and data-acquisition equipment. The students then conducted feasibility studies and developed a design tool to identify a plan for the conversion. The resulting electric-powered go-kart was found to outperform the gas-powered go-kart on various levels.

The go-kart was displayed at the second annual Century of Upstate New York vehicles show.

New logo and descriptor reflect shifts in PMMI and industry

PMMI IS NOW “The Association for Packaging and Processing Technologies,” the largest association serving the processing and packaging supply chain.

The new descriptor and logo reflect the evolution of PMMI, which has discontinued using “the Packaging Machinery Manufacturers Institute” publicly.

“PMMI has had a long, distinguished history as Packaging Machinery Manufacturers Institute, but that name doesn’t reflect who we are today,” said Charles D. Yuska, president and CEO of PMMI. “In 1933, PMMI only represented packaging machinery manufacturers. Today, we’re a resource for the entire packaging and processing supply chain.”

Seegrid and Bastian Solutions create integrator partnership

BASTIAN SOLUTIONS, a global materials handling systems integrator, recently announced it will become a partner integrator with Seegrid.

“Seegrid’s robotic industrial trucks provide flexible and affordable solutions to complement existing or new facilities,” said Aaron Jones, vice president at Bastian Solutions.

John Hayes, national account manager for Seegrid, noted, “Seegrid is very happy to partner with Bastian Solutions. The innovation and dedication they bring to their customers is second to none; not just material handling but to all manner of business solutions.”

Jones added, “Bastian Solutions’ clients will appreciate the flexibility Seegrid offers and the immediate benefit to their operations. We look forward to implementing this technology to help our customers achieve their business objectives.”
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History defined by innovation leaders

ew, vibrant, exciting, “game-changing” technology drops down in front of us, sometimes out of nowhere, and we spend the first few moments with our mouths agape as we figure out how it works, what it means. The buzz builds through the B2B media, and all of a sudden you’re considered a dinosaur if you’ve yet to either purchase or apply this new technology in your business.

“This is going to change everything,” they say. But as time passes, and the technology is plugged into bits and pieces of our operations by the early-adopting mavricks, we begin to slowly realize the limitations of the “game changer.” We usually find that while it’s certainly helpful in one area, it often lacks the ability to meaningfully help in another.

More time passes, more investment and adoption takes place, and we realize that while it hasn’t changed everything, it certainly can supplement existing processes, streamline areas of work and increase productivity in targeted areas.

The media buzz subsides, and in a few years we hear that Company A has applied it in manufacturing, while Company B has found it handy in distribution—and both have realized remarkable benefits now that they understand its full capabilities and have plugged it into their specific needs.

This discovery process certainly isn’t new; in fact it’s probably been the case since the invention of the wheel. It’s human nature, it’s never going to change, but it’s an extremely important process for us to go through—especially in the case of how we evolve and apply the technology inside supply chain operations.

Ten years ago, Modern and the publications in the Supply Chain Group applauded Walmart’s aggressive RFID initiative that pushed suppliers to tag cartons and pallets to help speed up its receiving process in its distribution centers. Were they pushing the envelope? Did they ruffle some features? Where millions spent, often in vain? Yes, yes and yes.

But as we documented the successes and failures of the rollout over the proceeding years, we were also able to cover the quick evolution of software, hardware, cheaper tags and the development of protocol standards similar to what was done with bar coding 40 years ago. More time passed, and we were sharing success stories of tagging and tracking often unrelated to the Walmart initiative, yet directly related to the residual developments spawned from the well-publicized push.

Fast forward to 2013, and we have the RFID implementation story of Macy’s, one that’s brilliantly told by executive editor Bob Trebilcock starting on page 30. The story offers a short history, starting with the Walmart initiative, and documenting the different approach Macy’s has taken to applying the technology.

“Instead of tracking cases and pallets,” says Trebilcock, “Macy’s is using RFID to maintain an accurate inventory of the items that are replenished in the stores on a regular basis, a group of products that represents about 30% of Macy’s business.” For Macy’s, the value comes from more accurate inventory leading to an increase in sales of those tagged items.

“Now they may extend this technology back to the DC, but then again they may not,” adds Trebilcock. “It’s as if the two retailers both took a look into the future, but from the opposite ends of the telescope.” And the technology discovery process continues.
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IN TERMS OF the global economy, the alarm bells have stopped ringing. According to Cliff Waldman, senior economist for the Manufacturers Alliance for Productivity and Innovation (MAPI), that’s one of the key takeaways from the U.S. Chamber of Commerce Foundation’s Quarterly Economic Roundtable Series held last month. “There is a split decision out there,” said Waldman in a recent interview with Modern. “There’s less sense of emergency and imminent disaster around things like the Euro disintegrating, or a hard landing in China or Brazil. We’re in a world that’s calmer, but after five years of crisis it’s a chastened world, and almost bereft of dynamism.”

Manufacturing, in that climate, is going to have mixed results, he says. “With all the problems in the world and the fiscal dramas that came out of congress, it really slowed manufacturing down,” said Waldman, who said the picture looked very promising in the beginning of 2012, before closing the year with a little better than a 4% growth rate. Waldman thinks this will slow to 3% in 2013 and maybe return to 3.5% in 2014. “These are growth rates, which is good, but it’s very moderate growth.”

One issue Waldman brought up is the focus on the federal government, with economic questions centered too much around national concerns and national policy. “But economies advance on a regional level, in smaller units,” said Waldman. “So the focus shifts to regional policies toward a national end. That’s where the policy innovation has to happen. Not everything can come from Washington.”

For example, in New Jersey they are working to transform the unemployment system into a re-employment system. “That kind of approach at a national level could be one of the most productive diversions of resources we could do in this economic environment,” said Waldman. “These
days, we need some innovative policy thinking in the unemployment insurance area.”

One of the audience members asked whether the persistent extension of unemployment benefits is responsible for high unemployment. “It’s been studied in the U.S., and all the statistical evidence shows it’s at best a modest effect. In Europe I’m sure that is a problem, but in the U.S. there’s almost none of that.”

The discussion, hosted by the GFI Group and the U.S. Chamber of Commerce Foundation, briefed about 80 researchers, government agency representatives and others on the economic outlook of the U.S. economy, global economy and key sectors. The briefings offer the business community better insight into the impact of policies on their industries as well as to offer solutions to potentially negative effects.

ECONOMY

MHI forecasts growth of material handling equipment orders of 5% to 6% for 2013

MATERIALS HANDLING EQUIPMENT new orders grew 7.2% in 2012 and are forecasted to grow 5% to 6% in 2013 and 10% or more in 2014, according to the latest Material Handling Equipment Manufacturing Forecast (MHEM) released by MHI.

“As the current US economic expansion shifts from capital expenditure driven to consumer-led, we anticipate modest, positive MHEM growth for 2013. Housing, automotive rebounds and expansion in industrial, warehouse and commercial buildings (over 69% 2014 - 2018) will contribute substantially to improved MHEM growth for 2014 and beyond,” says Hal Vandiver, MHI executive consultant.

In addition, material handling equipment shipments grew 9.8% in 2012 and are forecasted to grow 3.5% in 2013 and 9.1% in 2014. Domestic demand (shipments plus imports less exports) grew an 10.9% in 2012 and is estimated to grow 3.4% in 2013 and just over 9.5% in 2014.

MHEM Trade growth slowed by more than 50.0% in 2012 reflecting reduced US demand and serious problems in foreign markets. Import growth in 2012 was 17.9%, down from 37.7% in 2011. Export growth was 11.2% in 2012, down from 26.2% in 2011. MHEM imports and exports are expected to slow dramatically in 2013 and rebound modestly beginning mid-2014.

The MHEM forecast of material handling equipment manufacturing is released each quarter by MHIA and looks 12 to 18 months forward to anticipate changes in the material handling and logistics marketplace.

WEIGHING

Rice Lake grows European presence with purchase of Master Engineering

RICE LAKE WEIGHING SYSTEMS announced that their Arnhem-based European division, Rice Lake Weighing Systems Europe B.V., has acquired the Dutch belt-scale manufacturer Master Engineering, of nearby Heteren.

Throughout The Netherlands and Belgium, Master Engineering has become a key systems and solutions provider of static and dynamic weighing, batching and dosing systems. Rice Lake plans to retain all existing Master Engineering employees and continue manufacturing as normal, while relocating their Arnhem operations to the Master Engineering facility in Heteren.
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Sealed Air and Ecovative relationship to produce and distribute mushroom packaging in Europe

SEALED AIR CORPORATION and Ecovative Design have completed an agreement to expand their existing relationship in order to continue to accelerate the production, sales and distribution of Ecovative’s Mushroom Packaging in Europe. Sealed Air plans to begin offering the products in Europe immediately.

Last year, the two companies announced Sealed Air as the exclusive licensee for protective packaging in North America for mushroom packaging, a new technology for rapidly renewable and environmentally responsible packaging materials made from agricultural byproducts and mycelium, or mushroom roots. In October 2012, Sealed Air launched Restore Mushroom Packaging, its first commercialized product using Ecovative’s biomaterial technology.

“The agreement builds upon our successful, ground breaking relationship with Sealed Air and continues the overall momentum for providing an innovative and effective alternative to petrochemical based packaging on a much larger scale,” said Eben Bayer, CEO of Ecovative. “We are confident that we can extend this momentum into the European marketplace.”

“Ecovative has had a great deal of success using the unique properties of mycelium for protective packaging. We are looking forward to meeting the performance needs of potential European customers through a variety of packaging applications using this technology,” said Ryan Flanagan, president of Sealed Air’s Protective Packaging business.

Details of the transaction were not disclosed.
HighJump Software announces new partnership with NetSuite

HIGHJUMP SOFTWARE, a global provider of supply chain management software, has announced a new partnership with NetSuite, with plans to build HighJump Software SuiteApps using NetSuite’s SuiteCloud computing platform. The new SuiteApps are expected to provide NetSuite customers with HighJump solutions for warehouse management systems (WMS), direct store delivery (DSD) and electronic data interchange (EDI) software.

NetSuite’s SuiteCloud is a comprehensive offering of cloud-based products, development tools, and services designed to help customers and commercial software developers take advantage of the economic benefits of cloud computing.

SuiteCloud Developer Tools provide a comprehensive cloud customization environment, whether extending NetSuite to fit business needs or developing new applications. The tools include workflow management, scripting, analytics, Web services and more.

“We are pleased that NetSuite customers should have the opportunity to further improve their efficiency and customer service by adding proven, integrated supply chain management functionality to their cloud-based NetSuite business management solution,” said Guido Haarmans, vice president of business development, Technology Partners at NetSuite.

As a NetSuite Development Partner, HighJump plans to launch these SuiteApps out over the next 12 months. “We see an increasing number of companies in the supply chain industry embracing cloud-based services to help reduce IT overhead, cut capital expenditures and provide global access to information,” said Russell Fleischer, CEO of HighJump Software.
How to make a lift truck speak your language

Voice-enabled mobile computers can condense the benefits of two or more technologies into one productive platform.

By Josh Bond, Associate Editor

Amid the proliferation of lift truck technology, the operator has become burdened with the need to learn more than just knobs and levers. While juggling a smart phone, tablet, vehicle-mounted terminal, voice headset and RF scanner, the operator runs a risk of being less productive than he or she might have been with a good old fashioned sheet of paper. Having identified this potential problem, hardware and software manufacturers have worked to condense and combine technologies onto common devices on common platforms. The latest trend is the integration of voice technology with vehicle-mounted terminals, providing operators the clarity of a screen with the constant contact of voice.

“Those who have invested in voice are looking to leverage that investment for picking, packing, cycle counting or replenishment,” says Bruce Stubbs, industry marketing director for distribution center operations for Intermec. “There are lots of people looking to push the envelope even further and use voice with forklifts.”

Currently, that might entail equipping a forklift operator with a hip-mounted terminal with a wire extending to a headset. The operator must then manage the equipment on his body as well as the equipment on the truck. With the voice functionality piggybacked onto the vehicle mount, the operator need only wear an earpiece, increasing his mobility. But, the benefits go beyond safety and ergonomics.

Traditional vehicle mount screens are often designed to black out when in motion, in an effort to avoid distracting the operator. The productivity downsides of requiring a vehicle to remain stationary in order for the operator to receive information are obvious.

