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August 2015

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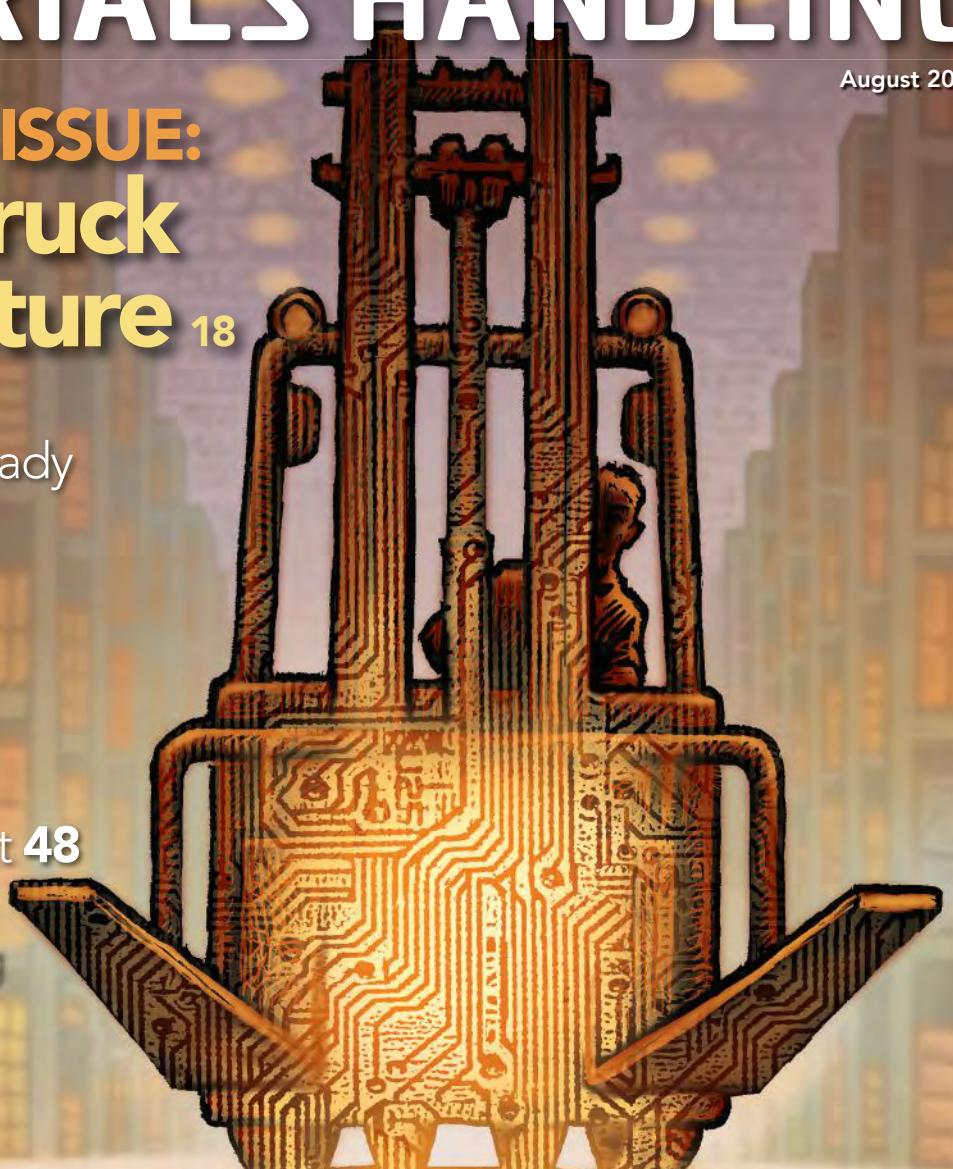
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 **DEMATIC**

Mitsubishi Heavy Industries and Mitsubishi Nichiyu Forklift to acquire UniCarriers

MITSUBISHI HEAVY INDUSTRIES (MHI) and Mitsubishi Nichiyu Forklift (MNF) recently announced plans to jointly acquire UniCarriers.

By purchasing all shares currently held by Innovation Network Corporation of Japan (INCJ), Hitachi Construction Machinery, and Nissan Motor, the transaction will result in MHI and MNF holding respective stakes in UniCarriers of 65% and 35%.

UniCarriers is the result of the 2013 merger of Nissan Forklift and TCM America, and Mitsubishi Nichiyu Forklift was created through the recent merger

of Nippon Yusoki and the forklift section of MHI.

A press release highlighted intensifying global competition and the importance of scale expansion in the realm of research and development. According to the release, the acquisition is intended to help build a business model “transcending the conventional parameters of the logistics machinery and equipment industry.”



Columbus McKinnon to acquire Magnetek

COLUMBUS MCKINNON, a designer and manufacturer of materials handling products, and Magnetek announced a definitive agreement for Columbus McKinnon to acquire all of the outstanding shares of Magnetek for a total value of \$188.9 million.