“With integrated voice, the screen can still black out, but the operator will have constant contact with the system while driving, picking or performing other tasks,” adds Stubbs.

The screen can provide additional information, such as images of the item or quantity to be picked, or even pallet-building diagrams. And, depending on the type of vehicle-mounted terminal, it might be detached and hip-mounted so that an operator can perform tasks independent of the lift truck. The lift truck might also feature integrated charging bays for terminals or Bluetooth headsets.

Additionally, the combination of previously independent hardware and software can simplify information technology and maintenance costs. The benefits of streamlined hardware and software also tend to reduce training time.

“It’s two things that once existed separately,” says Stubbs, “and now you can blend them and get the best of both worlds.”

Josh Bond is Modern’s associate editor and can be reached at jbond@peerlessmedia.com
Imagine the other wonders they would have created with a Hyundai.
3 steps help prevent stretch wrap failure

Developing baseline wrapping standards can help reduce waste and damage in your operation.

By Sara Pearson Specter, Editor at Large

When a unit load fails, stretch wrap is often fingered as the culprit. After all, had the wrap held the load together on the pallet, damaged product wouldn’t be heading to the landfill and impacting the bottom line, right?

Not necessarily, says Derek Jones, senior marketing product manager for Lantech. The wrap may be perfectly fine, he suggests. Instead, it’s the application that may have been faulty.

“Many companies that experience stretch wrap failures haven’t established a baseline standard of best wrapping practices for each type of unit load being handled,” Jones explains. “Depending on the size of the operation, there could be anywhere from a couple to a dozen different load weights and types, with or without sharp corners.”

To establish proper wrapping standards, Jones suggests three steps. First, make sure the minimum amount of containment force, or wrap tightness, is applied to ship the load correctly. “Baseline containment force is calculated by multiplying the wrap force—controlled by a knob on the stretch wrap machine—with the number of revolutions of film,” he says.

Second, ensure the load is properly locked to the pallet. “Product damage happens when a load slides off the pallet because the load was not locked to the pallet,” Jones adds. Operators often start the wrap over the sides of the pallet—where forks from a pallet jack or forklift can puncture the film. Lantech’s systems automatically roll a short, initial “cable” of film that grips the pallet just under the deckboard, avoiding fork damage.

Third, take time to manually tuck the film’s tail under the wrap. This prevents any excess that could snag against something and compromise the wrapped load’s integrity.

Because a facility could potentially be wrapping multiple load types, Jones recommends first developing a baseline wrapping standard for the most common type, then build from there. While it requires a time investment, the alternative is far more costly, he says.

“We estimate that annually 0.5% of all shipped product gets damaged,” Jones says. “That translates into billions of dollars of damaged product that likely ends up in a landfill, causing a sustainability issue.”

Sara Pearson Specter is an editor at large with Modern and can be reached at sara@saraspecter.com.
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Giant Eagle makes mobile ROBOTS

Robotic industrial trucks are driving efficiencies in Giant Eagle’s distribution centers. Here’s what the rest of us can learn from an early adopter of robotic technology.

By Bob Trebilcock, executive editor

ew materials handling technologies, like robotics, are a little like concept cars at the auto show. It is fun to dream, but most of us hesitate to buy one as the primary family auto. Similarly, systems integrators and distribution center managers are kicking the tires when it comes to materials handling robots; many, however, are waiting to see how the early adopters fare before driving one home.

Pittsburgh-based Giant Eagle is turning early adoption into a competitive advantage. One of the nation’s largest privately held multi-format fuel, food and pharmacy retailers, Giant Eagle is an early adopter of pallet-handling robotic industrial trucks (Seegrid, seegrid.com), a type of mobile robot that resembles an operator-less lift truck. The company began testing the idea of using the trucks for putaway operations in the fall of 2007. Since then, Giant Eagle has put into service four double robotic pallet trucks (vehicles that can handle two pallets at a time) in a 440,000-square-foot distribution center outside of Pittsburgh. Another four trucks are working at a retail support center, or RSC, as Giant Eagle refers to its DCs, in Cleveland.

The trucks are used to automatically move two inbound pallets at a time from the receiving area to drop-off locations serving the most distant locations in reserve storage. They move between 20% and 30% of the inbound receipts. In the Pittsburgh RSC, they complement other automated technologies, including an automated storage and retrieval system (AS/RS).
the case for
with 12,000 pallet locations serviced by three cranes and a voice-directed picking solution.

The result, says Joe Hurley, senior vice president of distribution and logistics, has been a reduction of manned travel for putaway and an increase in the productivity for the lift truck fleet.

“We have reduced manned travel for putaway by 20% to 30%, and we increased the high lift pallet per hour by 20%,” Hurley says. What’s more, robotic industrial trucks have freed lift truck operators up for more valuable processes, such as replenishment and picking. Finally, the vehicles are contributing to Giant Eagle’s competitiveness in a crowded marketplace. “New competitors enter our markets every day,” Hurley says. “We have to keep our warehouses efficient so we can take cost out of the system and reinvest those savings into the value proposition we offer to customers.”

The lessons learned from Giant Eagle’s pilot and deliberate implementation process can serve as a road map for any early adopter considering a new technology.

Exploring robotics

With nearly $10 billion in sales and 36,000 team members, Giant Eagle is ranked No. 29 on the Forbes list of the largest privately held companies. The company operates 229 supermarkets and 187 fuel and convenience stores in Ohio, Pennsylvania, West Virginia and Maryland.

Continuous improvement and automation are part of the company’s distribution DNA. In addition to the AS/RS, a warehouse management system (WMS) and voice-directed picking system, the company uses labor standards to measure productivity. Thanks to that productivity data, Giant Eagle was acutely aware of the distance team members were traveling with conventional lift trucks: 500 miles a day, including 300 miles for putaway processes and 200 miles for replenishment processes. Since putaway is a non-value-added process, Giant Eagle has long been focused on reducing those miles.

“Using operators to move pallets from Point A to Point B, whether it was inbound or outbound, is an age-old problem in distribution,” says Hurley. “Because we measure labor, we know that the travel component accounts for a majority of our labor standard. We wanted to minimize the amount of human travel.”

Prior to robotic industrial trucks, wire-guided automatic guided vehicles (AGVs) moved a segment of pallets from receiving to reserve storage. However, since paths had to be cut into the concrete to guide the AGVs, the technology was not flexible enough for the seasonality of the products handled by a grocery chain. Flowers at Christmas are handled and stored in different locations than iced tea in the summer. In contrast, the robotic vehicles used by Giant Eagle are guided by a unique vision system that eliminates the need for wire-guided paths, tape or laser reflectors. The vehicles quickly and easily learn a new path to a new drop location when requirements change.

Giant Eagle received its first robotic truck in September 2007. Hurley says there were three objectives for the pilot test: safely incorporate a robot into a busy warehouse environment; effectively create an interface between the robot and Giant Eagle’s WMS to move the right pallets that would increase efficiency and minimize travel; and mea-
sure and improve operations.

“We were taking a leap on a new technology,” Hurley says. “But we knew we had to solve this old problem of travel time.”

Moving the right pallets
From the start, Giant Eagle had determined that robotic industrial trucks would not move every pallet from the receiving dock. Instead, the intent was to create a process that used both lift trucks and robotic trucks to maximize both technologies and deliver productivity improvements. The question was: Which pallets should be moved by the robots, and where should they be delivered to achieve the maximum result?

That calculation didn’t just involve reduced miles traveled. The solution also had to take into account the fact that lift trucks traveled at 7 miles per hour while the robots traveled at 4 miles per hour unloaded and 2.7 miles per hour loaded.

“Our first step was to pull the data around our inbound pallets and then measure the associated travel with each pallet,” says Hurley. “For example, if the average travel time associated with one section was 4 minutes per pallet and another section was 2 minutes per pallet, then we would attack the 4-minute travel time first.”

As a starting point, the Giant Eagle team identified routes that involved travel distances of 200 to 300 feet from the receiving staging area to a drop zone, especially areas where high-velocity, high-cube items are slotted. “You simply can’t put everything in the front of the warehouse,” Hurley says. “That may be efficient for picking, but you sacrifice the ability to group items that are commonly picked together on the outbound side. The most efficient set up for order selection might not work on the retail shelf or in the labor design.”

Once the routes with the greatest opportunity for improvement were identified, Hurley’s team created a delivery process and trained the robot on the route. The process consisted of a few basic steps. In the staging area, a team member loads a stack of two pallets onto the robot and scans a license plate bar code label with a truck-mounted scanner.

Once the WMS displays a putaway location on a screen on the robot, the team member keys in the relevant information and sends the robotic industrial truck on its route. When the vehicle arrives at the drop zone, an onboard bar code scanner reads the license plate bar code on the pallets as the mast is lowered. The WMS alerts a team member in the putaway zone that a load is ready for storage.

“When we started hauling pallets and measuring the results, we were taking between 20% and 30% of the associated travel time out of the process,” Hurley says. “We were excited about that.”

Man vs. machine
Determining what pallets and delivery routes would deliver the most bang for the buck was part of the learning curve.

There was also a training curve with team members.

“When team members see a robot, the first thought in their mind is: Will this replace me?” says Hurley. “We emphasized that we could use technology to maximize our team members to deliver better value to our end customer.”

Accordingly, Giant Eagle did not reduce its head count, he adds. Rather, the company was able to realign lift truck drivers to more valuable tasks, such as replenishment and order selection.

In addition, team members had to learn the rules of the road when interacting with the robots. For instance, if a team member on a lift truck and a team member on a pallet jack are in the same travel path, one is going to go to the left or the right so they can pass one another. The robot, on the other hand, is trained to follow a specific path. “Today, the robots are part of the flow,” Hurley says. “Team members work around them as if they were any other piece of equipment.”

In the spring of 2009, Giant Eagle added a robotic industrial truck in
Putting food on the table
Mobile robots keep product flowing at Giant Eagle’s retail support centers.

At its Pittsburgh retail support center, Giant Eagle's materials handling system uses a variety of automated technologies to keep product flowing through the facility.

Receiving: When an inbound truck arrives at the receiving dock (1), the merchandise in the trailer has already been received in Giant Eagle's warehouse management system (WMS) through an advanced ship notice. A receiver verifies the delivery by scanning the license plate bar code label on each pallet in the staging area (2). Once the pallet is verified and tagged, the WMS identifies a storage location in the reserve storage area (5).

Storage: The facility manages three storage processes, depending on where the product will be stored.

- Robotic industrial truck put-away: Robotic industrial trucks are used to move two pallets at a time from a robot start area (3) to end-of-aisle drop points (4) in the reserve storage area (5). The mobile robots are primarily used for the longest hauls and currently deliver to 14 locations. To initiate this process, a team member scans the license plate bar code label on the pallets using a scanner mounted on the robot. The drop location for the pallets is displayed on a screen. The team member enters the start, drop and end location into the robot's control system with a keypad on the robot. The mobile robot knows the route (6) associated with that pallet and proceeds to a designated drop zone (4). A bar code reader on the robot reads the pallet label as the mast is being lowered to drop off the pallets. That notifies a team member in that area that the pallet is available for putaway into a storage location in reserve stor-
When the team member scans the license plate bar code label, the WMS directs him to the correct reserve storage location for that pallet.

- **Conventional putaway:** In addition to robotic putaway, team members are also assigned to the receiving area for conventional putaway processes to picking and storage locations in reserve storage near the receiving dock. When the team member scans the license plate bar code label on a pallet, the WMS directs him to the correct storage location.

- **AS/RS putaway:** Giant Eagle uses its automated storage and retrieval system (AS/RS) to store slow-moving items and to build up an inventory of seasonal items. The WMS identifies items destined for the AS/RS during the receiving process. Once the pallet has been verified, the team member delivers it directly to the induction station for the AS/RS, where it is automatically put into a storage location.

**Picking:** Orders are picked for specific stores and are directed by a voice picking solution. Team members receive their picking instructions over their headsets. They speak a check digit to confirm that they are at the right location and then pick to double pallet handling pallet jacks.

**Packing and shipping:** Pallets are manually stretch-wrapped and staged on the shipping dock. When a team member scans the license plate bar code label, the WMS directs him to the right trailer. The team member can then scan either the right or left hand side of the truck for loading.

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**System suppliers**

- **ROBOTIC INDUSTRIAL TRUCKS:** Seegrid, seegrid.com
- **LIFT TRUCKS:** Raymond, raymondcorp.com; Yale Materials Handling, yale.com
- **PALLET RACK:** Frazier, frazier.com
- **DOUBLE PALLET JACKS:** Raymond, raymondcorp.com; Yale Materials Handling, yale.com
- **STRETCH WRAP:** Manual stretch wrapping
- **BAR CODE SCANNING:** Motorola, motorolasolutions.com
- **AUTOMATED STORAGE AND RETRIEVAL SYSTEM:** Dematic (HK Systems), dematic.com
- **CLAW ATTACHMENT:** Tygard Machine & Manufacturing, tygardclaw.com
- **WAREHOUSE MANAGEMENT SYSTEM:** Manhattan Associates, manh.com
- **VOICE-DIRECTED PICKING:** Vocollect, vocollect.com
Amid demands for innovation and customer service, public refrigerated warehouses are challenged to provide flexibility and efficiency for a fickle customer base.

By Josh Bond, Associate Editor

The challenges of refrigerated spaces are amplified versions of those faced by dry goods facilities. Associates are exposed to the harshest conditions in the materials handling industry. The cost of operating a refrigerated warehouse makes the hunt for efficiencies even more critical. And, the concept of product traceability is subject to the legal repercussions of an ever-stricter regulatory landscape.

In recent years, more and more manufacturers have looked to outsource their cold storage to third-party logistics (3PL) providers in an effort to separate themselves from these concerns. Similarly, refrigerated 3PLs have seen significant consolidation as those with successful strategies swallow up those without. This has been good for 3PLs, but the increased level of competition means customers will gladly take their business elsewhere at the promise of a dollar’s savings. While many customers will leave a 3PL on a dime in pursuit of a nickel, price only ranked fifth most important to customers in a recent survey by Gartner Research. Most important was customer service, while innovation ranked third.

For decades, public refrigerated warehouses simply needed to do three things very well, says Joe Couto, senior vice president and general manager for Accellos, which serves 14 of the 25 largest refrigerated warehouses in North America. “The basic needs were to receive inventory well, manage the inventory well, and ship it accurately and timely, but you didn’t have many fancy capabilities beyond lot and cold chain management control,” he says. “It was mostly pallet-in, pallet-out, and it was a simple business.”
New challenges

The modern cold storage challenge centers on the transition from simple pallet-in, pallet-out operations to increased case handling, value-added services and meeting the various demands of customers and their clients.

“There’s an increase in outsourcing, but not just in storage and distribution,” says Corey Rosenbusch, vice president at the Global Cold Chain Alliance and president of the International Association of Refrigerated Warehouses (IARW). “Our members are also asked to provide value-added services, whether it’s repack operations, actual manufacturing or consolidation.”

The combined pressures of labor needs, efficient operations, and unstable customer base have put cold 3PLs in a tough spot. If they innovate, automate and update, there’s no guarantee the customer will stay with them long enough for those investments to prove worthwhile. If they don’t, there’s an even better chance they will lose business. Refrigerated warehouses, much like dry goods facilities in the face of the multi-channel boom, are working to turn a fickle customer base into long-term partners.

To do that, the fundamental business models of cold storage are up for grabs. The concept of “one size fits all” facilities is becoming untenable in many cases, as purpose-built, specialized facilities work to target specific customers, products and service requirements. Again, the challenge to this approach is the permanence of customer tenants. “There might be a 3PL who says, ‘I can do better than that with a customized, modern facility, but I’ll need
you to sign a 10-year agreement.” That idea is startling to most customers, but if the numbers are there, they’ll sign,” says Carlos Oliver, president of Frazier Industrial Company. “But they won’t sign for a conventional solution.”

Cutting costs

Customers (the manufacturers with product to sell) have cold storage 3PLs over the barrel. As customers’ clients (the retail entities that sell a manufacturer’s frozen goods) demand increased services in terms of pallet building and traceability, the customer increasingly passes the cost for these services to the 3PL.

“For a long time, while people were working to outsource cold storage, the competition was not as high as dry goods storage,” says Oliver. “But in the last five years, there’s been much more competition, there’s less capacity available, and the same people are competing for smarter customers. A lot of 3PLs haven’t changed their mode of operation for 30 years because they have not been inclined to design a custom solution in the face of that volatility and the potential for the customer to leave.”

For example, 20 or 25 years ago, the customer would tell the 3PL which lot to ship, and then the customers left it to the 3PL to figure out which one was the oldest based on date of production, lot number or first-in, first-out, says Couto. Now, if one retailer asks for a 90-day shelf life and another wants 100-day shelf life, the 3PL needs to be ready for that. If shipping direct to a store, not only do they have to assemble a perfect order, many stores have specific requirements in terms of pallet height or pallet type for a 3PL to ship on. “Now the customer’s clients and their rules are in the mix,” says Couto. “The 3PL’s capability needs to be greater, and the complexity gets higher and higher, but the customer will probably not want to pay more.”

With the level of competition, the 3PL’s choices are to provide the service or lose the business. “There’s real pressure on rates right now, based on manu-

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**The cold storage challenge: Energy efficiency**

To get a sense of the costs associated with operating a refrigerated space, Modern spoke with Jon Schumacher, director of marketing for Rite-Hite doors, about the mathematics of energy loss at freezer doors.

Schumacher uses an algorithm to calculate the cost of each door cycle. One refrigerated warehouse customer used each 8 x 14-foot door an average of 720 cycles per day, or 262,000 per year in its seven-day operation. The formula accounts for the energy required to activate the door, the energy lost in temperature transfer between a -10°F and 45°F environment, and the cost to run a door heat lamp. The formula assumes a cost of $0.08 per kWh.

Schumacher estimates the annual cost to run a single 10 kW heat lamp is as much as $10,000 per door, and the temperature energy loss for a low-speed door operating at 20 or 30 inches per second is between $5,000 to $20,000 per door, per year. In the example above, the door costs its owner $0.09 each time it opens, or $65 per day, per door. With a high-speed insulated door that requires no heat lamps, those costs might drop to $0.03 per opening, or $22 per day. One company saved 1.7 million kW of energy per year by replacing 20 doors in one facility, says Schumacher, enough to power 150 homes for that year.

For even better savings, Schumacher recommends narrower doors. Although many customers prefer to enable two-way traffic through doors, it is rare that two lift trucks will pass through the door at the same time. With separate in/out doors wide enough for just one lift truck, each cycle will cost nearly half as much. Depending on the offer from the utility company, he says, as much as half the cost for new doors might be covered by rebates.
facturers’ desire to reduce landed cost to the consumer,” says Rosenbusch, who says 3PLs are looking for efficiencies with technologies, with many pushing to ensure they have a robust warehouse management system (WMS) in place. In addition to facilitating more product visibility and USDA inspector-friendly facility layouts, a WMS can also address the goal of customer retention.

“We’re over the peak where most cold storage companies have a good baseline WMS in place. Now we’re trying to get past the challenge of multi-level product handling that the client base is demanding. They need to handle a pallet, break it down, pick eaches, pack it all back up, and get it to the store. I see that as a big struggle,” says Jeff Hedges, president of OPEX Corporation. “But if you can offer a WMS the client can somehow interface directly to, you can develop a bond with the customer and it might be harder for them to shop around for alternatives.”

Balancing labor and automation
Assuming customers will always come and go, the question of cube optimization in refrigerated spaces is somewhat relative. With the occasional rapid influx or exodus of stock keeping units (SKUs), customer acquisition and departure can severely undermine a 3PL’s efforts to optimize storage space and processes. This challenge is most pronounced in the evaluation of automation technologies, which work best in more predictable environments.

The case for automation is made stronger by the difficulty of manual labor in cold conditions. High turnover, frequent breaks, more frequent battery changes and lower productivity all point toward automation. But with the volatility of SKU profiles and increased demand for value-added services requiring manual labor, how can automation expenses be justified?

A big lesson in terms of automation that is unique to cold storage is the need for flexibility, says Todd Hunter, strategic account manager for Dematic. “Most manufacturing and distribution systems we develop can be shaped around a snapshot of the operation. But with cold storage, they might have some good consistency with maybe 50% of what they’re handling, and the rest is under contracts six months long. That makes a lot of automation difficult to justify.”

The kind of automation that is successful, says Hunter, targets the consistent part, whether that is a particular package type or a long-term customer. “The evolution of these facilities began as ‘I’ve got a space, it’s cold, and I have to put things in it.’ Now it’s about putting things in there intelligently,” says Hunter. “I can’t take one approach and expect it will meet all my needs. All automation won’t work, and all labor won’t keep you competitive.”

In some cases, automation is being used not to replace labor, but to decouple it from the necessity of working in a sub-zero environment. Dan Labell, president of Westfalia Technologies, offers the example of automation being used to deliver product from a freezer to a warmer environment for picking.

Jon Schumacher, director of marketing for Rite-Hite Doors, suggests he has seen this trend bear out in the types of doors installed between cold and ambient areas. “We are seeing more conveyor doors for freezer applications than ever before, from next to none 10 years ago to a few hundred last year,” he says. “If you’re opening a 3 x 4-foot door instead of an 8 x14-foot one, that’s a big savings opportunity.”
A pick tunnel located in the freezer is another alternative, which might be coupled with automated dynamic slotting or static slotting for fast movers. “I see order picking in a 3PL cold storage environment remaining mostly manual, but becoming as ergonomic as possible,” says Labell. “Routing product to a warmer ‘flex space’ whenever possible might be ideal. The pick tunnel is also flex space, and a customer might pick in one, the other or both depending on need.”

### Purpose-built

3PL companies are increasingly entertaining the idea of constructing purpose-built buildings around a specific function, such as case handling and picking, then looking at customers to fill it, says Hedges. Or, they will approach a few customers with a proposal for a long-term commitment in something automated or otherwise purpose-built.

“Cold storage companies have tried to define themselves by being one-stop shopping for everyone, and that’s becoming more difficult,” says Hedges.

The model is now changing to one centered around specializations. When a facility needs to only perform one task or a small assortment of tasks very well, it might work to justify automation. With automation, a customer might find efficiencies that save money for all involved. With better rates for a targeted service, that provider might find customers more inclined to stick around for the long term.

“For the longest time, they’ve all had their select customer niche, but to acquire new customers, they are looking at driving cost out with automation, efficiency and product accessibility,” says Frazier’s Oliver.

The core concept here is to break out specific products by commonality and consistency and build a materials handling system around them. “Instead of building the facility to suit all products, build it to suit some of them very well,” says Hedges, “and bring products to the facility where it makes the most sense to handle them.”

With facilities performing specialized roles in the cold chain, the flow of product from factory to consumer is also changing shape. Some 3PLs are consolidating distribution centers to bundle services for multiple 3PL customers, says Labell. He sees things heading toward more 4PL consolidation, as “mega-centers” leverage their size for efficiencies. “This massive center receives truckloads of products from other 3PLs. This would reverse the trend of adding order selection and picking to the 3PL world because these facilities would handle it in the mega-center,” explains Labell. “That’s a model that is going to gain traction in the next 20 years.”

### From the front lines

Larry Rauch, president of Los Angeles Cold Storage, an IARW member that helps customers distribute across 48 states, says the transformation in cold storage means 3PLs are not just warehouse companies, they are logistics providers. He echoes the issue of long-term customer retention, saying information technology has played a role in combating that trend.

“We’re giving the customer access and the ability to run reports themselves and track inventory closely in real time,” says Rauch. “There’s been a significant movement in the last few years toward that. You hope that by offering your customers a variety of services, including the technology, they will be more inclined to stay.”

Inspection and traceability, grouped together, is a trend that is increasingly costly, says Rauch. “It’s being asked of us by both governments and customers,” he says. “It’s something we’ll be increasingly struggling with, and costs will be transferred to customers. You can make the case that some of those requirements will create better companies, but some will not translate into more efficient companies.”

Dematic’s Hunter agrees, and says advancement among cold storage 3PLs happens on a relative basis. “If someone develops some cost-saving strategies, everyone else is compelled to follow,” says Hunter. “The cold storage industry has been content, but they are being forced by competitors to innovate.”