The transaction combines complementary strengths to create more competitive and comprehensive materials handling solutions. The boards of directors of both companies have approved the agreement unanimously and Magnetek’s board of directors has unanimously recommended that its shareholders tender into the offer.

Magnetek is North America’s largest independent supplier of digital drives, radio controls, software and accessories for industrial cranes and hoists, and also the largest independent supplier of digital DC motion control systems for elevators. “The accretive combination of Magnetek’s technology and ‘smart power’ with our broad line of lifting and positioning mechanical products creates a total solution for our customers,” said Timothy T. Tevens, president and CEO of Columbus McKinnon.



Reddwerks announces alliance with JDA Software

REDDWERKS CORP., a leading provider of warehouse execution software, has announced an on-going alliance with JDA Software, a leading provider of end-to-end, integrated retail and supply chain planning and execution solutions.

The alliance is intended to allow JDA and Reddwerks to offer a complementary, end-to-end order fulfillment platform capable of providing operational agility and distribution center-wide alignment of customer orders, inventory, warehouse labor and materials handling equipment.

“The opportunity to partner with Reddwerks is exciting and timely,” said Mark Morgan, senior vice president of North American sales at JDA. “As omnichannel demands increase for our manufacturing, distribution and retail customers, it is imperative for our customers to focus on the most profitable fulfillment model possible.”



PMMI predicts 2015 Pack Expo will be triple the size of 1995’s inaugural event

THE 20TH ANNIVERSARY edition of Pack Expo Las Vegas (Las Vegas Convention Center; Sept. 28-30, 2015), could be the show’s largest edition yet, according to show owner and producer PMMI, The Association for Packaging and Processing Technologies.

In addition to more than 800,000 net square feet of exhibit space, PMMI also anticipates visitor attendance near 30,000 and more than 2,000 exhibitors. These industry leaders serve more than 40 vertical markets, an indicator of Pack Expo Las Vegas’ growth in breadth and depth over the years. The expansion includes the

Las Vegas debut of Pharma Expo, jointly produced by PMMI and the International Society for

Pharmaceutical Engineering (ISPE).

In 1995, PMMI introduced Pack Expo West, featuring packaging equipment from 532 exhibitors and attracting 9,334 attendees. Exhibit space was about 200,000 net square feet—about 25% of this year’s event.





A FAN THAT COOLS OFF AND PAYS OFF.

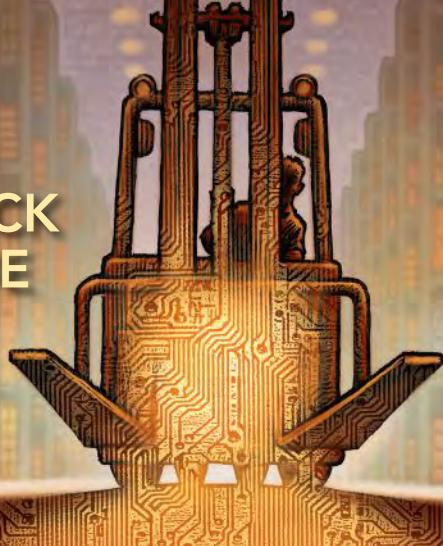
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LIFT TRUCK ISSUE



Cover Illustration: Phil Foster

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PRODUCTIVITY SOLUTIONS FOR DISTRIBUTION, WAREHOUSING AND MANUFACTURING

COVER STORY

18 Lift truck priorities: Building the lift truck of the future

Lift trucks used to be about brawn. The lift truck of the future will be about intelligence, automation and software. And, the future is closer than you think.

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Lift truck purchases remain steady in 2015 as companies look to upgrade and/or replace vehicles while also putting more into their training, technology and maintenance programs.

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39 Top 20 lift truck suppliers

Currency conversions obscure some sizable revenue gains among foreign companies, but overall growth in unit sales matches 2013's strong performance.

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Having sprouted from mere lift truck maintenance, fleet management is now budding into a powerful and integral part of labor management.

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Data collection devices for the warehouse have long been RF enabled and mobile, but heavily focused on simple data capture routines. Now tablets, smart phones and other devices are supporting richer apps and management activity, while wearable, wireless printers give warehouse workers the capability to perform efficient, on-demand printing.



60 seconds with...
Brett Wood, ITA.
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EDITORIAL OFFICES

111 Speen Street, Suite 200
Framingham, MA 01701-2000
(800) 375-8015

Michael Levans

GROUP EDITORIAL DIRECTOR
mlevans@peerlessmedia.com

Bob Trebilcock

EXECUTIVE EDITOR
btrebilcock@peerlessmedia.com

Noël P. Bodenburg

EXECUTIVE MANAGING EDITOR
npbodenburg@peerlessmedia.com

Josh Bond

SENIOR EDITOR
jbond@peerlessmedia.com

Sara Pearson Specter

EDITOR AT LARGE
sara@saraspecter.com

Roberto Michel

EDITOR AT LARGE
robertomichel@centurylink.net

Jeff Berman

GROUP NEWS EDITOR
jberman@peerlessmedia.com

Wendy DelCampo

ART DIRECTOR
wdelcampo@peerlessmedia.com

Daniel Guidera

ILLUSTRATION
daniel@danielguidera.com

Brian Ceraolo

PRESIDENT AND GROUP PUBLISHER
bceraolo@peerlessmedia.com

PEERLESS MEDIA, LLC

www.peerlessmedia.com

Kenneth Moyes

PRESIDENT AND CEO
EH PUBLISHING, INC.