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### The refrigerated warehouse landscape in the United States

Occupancy for North American International Association of Refrigerated Warehouses (IARW) members averaged 79.19% during the second half of 2012, a decrease from the occupancy rate of 84.73% reported in the first half of 2012, but comparable to the 77.9% for the same period in 2011.

Each year, the IARW releases a list of Top 25 North American and Top 25 Global public (3PL) refrigerated warehouses. According to the USDA’s latest report, the U.S. members of the North American Top 25 list represent 2.59 billion cubic feet, which is 65% of gross refrigerated capacity and 85% of public refrigerated warehouse space in the U.S.

IARW’s total U.S. membership is 2.9 billion cubic feet, which is 96% of public refrigerated capacity in the U.S. and 73% of U.S. gross refrigerated capacity.

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### Companies mentioned in this article

- **FRAZIER INDUSTRIAL COMPANY**: frazier.com
- **DEMATIC**: dematic.com
- **INTERNATIONAL ASSOCIATION OF REFRIGERATED WAREHOUSES**: gcca.org
- **ACCELLOS**: accellos.com
- **RITE-HITE**: ritehite.com
- **LOS ANGELES COLD STORAGE**: lacold.com
- **WESTFALIA**: westfaliausa.com
- **OPEX CORPORATION**: opex.com
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Ten years after the Walmart mandate, Macy’s is finding value in RFID technology by looking at it differently.

By Bob Trebilcock, Executive Editor

It’s hard to imagine that nearly 10 years has passed since Walmart shined a spotlight on RFID technology in the retail supply chain. Fast forward a decade, and department store leader Macy’s is two years into an aggressive roll-out of RFID technology.

The two initiatives couldn’t be more different from one another. First announced in 2003, Walmart tagged cartons and pallets to speed up the receiving process in its distribution centers. The ROI was expected to come from automatically reading all those cases and pallets as they passed through an RFID portal at the dock doors. Tagging individual items in the store was way off in the future.

Macy’s, on the other hand, launched its initiative in 2011 in the store. Instead of tracking cases and pallets—something we don’t hear much about these days—Macy’s is using RFID technology to maintain an accurate inventory of the items that are replenished in the stores on a regular basis, a group of products that represents about 30% of Macy’s business. Having a more accurate inventory is leading to an increase in sales of those items. In the future, the technology may be extended back to Macy’s distribution centers. But then again, maybe not.

It’s as if the two retailers both took a look into the future, but from the opposite ends of the telescope.

Why the different approach? Electronic data interchange (EDI) and bar code scanning do a pretty effective job of tracking inventory in the distribution center, says Bill Connell, Macy’s senior vice president for logistics and operations. Now, however, Macy’s is using its stores for brick-and-mortar sales and as potential fulfillment centers for orders received on the Web or from mobile devices. If the inventory system says a pair of women’s shoes is on the selling floor at the Natick Mall outside Boston, those shoes need to be on the floor. RFID is providing that level of visibility.

“We are leveraging our assets across all sales channels,” Connell says. “We are integrating every opportunity our customer has to interact with us. Anything she wants, anywhere she wants and any time she wants. That implies a lot of changes for us as we think about operational and logistical activities.”
RFID in the retail context

Macy’s may be at the head of the pack when it comes to the adoption of RFID, but it is part of a broader initiative by major retailers that has been in development for a decade, says Bernie Hogan, senior vice president of emerging capabilities and industries at GS1 US, the standards organization (gs1us.org).

“When we created the Gen II standard, market leaders like Walmart and the Department of Defense committed to adopting the technology to lower the price of the tags,” Hogan says. The initial focus on cases and pallets was in part a result of the limitations of the technology. “Back then, tagging cases and pallets in the distribution center were the only things that were practical from the standpoints of the cost of the technology and changing business processes,” Hogan adds.

There were limitations to the technology at the time. “When we moved from bar codes to passive RFID tags, we lost the ability to track where we were in the process,” explains Phil Gerskovich, senior vice president of new growth platforms for Zebra Technologies (zebra.com). “If you scanned a bar code on the receiving dock, the warehouse management system (WMS) knew that you were at dock No. 7 and initiated the receiving process. RFID allowed you to read tags from a distance, but you didn’t know whether you were receiving, shipping, staging or something else.” What’s more, Gerskovich says, the first generation of tags and readers were not as accurate as they needed to be to drive an ROI.

That doesn’t mean there weren’t successes. Hogan points out that about 70% of the Department of Defense’s inbound cartons and pallets have an EPC tag today.

What’s changed is that the technology is better, the cost as better and its easier to change business processes. “The business case is clear,” Hogan says. “Macy’s, for instance, is tagging a narrow category of merchandise where it can show an immediate lift in sales.”

What’s more, retailers like Macy’s aren’t launching their initiatives in isolation. They and their suppliers are working within the context of standards estab-
lished by GS1 US, much as they did with bar codes 40 years ago. “You don’t want Retailer A asking for it one way and Retailer B asking for another,” Hogan says. “By working with a standard, the industry is arriving at shared value.”

**Accurate inventory**

For Macy’s, the value comes from improving the accuracy of its inventory. In the distribution center, the combination of a warehouse management system, bar code scanning at each step of a process, and regular cycle counts delivers inventory accuracy rates of 95% or better.

The store is a different environment. A retailer like Macy’s typically takes a full inventory in January, after the holiday selling season and before spring merchandise begins to roll into the stores. After that, it’s downhill.

“We know that the accuracy of the inventory deteriorates by a rate of 2% to 3% a month,” says Connell. There are a number of reasons for that degradation, ranging from theft to the way items are checked out at the register. By the start of the holiday selling season in November, most retailers’ inventory count is between 60% and 70% accurate at the floor level. “Just as you’re going into your peak selling period, you’re inventory is the most inaccurate,” Connell says. That inaccuracy leads to a loss of sales: Customers don’t know that there’s inventory in the stock room, for instance, if the shoe samples aren’t on display.

Inventory accuracy was the catalyst for Macy’s RFID initiative. The groundwork was laid in 2009, when one of the company’s vice presidents tagged every item in a Bloomingdale’s store in the Soho section of Manhattan. Macy’s shared the data collected from that experiment with the RFID research center at the University of Arkansas. After an analysis, the university identified up to 60 potential use cases for RFID at the item level. The most promising was the unique ability to count much faster and accurately at the item level than was possible or practical with a bar code scanner.

Based on the Soho project, Macy’s launched a broader RFID pilot in a select group of Bloomingdale’s and Macy’s locations in 2010. The new pilot focused on improving the inventory accuracy of three categories that are frequently reordered: denim, men’s basics and women’s intimate apparel. Using RFID, Macy’s discovered it could easily perform multiple cycle counts throughout the year and that on average, inventory accuracy could be maintained at 97% or better. Frequent counts also led to the correct placement of items in the right range of sizes, colors and styles on the selling floor. The combination led to an increase in sales of those items being tagged.

In August 2011, Macy’s announced that it would adopt RFID technology in its Macy’s and Bloomingdale’s stores on an accelerated timeline. The goal was to begin using RFID in all stores nationwide to count “size-intensive replenishment goods—those items regularly stocked and automatically re-supplied as they are sold to customers” by the third quarter of 2012.

Eighteen months later, Connell says the system is in place, and stores are now tagging and reading all of the replenishment items it sells—everything from housewares to shoes to children’s wear. “We’ve spent the past two years writing the software and deploying the systems that stand behind RFID,” Connell says. “With an RFID reader, we can scan the Levi’s wall and realize what’s in the backroom that should be on the floor.” The scan can also automatically updates the store’s inventory files. That information is used to generate a more accurate replenishment order.

RFID is also being used to maintain an accurate inventory of furniture and bedding in DCs. “We sell furniture and bedding from samples on the floor and ship from our DCs,” Connell says. “With RFID, we can take an inventory in the DC on a daily basis to ensure that we know where every piece of furniture is in the facility.”

While Connell declined to reveal sales numbers, he says Macy’s has recorded a growth in the top-line sales of the items being tagged. “We went into this with specific expectations for what RFID could do for us in terms of top-line sales and reordering,” he says. “What I can say is that the deployment has met our expectations and in some instances exceeded them.”

**Beyond replenishment**

One of the most challenging aspects of early RFID deployments was getting suppliers to agree to tag cartons and pallets at their facilities. Their gripe was simple: What’s in it for us? Macy’s has pushed the tagging process downstream to its suppliers. The difference, Connell says, is that there is something measurable in it for the suppliers—more sales. “We’re enabling higher sales, greater efficiencies and lower costs. Those are wins, wins, wins,” Connell says. “If you focus on that, the case to invest in the technology is a simple one.”

Another challenge was the cost of the tag. The No. 1 question back then was: When will we see a 5-cent tag?
By tagging items that are regularly stocked and automatically replenished, such as men’s basics, Macy’s has driven inventory accuracy from less than 70% to 95%.

Macy’s focus on top-line sales growth mitigates the cost of the tag. “The question we ask is: What’s the cost of inventory inaccuracy in labor costs, missed sales opportunities and margin erosion?” Connell says. “If you’re able to sell three additional $40 items because of more accurate inventory, it doesn’t matter whether the tag costs 5 cents, 8 cents or 10 cents.”

For now, Macy’s is content to use RFID in the stores rather than extend it to the cases and pallets coming into its DCs. “We don’t think of RFID as a technology in search of a problem,” Connell says. “EDI and UCC128 processes have been refined over the years and work quite well. We won’t roll out RFID in a new area unless there’s a problem to be solved.” Still, he can foresee extending the RFID solution across more SKUs in the future, especially as Macy’s incorporates more and more of its stores as fulfillment centers for online orders.

The most important lesson, Connell adds, is that Macy’s approached this project from the view of how to better serve customers. “Any decision we make is made through the prism of what does our customer want,” Connell says. “Answering that question is central to everything we do as a company, including initiatives like RFID.”

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Dock logistics: The final frontier of the modern warehouse

New technologies, and creative uses of old ones, are enabling the dock to keep up with the rest of the warehouse as it transitions from brute force to efficient allocation.

By Josh Bond, Associate Editor

In just a few decades, automation, information and technology have transformed the warehouse from a simple storage space to an engine for company performance and growth. Processes throughout the modern warehouse bear only vague similarities to their counterparts from the 1980s. That is, until you get to dock logistics, which have largely escaped this evolution.

On the receiving side, labor is often thrown at the hodgepodge of incoming goods, which are typically staged in a huge area so they can be manually inspected, labeled and diverted as needed. Only
Automation technologies like automatic guided vehicle (AGV) forklifts, robotic unloaders and automated storage and retrieval system (AS/RS) buffers are increasingly at home at the dock.
when they have finished this time-consuming process are they released to, say, a state-of-the-art automated storage and retrieval system (AS/RS). Even the “touchless” warehouse often includes the caveat “once product has been received.” On the outbound side, efficient picking processes handle goods to within minutes or seconds of defined standards. Then that product sits at a dock, sometimes for hours.

As the final frontier in warehouse modernization, the spaces between the trailer and storage and between order fulfillment and the trailer have been overdue for an overhaul. “The biggest issues are related to inventory and time,” says Drew Hale, partner at The Progress Group. “The traditional dock has been under the presumption that there is inventory somewhere between the dock and storage and between the outbound truck and customer. It still is not unusual that if someone wanted to know what was in each of those trucks they’d open up the door and look.”

From slow to speedy receiving
Receiving has traditionally been a slow, labor-intensive process for a number of reasons. First, it is often not as important to put product speedily into storage as it is to pick it quickly and deliver it to the dock before shipping windows close. Additionally, the receiving dock acts as a sort of catch-all, where mislabeled products, order errors and other inconsistencies can be manually addressed before product enters a storage system.

“For 20 or more years, the conventional approach has been to load cartons onto pallets before they are moved and stored by lift trucks,” says Steve Schwietert, vice president of integrated systems sales for TGW Systems. “Receiving cartons has always been seen as a necessary evil that’s not very pretty. There might be three to five touches before a product even enters storage.”

As the slow setup for the more
“Automation forces discipline into the process. Without automation, shipping and dock work is rarely subject to any sort of engineered standards.”

—Darrin Peuterbaugh, account manager for Elettric 80

time-sensitive, pick-pack-and-ship operations, the receiving dock didn’t warrant much scrutiny until the rise of information technology. With visibility into what’s coming in each trailer, the best decision can be made to either direct products to storage, or perhaps bypass the entire putaway and picking process in favor of allocating inbound items directly to an outbound order. The concept of crossdocking can reduce touches, needed storage space and inventory. Of course, crossdocking requires software that bridges transportation and warehouse systems.

“Some have embraced making real-time decisions upon receipt,” says Schwietert. “Some are limited by software that requires product to arrive at a picking location before it can be allocated to an order.”

If there is 2.5 weeks of inventory in storage, inbound processing is not pressing. As organizations drive that 2.5 weeks closer to zero, then inbound becomes important. “Generally, people wanted to have 90% of what they received today available in inventory within 24 hours,” says Hale. “Now, the dock-to-stock target is more like four hours.” Such a facility requires less space, more dock doors and conveyors, and the ability to turn over trucks faster. New solutions support a rising movement toward just-in-time inventory patterns, especially in retail.

Automation at the dock
Speed at receiving can be enhanced with a new array of robotic truck unloading technologies and automatic guided vehicles (AGV). AGV fork-lifts and automated truck loaders and unloaders are increasingly at home in dock environments. The limiting factor for their adoption at the dock was the guidance technologies, which were challenged by the inconsistent conditions inside a trailer. Following advancements in perception, AGV forklifts can now roam from unloading to putaway to outbound deliveries and more.

Among the benefits of an automated dock is being able to track the product all the way into the trailer and validate that, says Darrin Peuterbaugh, account manager for Elettric 80. “Automation forces discipline into the process. Without automation, shipping and dock work is rarely subject to any sort of engineered standards.” When a product is loaded onto the trailer, that information is available immediately, which streamlines the business processes, he says. “Then you’re not relying on a person to update the ERP [enterprise resource planning system] or generate an ASN [advanced ship notice].”

In a facility with 30 or 40 dock doors, four or five AGVs could handle the loading. An AGV traffic management system allows sequencing, but it also allows an order to be interleaved, or split among multiple units, according to Peuterbaugh. Typically, with traditional forklifts, the orders are handled discretely, and productivity can suffer as a result.

The dock was a particular bottleneck in applications where cases are floor-stacked in trailers, according to Kerry Phillips, president at Wynright. “The primary problem was that you could pick and process an order for an outbound trailer faster than you could actually load it,” he says. The latest robotic truck loaders/unloaders rival human speeds, but they do more than simply remove goods from the truck.

Truck unloaders can take on a variety of configurations to achieve everything from unloading to scanning, labeling, weighing and product routing. The mix-and-match options enable enhanced quality control and reduced labor, while allowing the customer to precisely balance manual labor and automation. Labeling errors, for example, can be routed to a manual receiving station, but depending on the
suppliers’ labeling practices that might be virtually a non-issue. "Across the board, there's less concern a label will be applied correctly or survive the trip," says Schwietert. "The predictability of carton-level labeling accuracy is now upwards of 90%, whereas 15 years ago, it was closer to 50%.

The outbound buffer
To be efficient on the picking side, you want to keep the workload as level as possible. “But outbound shipping is not level, which is where the need for some sort of buffer comes in,” says Hale.

Ideally, an outbound shipment is sequenced by route stop, aisle-ready, or in some way loaded to make sure that unloading downstream can be made easier. However, because there is no way to guarantee the right pallet arrives in the right order, docks have traditionally included plenty of space for sorting and sequencing the order before loading. According to Tom Coyne, CEO of System Logistics, this is not terribly efficient in terms of space, labor or time; and truck turnover is often as much as two hours or more.

AS/RS buffers have been used to sequence pallets or cases and to release them in order, cutting truck turnover to as little as 10 minutes, and the required staging area to as little as six pallet locations. Coyne notes an example of a customer whose loading process was so efficient, the carrier agreed to have the drivers load their own trucks, creating further labor savings for the warehouse.

To achieve just-in-time shipping, the dock alone is not the only enabler of efficiency. If the upstream order ful-

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**MODERN equipment report**

Assisted by human tenders, robotic truck loaders/unloaders must be able to navigate the unique dimensions of each truck.
fillment system can produce sequenced orders, then the dock needn’t concern itself with sorting random items. “It’s not shipping automation from the perspective of how you get the goods on the truck,” says Coyne. “It’s often about how you can support truck loading with a materials handling system.”

That said, Coyne believes an automated dock buffer can be done as a subsystem meant just to support shipping sequencing. “The shipping dock is a place where operators should focus for targeted investments, because of the combined benefits of labor and space savings,” says Coyne. “There are a lot of things we do in materials handling that give you one or the other. Automating the shipping process can get you both.”

Again, these systems are best deployed in operations with good visibility into inbound and outbound inventory and smooth coordination between warehouse and carriers. “What makes this an interesting strategy is that it doesn’t just affect what happens inside the four walls, but ends up being a supply chain strategy,” says Schwietert. “Otherwise, all that change and optimization inside the facility stops dead at the dock door, after which it’s out of their hands.”

Where is your dock?
The good news is that automated buffer systems often require less space than the traditional dock, making it a viable solution for retrofits. But this might be the time to consider whether you need a large, central dock staging area in the first place. Rob Schmit, executive vice president at Daifuku Webb, suggests sequencing does not need to happen in one place. Still, he appreciates the customers’ desire for a little wiggle room.

“Space is the key. The rest of the facility is jam-packed, with, ideally, every square foot optimized,” says Schmit. “But the dock is the one place where the facility has some room to breathe. As much as a customer might like trying to put in as much automation as possible, they also like to have some space, and nine times out of 10, that’s at the dock.”

The dock is a space where all of the shuffled incoming pallets can be sorted and sequenced. But why shuffle them at all? What if a pallet could go directly from the place where it was assembled to the trailer, in sequence? Schmit describes a series of small “pre-buffers” scattered throughout a facility where small quantities of product can be staged. A fleet of AGVs could then ferry the right item from the mini-dock to the trailer, in sequence and just in time.

“If you can push back the dock space into decentralized areas and guarantee the transport of product from those pre-buffer or end-of-aisle locations,” says Schmit, “you can reduce your dock size and put your space in locations that are of higher value to the organization.”

“The driving force has to be stated,” says Hale. “We don’t need much interaction between the warehouse and carriers if nobody’s going to drive us to be fast. If nobody says speed, it won’t happen. It’s changing, but it hasn’t yet changed.”

Companies mentioned in this article
DAIFUKU WEBB: daifukuwebb.com
ELETTRIC 80: elettric80.com
SYSTEM LOGISTICS: systemlogistics.com
THE PROGRESS GROUP: theprogress-group.com
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Cradles to Crayons (C2C) is a non-profit organization serving homeless and low-income children in Boston and Philadelphia. When C2C Boston relocated its “Giving Factory” warehouse and operations center to a new building, they encountered challenges in the loading dock area. Used for truck deliveries and customer drop-offs, the loading dock was open to the rest of the warehouse, creating weather and temperature problems.

In the warehouse, volunteers and staff inspect, sort and package all the donated materials. To keep workers comfortable and productive during the Boston winter, C2C wanted to enclose its loading dock area to help keep the snow, sleet and cold temperatures out. However, C2C also wanted the flexibility to open the area when the weather was nice.

Working with an equipment supplier (Rite-Hite Doors, rite-hite.com) and facilities consultants, C2C decided to install a loading dock enclosure consisting of flexible, insulated wall panels constructed with layers of industrial vinyl fabric wrapped around anti-microbial polyester batting.

The loading dock curtain walls have helped C2C keep its volunteers and staff comfortable year round. “We like our cool purple curtain wall more than a traditional wall,” says Sally Sharp Lehman, C2C’s director of operations. “It gives us the flexibility to close off the loading dock area during really cold or really hot days, but also allows us to open the warehouse for the beautiful days, which is great since our warehouse doesn’t have air conditioning. The insulated loading dock curtains do an excellent job and provide a noticeable temperature difference that has helped us to save on winter heating costs.”

The fabric curtain walls are made of 5-foot wide panels interconnected with Velcro to span the width of a given space. It can be installed as a stationary system or, as in the case of C2C Boston, walls that slide open and closed. A portion of the warehouse’s enclosure also included semi-permanent traffic doors that provide access for pedestrians, pushcarts and forklifts.
Market Basket, a New England-based supermarket chain, found itself tight on dock space at a new store in Wilmington, Mass. By installing a versatile hydraulic dock lift, the facility was able to resolve space constraint issues while accommodating a variety of vehicle sizes for loading and unloading.

Although the location was ideal for the new store because it was part of an existing shopping plaza, the property footprint was not optimal for shipping and receiving. The store was able to accommodate a loading dock for both dry grocery and frozen foods on its northern end, but not a dairy dock at the southern section.

“The layout meant that we couldn’t dig down to create a driveway or pit for a standard loading dock,” says Normand Martin, Market Basket’s director of facilities and planning.

Martin and his team selected a lift (Kelley, kelley.4frontes.com) with which he had experience at another facility in Andover, Mass. A typical dairy dock sees almost every size and style of truck imaginable, from major dairy trailers to LTL deliveries by smaller trucks delivering gourmet cheese and other specialty products. Some of the trucks are 48 inches off grade, while others are 24 inches off grade. They even see some trucks that require the driver to off load product one case at a time by hand. The new 7- by 8-foot platform on the new pit-mounted, 6,000-pound capacity hydraulic dock lift accommodates all the options.

The driver has full control over the dock lift motion with the pre-wired, hand-held push-button controller. The lift safely and smoothly lowers the platform to the ground in less than a minute without jostling the load. The dairy cases are then transported on dollies designed specifically for milk crates the short distance from the lift’s platform into the dairy coolers. This efficient operation means the driver can quickly get the dairy load off the truck, load on empty containers and move so the next truck can access the lift for unloading.
STAPLES:
Smart packaging, happy customers, healthy planet

A look inside the second-largest Internet retailer’s Secaucus, N.J., fulfillment center to explore its network-wide transformation from a few standard box options to an almost limitless number of custom, right-sized boxes.

By Maida Napolitano, Contributing Editor

As the world’s largest office supply company, Staples is committed to providing all types of businesses with every office product they need to succeed. It also strives to ensure that the entire process of ordering and acquiring these products be as quick, effortless and hassle-free as possible. It’s even their company tagline: “That was easy.”

With $24 billion in sales, this customer-centric strategy is clearly working. Staples is the second-largest retailer on the Internet, shipping millions of cartons annually to consumers and businesses throughout North America. It accomplishes this by leveraging a highly responsive supply chain and distribution system that guarantees that any order placed before 5 p.m. will be delivered the next day to 98% of the population from its network of state-of-the-art fulfillment centers (FC).

But even the most sophisticated and automated FC could not address one of the key prevailing customer concerns: excessive packaging. The company had long been searching for solutions that curtailed the use of oversized corrugated and excessive filling material for its shipments—it’s even self-imposed a goal of a 20% reduction in packaging by 2020.

In January 2012, the Boston-based retailer made tremendous strides toward achieving this goal when it launched its “Smart-size Packaging Program,” deploying a system-wide rollout of a transformational new technology known as “on-demand packaging.”

This packaging solution allows the retailer to automatically create a custom-sized carton specific for every less-than-full-case order it ships. These types of orders—also known as break-pack orders—account for approximately 40% of Staples’ order volume.

These optimized box configurations that fit “just right” not only address customers’ concerns on unnecessary packaging and help improve customer satisfaction, but they also align with in-house sustainability goals, allowing Staples to accrue a savings in its annual carbon footprint equivalent to about 100,000 trees—the size of a small forest. And, the solution saves Staples money, reducing corrugated inventory requirements, increasing efficiencies in handling and transportation, and
minimizing wasted space and dunnage material within the shipped order.

The retailer's Secaucus, N.J., fulfillment center was Staples' first business-to-business facility to deploy this packaging technology. The Secaucus FC primarily serves Fortune 500 companies in nearby downtown Manhattan plus larger businesses in and around the tri-state area of New York, New Jersey and Connecticut. This packaging technology is set to make an impact on not only this particular facility and the rest of Staples' fulfillment network, but also the planet.

The problem with excessive packaging
Shipping customers exactly what they ordered, next-day delivered, has been part of the Staples “perfect order” strategy for a number of years. As part of this initiative to fine-tune that perfect order, supply chain team leaders have been listening intently to customer feedback.

One of the most pressing complaints that the company had been facing was the issue of excessive packaging. “Before smart-size packaging, we had to fit an order into one of five box sizes, which wasn’t the most user-friendly when all you ordered was a box of pens,” says Jerry Imbrenda, manager of the Secaucus fulfillment center. “For a customer to get a single item undamaged, we would put it in a corrugated carton with a number of air pillows.”

He adds that if the order didn’t fit within one of the smaller-sized boxes, it would go to the next larger size, which most often was significantly more volume than what was needed—requiring a high amount of dunnage to fill the empty space in the carton. In this era of heightened sustainability awareness, customers were not pleased with how this also negatively affected the environment. The supply chain leadership at Staples knew
something had to be done.

**New packaging solution**

In December 2009, a Staples board member had come across a new on-demand packaging technology (Packsize International, packsize.com) developed in Sweden and brought to America. The Staples team, headed by Rod Gallaway, vice president of logistics strategy, global design and engineering for the retailer, started evaluating the technology and its applicability to its business.

“In May 2010, we visited one of the supplier’s existing customers,” recalls Gallaway. “We evaluated its ability to support our business needs and service level requirements, then performed a detailed business case validation.”

Pleased with the results, Gallaway and his team proceeded with a pilot program in September 2010 at the company’s Orlando facility. Phase 1 had the packaging machines making existing carton sizes without any system interface, so the team could study their reliability and determine their throughput capabilities.

In May 2011, the team implemented Phase 2 where a system interface was developed between Staples’ warehouse management system (WMS) and the packaging machines. The pilot performed through a couple of peak seasons, delivering key metrics to the team.

“The objective here was to study customer satisfaction impact, sustainability impact, and capital and expense impact so that we could develop the network-wide business case,” explains Gallaway.

After verifying the economics and success of the pilot project, the team then made the decision to begin immediately deploying the technology to all of its FCs by early 2012.

As of May 2013, Staples has implemented “smart-size packaging” in 15 other e-commerce FCs and plans to complete installation of the packaging solution in all of its centers by year’s end.

**On-demand packaging in Secaucus**

The Secaucus facility processes both full-case and break-pack orders in its business-to-business FC. Of the 20,000 to 40,000 total orders shipped daily, about 30% are break-pack orders, requiring four of the supplier’s EM7-25 “package converting machines” to generate about 6,000 to 8,000 custom-

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**How Staples’ on-demand packaging works**

1. Corrugated z-Fold is fed into an on-demand packaging machine.
2. Product dimensions can be input manually, with a scanner, or through an existing WMS.
3. The machine cuts, creases and scores the corrugated to the exact specifications.
4. Right-size packages are easier to handle, cost less to transport, and make happier customers.
sized boxes daily. A fifth machine is on standby. “We went from five box sizes to nearly 100, and we measure virtually every SKU, so the system knows its cube,” says Imbrenda.

Integrating with the WMS, order information is sent to the proper machine and that machine’s corrugated track. The machine’s software manager, PackNet, adds up the cube of the units of that order and performs sophisticated algorithms to determine the right-sized carton to generate.

In the meantime, bales of corrugated are fed into individual tracks of the machine where they are cut, creased, and scored to the exact specifications, creating un-erected boxes at speeds of up to 1.7 seconds/box. At an adjacent station, a bar coded parcel shipping label is simultaneously generated and applied to the correct box.

Another worker erects the empty carton and feeds it to a bottom taping machine before it is inducted into the facility’s network of picking conveyors. Shipping boxes are then diverted to different pick zones where workers scan the box label for the order and pick units of that order directly into the box. Completed picks travel to another level of the facility, where the order is checked, taped, and manifested for outbound shipment.

**Reaping the benefits**

The switch to smart-size packaging has generated immediate savings to Staples. Staples did not buy any of the machines, they were provided as part of the corrugated supply, but there were some capital expenses to accommodate the machines in their facilities, such as electric power and air installation, WMS modifications, and the retrofitting of conveyors. However, average corrugated usage has dropped more than 15%, air pillow usage has been reduced by about 60%, and break-pack order cube has been reduced by approximately 20% allowing more orders to be accommodated in one truck delivery.

Before the packaging machines were installed, Staples had to carry at least half to a full truckload of corrugated inventory for each carton size. Now, the inventory is about two truckloads of corrugated bales, in total. On average, Staples now needs at least 50% less storage space for corrugated.

A conservative estimate of the carbon footprint reduction based solely on corrugated reduction shows that for the 15 facilities already converted, a savings of more than 8,300 metric tons, equivalent to almost 31,000 trees, has been realized. When fully implemented, the program is expected to save over 25,000 metric tons.

Packsize’s CEO Hanko Kiessner urges possible early adopters to first do a pilot program, then measure the success of the pilot before making a decision. “When the boxes that you get from box manufacturers are 40% too large, then you are really paying for all those inefficiencies, taking up 40% too much space on the truck,” he says.

According to Staples’ Imbrenda, “It helps us reduce our cost here internally while giving our customers what they want. They want their orders in smaller packages and they want less waste—and it helps the environment. It’s a win all over.”

—Maida Napolitano is a Contributing Editor for Modern Materials Handling
Omni-channel distribution: Moving at the speed of “now”

The pressure is on retailers to deliver anything, anytime, from anywhere. Three experts answer four key questions that will help traditional brick-and-mortar retailers revolutionize their use of WMS and their shipping processes on the way to a multi-channel transformation.

BY MAIDA NAPOLITANO, CONTRIBUTING EDITOR

You walk in to your favorite retail store and spot an item you’d like to purchase. A new app on your smart phone lets you “scan” the UPC bar code, which automatically opens up a search engine that finds the same item for less. A few finger slides and clicks on your phone and the wheels are set in motion for you to receive that item the very next day—and you didn’t even have to wait in line at the register.

Welcome to the new world of retail where mobile technology, wire-
less networks, and e-commerce have added a whole new dimension to the consumer’s shopping experience—and a slew of challenges for the supply chains of traditional brick-and-mortar stores. It’s a trend that our experts see gaining momentum, as store sales remain flat and e-commerce business with next-day service levels continue to grow.

It’s all about keeping up with today’s tech savvy consumer. “Consumers want the ability to order anything, anytime, from anywhere,” says Albert Avalos, global vice president for system integrator Fortna. “Through social networks, significant backlash is instantly relayed if the experience is not exceptional.”

Thus, the pressure is on for supply chains to deliver—literally. “As e-commerce becomes a larger percentage of the shipping volume, it’s taking less of a back seat in terms of the design of the operation,” notes Bob Silverman, senior vice president of supply chain and logistics solutions for commercial real estate firm Jones Lang LaSalle. “More facilities will be set up handling multiple channels with separate picking operations, replenished from a common inventory.”

Kevin Hume, principal with supply chain consulting firm Tompkins International, is experiencing the retail transformation firsthand. “For awhile, everyone was talking about the death of the brick-and-mortar store,” says Hume. “But we now have the technology for even the stores to be able to ship e-commerce orders.” By functioning as mini-fulfillment centers (FCs) all over the country, stores are able to support next-day shipping more cost-effectively.

**OMNI-CHANNEL CASE STUDY**

**Bare Escentuals’ multi-channel, multi-company DC**

Within 10 minutes on her first guest stint on the QVC network back in 1994, Bare Escentuals (BE) creator and executive chairman Leslie Blodgett sold out her entire inventory of mineral-based cosmetics—literally conquering television as her first direct-to-consumer retail channel.

Since then, the California-based cosmetics company has never looked back. It now services wholesale customers such as Macy’s, Sephora, Ulta, more than a thousand spa salons, more than 230 company-owned boutiques, and consumers directly through its Website, infomercials and catalog operations.

Marketing three brands—bareMinerals, BUXOM (exclusive to Sephora) and md formulations (mostly in spas)—this retailer stands in an elite club because it services a multitude of channels from just a single 400,000-square-foot distribution center in Columbus, Ohio.

But it wasn’t always that way. In 2006, BE operated a 100,000-square-foot West Coast DC that handled a rapidly growing wholesale and spa salon business, while simultaneously supporting a small retail network of 50 boutiques. A 3PL-run DC in Plymouth, Mich., handled its direct-to-consumer business from the infomercial and the catalog.

“As we grew, it became that much more expensive to operate a smaller facility from which we were bursting at the seams,” recalls Michael Thompson, BE’s vice president of operations, Americas. “The cost of the 3PL side grew as well. With basically the same product assortment for all channels, we had to split our inventory across multiple places. And, since we were growing so fast, we were at a point where we couldn’t meet the demand.”

With a Web site launch pending in 2007, the company’s logistics team knew that bringing the fulfillment for all the channels into one facility would enable the retailer to make sure that they got the right product to the right people at the right time.

Partnersing with supply chain consulting firm Tompkins International, Bare Escentuals planned, designed and launched its new consolidated facility in 2007. In the operation, full-case, wholesale orders are picked by workers on lift trucks using handheld RF devices while direct-to-consumer orders are batch picked 20 orders at a time directly to shipping cartons by voice-directed pickers with carts. Retail store replenishment and spa salon orders are picked using pick-to-light technology.

Since then, the DC team has been hard at work in search of a tool that could support these two companies in a multi-channel, multi-company distribution model. In early 2012, they selected RedPrairie’s warehouse management system (WMS), going live last July.

“We’re less than a year in with the WMS, but we’re already learning the power of having all that information. When you walk through this DC, you see a lot of subsystems in operation,” says Tompkins’ principal Kevin Hume. “Many of these pick-pack operations are channel-specific, leveraging operational processes and equipment designed to reflect the order profile.” In 2010, the team faced even more challenges when Bare Escentuals was acquired by the Shiseido Group in the largest cosmetics related transaction ever. “Shiseido was bursting out of its current Americas facility, so with the acquisition they decided to take advantage of the infrastructure that BE has already built, thus essentially creating a shared services model for all of the Shiseido Group brands,” says Thompson.

For BE, this consolidated model has been an excellent fit. “There’s more flexibility to meet the needs of the business,” says Thompson. He cites how during Cyber Monday when the e-commerce business was processing three times the amount of orders, he was able to quickly leverage workers from the other channels. “E-commerce customers want their orders immediately. With consolidated multi-channel facility, we can support demand peaks quickly and internally, achieving that critical speed to customer.”
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Over the next few pages, our three experts shed light on how traditional brick-and-mortar retailers are making room for e-commerce and multiple distribution channels in their organizations. They respond to key questions and offer their thoughts on how best to go about this transformation. Finally, they zoom in on how warehouse management systems (WMS) and other software solution providers are responding—from offering real-time visibility to available inventory to executing the most cost-effective method of fulfillment to service the most demanding consumer. In an increasingly competitive global retail environment, retailers may have no choice but to go with the flow.

**Should you insource or outsource?**
For traditional DCs servicing their own stores, adding e-commerce to the fold can be a daunting undertaking. Some may need outside help.

The decision to outsource will depend on e-tail’s volumes, according to Silverman. “When volume is low, it makes sense to keep it in-house—one inventory, lower costs.” As volume increases, however, he believes that outsourcing to a third-party logistics provider (3PL) becomes more attractive.

“E-commerce picks are very different and can suffer in a system designed to support larger brick-and-mortar picks,” says Silverman. “Specialized 3PLs focused on e-commerce often have the materials handling equipment, systems, experience and expertise to more efficiently process e-commerce orders than many of their own clients can do in-house.”

As larger throughput volumes eventually magnify the costs associated with splitting the inventory with a 3PL, it may justify consolidating and designing an operation with multiple picking options, to optimize both the bricks’ and the clicks’ picks. At some point, even larger volumes result in a facility getting too big. “Separate facilities may be required, and they can each be optimally located based on the different logistics considerations of the channels,” adds Silverman.

**How do we pick?**
For multi-channel DCs, one of the primary challenges revolves around picking. Many traditional operations are not set up to efficiently accommodate a large range of orders with varying units and lines per order characteristics. “Picking labor is often the single biggest cost within the four walls, and inefficient picking systems can have a huge impact on a DC operation’s costs,” cautions Silverman.

Retail replenishment to stores is typically “pulled” based on point-of-sale (POS) information. “This is usually a pick-to-cart or pick-to-voice/light into totes process, then the totes are consolidated and packed into store shipments,” explains Fortna’s Avalos. In contrast, retail distribution in response...
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to new store openings, specific ads, and promotions are typically “pushed” and achieved using a put-to-store strategy or pack-and-hold operation.

E-commerce orders have a different profile from store orders. “That order profile is typically 1.2 lines per order, with about 30% to 60% one-line orders,” says Tompkins’ Hume. These orders are typically processed through cart zone picking or zone batch picking. For increased productivity, the single-line or single-unit orders are typically processed differently in a batched, high-speed packing operation in a separate area of the facility.

**How do we ship from stores?**

The ability to ship e-commerce orders from brick-and-mortar stores may be the strategy that most are anticipating. Why? Because processing and shipping from the store that’s closest to the person that wants it is the most cost-effective way to support a next-day shipment.

“Most of the major retailers we’re currently working with will be shipping from their stores this peak season,” says Hume. But the best way to accomplish this will vary by retailer.

According to Hume, some will select key stores that have the largest inventory—and those key stores may be defined by particular mixes of SKUs that they’ve identified as the highest volume of e-commerce items.

“They’re going to stockpile those SKUs at specific stores and make those stores forward-shipping systems, deploying full warehouse management capabilities,” explains Hume. “They may even leverage parcel manifesting technology, pushing the order down to the store where store employees can go out with a paper ticket to pick items off the store shelves and immediately prepare them for shipment.” He adds that store fulfillment can vary by store type. Low end stores may process 10 to 15 orders a day with minimal technology support and, at the other end, larger stores could have the capacity to ship hundreds of orders and require a mini-fulfillment center in the store’s backroom.

Avalos cautions that shipping from stores presents some challenges.

“While there might be licensing issues with putting warehouse management systems [WMS] and transportation management systems [TMS] inside the stores. Plus contracts with parcel carriers may need to be modified to handle this strategy.” He also points out how some stores may not even have the space or the labor to pull it off. There also consistently needs to be real-time visibility to available store inventory.

**What systems to use where?**

One of the most critical requirements for an omnichannel retailer’s success lays in the planning and executing capabilities of its WMS and other information management systems.

First and foremost, an inventory management system that spans the entire supply chain gives managers a leg up in achieving real-time visibility—and in some cases might actually save the sale. Rather than having a customer walk away because she can’t find an item, today’s sales associate may be equipped with a handheld mobile device to help her find it in any of the other stores. Some stores have even set up kiosks for customers themselves to check inventory, purchase the items, and have it shipped directly to their homes.

Another critical component to making omnichannel’s “buy from anywhere, ship from anywhere” philosophy possible is a distributed order management (DOM) system. “DOM allows you to find all the rule sets and criteria of how you want to cost-effectively support that next-day shipment,” says Hume. “It has the visibility of inventory at all the different stores.”

DOM understands the delivery time frame and instantaneously makes a decision where to most cost-effectively drop that order and still provide the service level promised. “It can drop it into the DC, an e-commerce fulfillment center, or to an individual store.”

However when inventory is scarce and the “bricks and clicks” are sharing inventory with multiple DCs, setting up your DOM becomes especially challenging, says Avalos. “Who gets priority? How do you reserve inventory for each channel? Do you send that order to the store or send it to the DC or split it across multiple DCs?”

Within the WMS, the requirements may be simpler, but just as critical. Consideration must be given to the picking and wave logic that can handle retail order profiles (larger orders) and the smaller e-commerce orders.

“It’s not just the regular pick/pack/ship logic anymore,” says Avalos. “There are more permutations: zone batch picking, multi-order picking, pick and pass, priority processing, multi-carton processing, etc.”

Good cartonization logic coupled with up-to-date weights and measures can streamline packing and manifesting while saving freight by packing orders into the least number of cartons. The TMS must be able to handle service/cost tradeoffs and to track information, not just ship to residences and businesses. Real time information exchanges between the WMS and the Web site to mobile devices is expected—it’s not an option. “In multi-channel systems, it’s critical to push out the status information in real time,” says Avalos.

In a consolidated multi-channel facility, the warehouse control systems (WCS) may now need to control a wider assortment of materials handling systems. “WMS/WCS integration becomes more critical,” says JLL’s Silverman. “The need to know exactly where in the system an order is—specifically where on the conveyor it’s sitting—is greater with shorter windows between dropping orders and shipment cut-off.”
“When the WMS does not have the sophistication needed, many times the WCS makes up the gap,” adds Avalos. He cites how in some DCs the WMS may be controlling the processing of store orders, while WCS controls e-commerce fulfillment where specialized picking and processes are needed. “This is not always the best option, but is usually a ‘right now’ option.”

**Last words**

Today we’re talking about next-day shipments for e-commerce, but the industry is buzzing with rumors of big retailers moving into same-day shipments.

“To be able to do same-day shipment you’re going to have to be as geographically close to the customer as possible,” says Hume. “In addition, you will need robust systems that look at all the different points of distribution—including one that ships from a store—and orchestrates the most cost-effective place to meet that service level.”

—Maida Napolitano is a Contributing Editor to Modern Materials Handling

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**“DOM allows you to find all the rule sets and criteria of how you want to cost-effectively support that next-day shipment.”**

—Kevin Hume, principal, Tompkins International

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Single-unit LED dock light heads withstand forklift collisions

Three new loading dock light heads feature an integrated LED module that lasts longer than 25 incandescent bulbs. Offered as a polycarbonate head, a powder-coated metal head and a goose-neck head, all three models have an LED module permanently installed. The light heads are field serviceable, and deliver rugged performance that withstands collisions with forklifts and pallet jacks. The LED light modules use 14 watts (80% less energy than incandescent or halogen bulbs) and produce lumen intensity comparable to a 150 watt PAR 38 bulb. Cool to the touch, they instantly achieve maximum light intensity and are backed by a three-year warranty. Tri Lite, 800-322-5250, www.triliteinc.com.

Sectional door approved for use in hurricane susceptible areas

The rugged, CruiserWeight sectional door with wind load package has received both Florida Building Code and Miami-Dade County approval for use in hurricane susceptible areas and high wind load environments. Originally created to withstand forklift impacts, the door holds up under pressures of +52 and -67.5 pounds per square foot. It features damage resistant, knock-out capable, polycarbonate interior skins; retractable plungers instead of roller wheels; and track-attached slide locks and lock out pins that secure the door during high-wind events. TKO Dock Doors, 877-408-6788, www.tkodoors.com.

Dock leveler’s reinforced structural frame ensures proper installation

Using a simple yet durable, low-voltage fan motor, the air-powered aFX dock leveler is able to raise and lower loads up to 50,000 pounds without a hydraulic pump/motor, cylinders or fluid. It features the SafeTFrame sub-frame structure for enhanced strength at the rear of the dock leveler, where forklifts transition from the facility floor to the deck. The frame’s four vertical uprights allow the unit to be properly leveled with the warehouse floor for full lateral support without steel shim positioning and welding during installation—saving more than 20 minutes at install. Kelley, 877-558-6960, www.kelleycompany.com.
the dock. Platform sizes range from 6 x 8 feet to 8 x 12 feet. Highlights include a weatherproof push-button NEMA-4X control with 20 feet of coiled cord; a diamond-tread, steel platform with beveled toe-guards painted yellow for safety; removable steel handrails with mid-rails and 4-inch-high kickplates; and hardened steel pins operating in self-lubricated bearings at all pivot points. Southworth Products, 207-878-0700, www.southworthproducts.com.

Instant dock lift
Because it requires only lagging into position and plugging into a power source, the Instant Dock 6568 dock lift can be used immediately. The device interfaces with manual pallet jacks and four-wheeled carts, lifting loads up to 5,500 pounds. With a platform measuring 6 x 8 feet, the lift rises from 5 to 58 inches at top speeds of 13 feet per minute. It is constructed with all tubular legs for maximum rigidity and comes in stainless steel, galvanized, FDA epoxy and enamel finishes. Advance Lifts, 800-843-3625, www.advancelifts.com.

Galvanized dock lifts stand up to challenging environments
For fast, safe transfer of loads to and from any truck bed to any dock height, the Dura-Dock series of hydraulic loading dock lifts functions without ramps or inclines. They come in 5,000- and 6,000-pound capacities and feature corrosion-resistant, galvanized base and legs standard for longer service life. The lifts work from grade level to a maximum height of 59 inches, and can accommodate any dock or loading configuration—whether the truck is parked perpendicular or parallel to

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Dock Equipment

Spring assist door opens easily
Featuring a durable, internal custom torsion spring and an interior chain-pull quick-release, the G2 Lite spring assist door provides easy, hassle-free opening. Its centrifugal latching mechanism lets the door be stopped at any position and released from both sides. Modular web construction allows its panels to be replaced with other panels made of vinyl, mesh and clear PVC. To withstand high winds, the doors’ impact-resistant fiberglass wind bars allow them to easily be reset without damage to the structure. The doors may be specified for manual or motorized operations.

IP-rated weight reading indicators easy to connect, operate
Offered as an adaptable weighing solution at the dock, the ZM series of IP69K-rated indicators provide fast, accurate measurements, as well as analyze, store, display and transmit crucial weighing data. The devices come in two models with eight variants. The ZM301 basic weight-reading indicator has high-speed value capturing capabilities of up to 80 times per second. Equipped with six operational keys (zero, print, units, tare, select and F1), it offers built-in routines, allowing multiple configurations for individual weighing needs. The ZM303 stores multiple tares and IDs in its internal memory, with easy retrieval for future use. It features a numeric keyboard and buttons for common weighing requirements—including counting, checkweighing and process control—for quick switches between applications. Avery Weigh-Tronix, 800-368-2039, www.averyweigh-tronix.com.

Non-impact restraint arm detects incoming RIGs
The StrongArm SVR303 low-profile, non-impact restraint arm uses switchless technology to detect incoming rear impact guard bars. Once engaged, the device uses 35,000 pounds of restraining force to secure the truck to the dock. Dual-acting hydraulic cylinders prevent lock-ups and releases, while an intelligent positioning system constantly communicates the location of the restraint arm through a network. This enables an integrated light communication system to accurately display safety conditions at the dock. Features include low profile, 8-inch construction, vertical restraint from 8 to 26 inches, NEMA6 sealed sensor and double-acting hydraulic cylinders that keep the unit operating safely during wet or flooded conditions.
Integrated forklift cutouts on dock board simplify placement, retrieval
To simplify dock board placement and retrieval, the Speedy Board incorporates forklift cutouts to its leading edge. This allows the forklift operator to quickly scoop up the board and safely move it into place, then retrieve it for storage when the job is done. All board handling is completed without loops, lifting chains or other personnel while the operator remains safely in the fork truck cage. The boards come in 18 different models with dimensions ranging from 60 x 30 inches to 72 x 72 inches, and are manufactured and tested in compliance with ANSI standard MH30.2. Bluff Manufacturing, 800-433-2212, www.bluffmanufacturing.com.

Header prevents inclement weather from entering dock area
The WeatherGuard 1600 series header protects the loading dock area from rain, snow, sleet, hail and wind. Ideal for drive approaches that slope toward the dock opening—causing rain water to funnel into the dock area—the header prevents damage to cargo and enhances employee comfort and safety. The header may be ordered as a complete unit or as a retrofit to existing seals and shelters. The structurally supported rigid head member is translucent, allowing natural light into the loading operation. Other features include a spring-loaded, foam-filled, pivoting head that ensures a watertight seal at the top the vehicle, and construction with durable materials. Fairborn, 800-643-5424, www.fairbornusa.com.

Dock management system
To maximize loading dock efficiency, the Salvo DockMonitor integrates data gathering and analysis with the supplier’s loading dock safety system to display live graphic information in real time. The system runs on a PC interface for assessment of overall site performance and individual dock statistics as a means to prevent accidents, keep workers safe, and comply with OSHA standards. Benchmarking functions include tracking use of each dock, monitoring load and unload times, comparing shift performances, logging carrier information, scheduling dock maintenance based on usage, and measuring maintenance downtime. Reports generated on these criteria can be exported to a range of standard file formats for further review and analysis. Castell Interlocks, 312-360-1516, www.castell.com.

Pneumatic-powered lift gate prevents falls from loading dock
To prevent personnel and forklift falls from a loading dock, the SentryGuard powered gate can be lifted or lowered using either a push-button remote control or wall switch. The pneumatic gate lifts or lowers like a railroad crossing arm to not disrupt floor traffic. Features include easy installation, small footprint, solid-state circuitry and an automatically activated, high-visibility warning strobe. For single openings, sizes range from 4 to 12.5 feet, while split-gate systems may be specified for openings up to 25 feet wide. Garlock Safety Systems, 763-694-2614, www.railguard.net.

Convert vacant space into loading dock with mobile yard ramp
To expand current dock capacity or create loading facilities where no dock exists, the mobile yard ramp is offered. Easily rolled from job to job, the ramp handles freight with a forklift virtually anywhere. By acting as a movable loading dock, the unit converts any vacant space into a freight-handling center without new construction. It provides ground-level access to trucks, railcars or buildings, and can be manufactured in capacities up to 30,000 pounds. Copperloy, 800-321-4968, www.copperloy.com.

Self-contained housing for line of truck locks
A line of zinc-plated truck locks is offered in two self-contained housing styles—bolt-in flange that anchors to the concrete drive and cast-in embedded into the concrete drive. The locks provide...
FOCUS ON Dock Equipment

more than 30,000 pounds of restraining force to prevent a vehicle from departing prematurely. Offered in powered and manual versions, the device features inside/outside light communication and a non-impact ram bar restraint that rises above the under-ride guards. After the truck/trailer backs into position against the dock bumpers the dock attendant switches the device to the restrain position. This turns the outside light red and inside light green. Once the attendant verifies that the ram bar is positioned above the under-ride guard, it is safe to enter the trailer. Upon completion of loading/unloading, switching the device to the release position deactivates the restraint. For safety, all activation components are housed inside the building. Nova Technology, 800-236-7325, www.novalocks.com.

System restrains a trailer with 30,000+ pounds of force
To reduce the likelihood of premature trailer pull out, the TPR vehicle restraint automatically positions itself to secure a trailer’s rear impact guard. Its integrated gear motor keeps the hook continuously engaged with a restraining force in excess of 30,000 pounds. The restraint also incorporates a three-light communication system to establish a clear line of communication between the truck driver and dock attendant. Features include internal and external signage and LED lights, a low profile carriage with service range of 9 to 27 inches off grade, and a control panel with a keyed bypass/override switch. McGuire, 800-624-8473, www.wbmcguire.com.

Seal prevents rain from entering dock area
The RS800 RainStop seal prevents the entry of rain into the loading dock area with a stiffly sprung 5.5-inch foam filled header curtain to create a positive seal on the top of the trailer. To further prevent product damage and slippery, unsafe conditions, the seal diverts water from the top of the trailer and away from entering the building. The seal can be ordered as a retrofit for existing applications or in conjunction with a new dock seal. Pentalift Equipment Products, 519-763-6700, www.pentalift.com.
Heavy-duty hydraulic pit leveler handles up to 80,000 pound loads

Offering dynamic capacities up to 80,000 pounds, the heavy-duty HDH hydraulic pit leveler uses an extra heavy rear angle with strategically placed gussets for maximum structural support and frame strength. Constructed with 55,000-pound minimum yield steel, the leveler’s base frame support struts provide additional structural reinforcement and safety. The unit features yellow and black diagonal safety stripes on integral toe guards, and full range toe guards in safety yellow. For extended service life—particularly in coastal areas, food service, chemical and pharmaceutical applications—the leveler can be hot dipped galvanized. Pioneer Dock Equipment, 800-251-3382, www.pioneerleveler.com.

Air-powered dock leveler uses existing air supply

Offered as an alternative to hydraulic, mechanical, low-pressure/high-volume air bag levelers and power-assisted levelers, the CentraAir series dock leveler is air powered. Featuring an automotive grade bellows system, which employs the same technology found in air-ride suspension systems, the system uses existing shop air or a dedicated compressor. It can either be push-button operated or run manually with a lanyard control located at the back of the leveler. Ideal for power-starved locations, the unit draws 0.07 amps, making it environmentally friendly. Poweramp, 262-255-1510, www.poweramp.com.

Rigid truck shelter accommodates trailers up to 8.5 x 13.5 feet

Made with 40-ounce high tear duroprene, the SH403 rigid truck shelter accommodates larger trailers at loading docks with bigger opening created by the head and vertical curtains. This reduces wear and tear on the shelter curtains to prolong its lifespan. Based on a 4-foot dock height, the shelters’ outside dimensions measure 11.5 x 11 feet. Due to flat pieces of spring steel that push the curtains against the outsides and top of the trailer (while allowing full access to the height and width), the shelter accommodates trailers as large as 8.5 x 13.5 feet. Rotary Products, 800-457-5251, www.rotaryproductsinc.com.

Portable steel yard ramp

For smooth loading and unloading, a portable steel yard ramp allows traffic to move from the dock level to the ground, or from the ground onto the back of a truck. It incorporates 18-inch solid, industrial rubber pneumatic tires for easy relocation of the ramp around a shipping yard. To adjust the ramp height to match any trailer bed height, a hydraulic adjustment system is included. The ramp also features a tow or fork clamp for transportation, serrated bar grating for traction, safety chains that hold the ramp in place, and a 72-inch long level-off section for easy access to end-loads. Systems Inc., 800-643-5424, www.docksystemsinc.com.

Provide better direction at the loading dock

A line of signage for display at the loading dock gives direction and advises employees and visitors of policies and procedures. The signage, when properly displayed, directs forklift, semi-truck and foot traffic in an orderly, efficient manner. Made from custom cut, UV-protected vinyl in more than 80 color choices, each sign is made to order in any size, orientation or color. Features include 0.040 aluminum sign backers in 22 different colors; aluminum blanks with radius or squared edges; and a variety of mounting-hole patterns and sizes. Allied Solutions, 800-643-5424, www.alliedproductsolutions.com.
**PRODUCT Showcase**

Highly visible wheel chocks sport ergonomic handle
A line of four different wheel chocks feature an ergonomic handle for easy insertion behind a trailer wheel to prevent roll-aways at the dock. The factory-installed handle is constructed of steel and includes a yellow, powder-coated finish for high visibility. The RWC-8-ERGO and ORWC-8-ERGO include a molded rubber wheel chock that measures 9.5 x 6 x 8 inches in black or orange, respectively. Featuring fabricated steel wheel chocks, the FAB-11-ERGO measures 8 x 9 x 10.75 inches, while the FAB-10-ERGO 10.5 x 10 x 7.5-inch chock includes an anti-theft chain to secure it to the building. Vestil Manufacturing, 800-348-0868, www.vestil.com.

Two-wheeled hand truck with powered lift
Combining the vertical lifting of a small powered stacker with the convenience, versatility and simplicity of a two-wheel hand truck, the LNB-350 makes it easier to transport and reposition items. Ideal for manufacturing, warehousing/distribution, shipping/receiving, retail, hospitals or offices, the truck is used to transfer loads to and from shelves, workbenches, conveyors, delivery trucks and customer vehicles. A tethered push button control directs the powered platform to position a load at a comfortable height, eliminating bending and stretching. To ensure smooth lifting and lowering with zero drift, a linear actuator is incorporated. Built on a lightweight, durable aluminum frame, the unit lifts loads of 350 pounds up 36 inches. For smooth travel, heavy-duty 10-inch polyurethane tires roll over uneven floors, pavement, thresholds, and carpeting without going flat or leaving skid marks. Lift’n Buddy, 701-499-5290, www.liftnbuddy.com.

Connection brackets
The Adapt-a-Stop connection bracket easily attaches to existing upright beams commonly used with pallet racks. The brackets are designed to connect using the same methods as pallet rack horizontal and upright beams. The load stops work with any bay size and adapt to needed clearances. The brackets are designed to help prevent damage when loading and unloading pallet racks or bays under racks. Compact, yet sturdy, the connection bracket adapts to all types and sizes of pallet rack uprights. The bracket allows for universal use with standard pallet racks found in hundreds of thousands of existing warehouse facilities. The brackets are available in four standard types: U-shaped side bolt-on, adjustable U-shaped side bolt-on, front bolt-on, and built-in connectors with locking pin. Other model types are available. Adapt-a-Stop, 510-209-5134, www.adaptastop.com
Fleet management, control and optimization

Combining lift truck fleet efficiency with warehouse optimization and professional services are the iWarehouse Essential and iWarehouse Enterprise systems. Essential provides access control and compliance while monitoring and collecting both lift truck and operator data in real time, increasing asset and labor visibility. To control lift truck and fleet usage, it automates vehicle access and provides an electronic operator checklist that is recorded and stored for OSHA compliance. Enterprise turns collected asset and labor information into actionable data to identify opportunities for fleet and warehouse optimization. To increase productivity and reduce operating costs, it can be integrated with select labor management systems. The Raymond Corp., 800-235-7200, www.raymondcorp.com.

AS/RS utilizes surface-mounted, track-and-guide system for fast installation

To reduce installation time and facilitate later relocation, the UltraStore automated storage and retrieval system uses a surface-mounted, track-and-guide system. Easy-to-use controls and human machine interface enable the system to be up and running quickly with minimal training and limited operator interaction. The crane moves down the lane while positioning the shuttle to the proper height. When the crane stops at the correct position, the shuttle inserts or extracts the stored material and brings it back down to the operator area. Upon arrival the item can be moved onto awaiting forklifts, conveyor system or workstation for ergonomic operations. Ideal for use in buffer storage, order picking, work in process, tooling, machine component storage and frozen goods, the system provides up to 85% space savings for items, cases, pallets and custom materials with unique sizes and dimensions. ISD-Integrated Systems Design, 215-431-4524, www.ISDDD.com.
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PRIMARY FOCUS: Emerging technologies that will impact industries in a three- to five-year horizon.

Modern: The bar code just celebrated its 40th birthday. How has this technology changed our lives?

Hogan: The bar code is the information backbone for supply chains around the world. It has created scales and efficiencies that would not be possible without bar codes. It is the key enabler of business processes for most of Modern’s readers. While people focus on the bar code, it’s less about the bars and spaces than the identification number that is contained in those bars and spaces. It’s used to identify a product starting at the source of manufacturing and tracks that product all the way to the end consumer. Think about this: The bar code is even used in countries like Cuba and North Korea. We might not agree with them on politics and policy, but we do agree on commerce.

Modern: What has been the most important development around bar codes during those 40 years?

Hogan: The most important development was that very early on, industry came together to agree on a standard for bar codes. At the time, there were different technologies, different approaches and different symbologies. Industry leaders were willing to stick their necks out and agree on a standard and agreed on a symbology. No one knew then that it would evolve into what it has today. We serve 150 countries around the world and more than 25 industry sectors.

Modern: Are we using bar codes differently today than we did initially?

Hogan: Absolutely. The original problem that the bar code was supposed to solve was a desire for more product information at the point of sale. You could capture it manually, but it was not accurate, and it created congestion at the checkout line. So they sought to automate that process. What they didn’t realize is how that starting point would lead to the creation of entire systems, such as merchandise replenishment systems and planning systems. On the marketing side, people are now using the information collected by bar codes to understand consumer behavior. Those uses evolved from trying to address a throughput problem in the checkout line.

Modern: Since part of your role is to look three to five years down the road, where are bar codes going from here?

Hogan: The ability to read a bar code with a smart phone is taking the technology much further. Every smart phone becomes a point of sale. I can have an app from any number of e-tailers or retailers so that I can buy product just from that smart phone app. From a materials handling perspective, most retailers are extending their infrastructure so that every store becomes a DC. We started with in-store point of sale and now stores are becoming distribution centers. Bar codes are making that possible, and it’s moving at a much faster pace than 40 years ago. □
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*Peerless Media Research Group, 2011