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MICHAEL LEVANS
GROUP EDITORIAL
DIRECTOR



Are we ready for the lift truck of the future?

This month, *Modern* is proud to offer you the fifth installment of our annual *Lift Truck Issue*. Back when we produced the first, it was clear that the U.S. economy was just starting to tiptoe out of recession, and fleet managers, who had taken their lift truck operations for granted for far too long, were short on budget and literally running their equipment into the ground.

Realizing that poor practice couldn't be sustained, *Modern* decided to fix an annual spotlight on what we traditionally called the backbone, the workhorse, the most fundamental piece of equipment to be found in any materials handling operation. The goal was to—year after year—offer a comprehensive snapshot of the lift truck market and see how suppliers chose to follow the ever-evolving needs of today's quick-response, omni-channel-centric warehouses and DCs.

I'm happy to report that, five years later, we find an editorial lineup that shows lift truck users re-investing and innovating. In some cases, they're even starting to transform the "old workhorse" into a data collection device capable of not only tracking lifts and operator performance, but communicating with warehouse and inventory systems.

In fact, we kick off the 2015 *Lift Truck Issue* with executive editor Bob Trebilcock's forward-looking piece, "Building the lift truck of the future" (p. 18). To get a better feel for the evolution of the lift truck and its supporting systems and software, Trebilcock spoke with eight industry players, including four lift truck suppliers, a battery manufacturer, a battery charger maker, an attachment manufacturer and a provider of fleet management solutions.

While lift trucks still "lift things up and put things down," Trebilcock says that what's on the drawing board for these brawny bad boys

is anything but simple—and could be transformational once more users get on board.

"We've been writing about how software and data capture technology is beginning to trump hardware in our solutions," says Trebilcock. "The lift truck industry realized this earlier than other segments and is ahead of the game. You know something is happening when a manufacturer of battery chargers is talking about cloud computing and Big Data."

And while suppliers are responding with the supporting lift truck technology and related solutions, senior editor Josh Bond says the challenge remains convincing end users and management to make the most of the data now available to them. Bond touches on the advancements, benefits and obstacles facing users of fleet management solutions in his piece, "Fleet-footed operations" (p. 48).

"Considering the materials handling industry's recent strides in automation, real-time responsiveness and end-to-end efficiency, it's curious that a disconnect still persists between the management of lift trucks and of the people who operate them," says Bond. "It's becoming very clear that those who bring the pieces together—labor management, asset management and order management—will find significant opportunities."

And as this issue shows, end users are taking these bold steps forward applying simple solutions that will better integrate their lift truck fleets as a necessary tool for improved labor and operations management. "But the best part of this story is that most end users will find that they can seize those opportunities without elaborate technologies or capital investments," adds Bond.

We hope this annual issue will help you discover your next bold step.

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MANUFACTURING

U.S. middle market manufacturers face increasingly stiff competition

SURVEY ILLUSTRATES GLOBAL PUSH TO ENTER U.S. MARKET, WITH OVERSEAS TECHNOLOGY INVESTMENTS OUTPACING THOSE OF DOMESTIC MANUFACTURERS.

BY JOSH BOND, SENIOR EDITOR

As employment and wages in the United States rise and the dollar continues to gain strength, the U.S. market has become increasingly attractive to manufacturing and distribution companies, according to an annual survey gauging middle market sentiment conducted by McGladrey, a leading provider of assurance, tax and consulting services focused on the middle market.

Based on responses from 1,660 manufacturing and distribution executives around the world, McGladrey's 10th-annual "Manufacturing and Distribution Monitor" survey found middle market manufacturers and distributors are bullish on growth prospects for the next 12 months. A majority of executives reported growth in domestic sales over the past year and they expect median sales to increase 5% during the next year.

In a recent interview, Karen Kurek, national industrial products practice leader for McGladrey, told *Modern* that this year's sample set was expanded to include non-U.S. respondents, which constituted about 35% of survey responses. She noted that non-U.S. companies are out-investing U.S. companies in several areas,

including equipment, facilities, R&D and IT. In general, non-U.S. companies' investment levels are 2% to 3% higher, and with a sample base of 1,600, Kurek said the figure is statistically significant.

"That's a wake-up call that U.S. companies need to invest in IT and do it successfully," Kurek said. "After

2009, most IT investment was just to keep things running, and now we're starting to see a lot of those companies invest in a more strategic way."

Another insight from the Monitor indicated that non-U.S. companies are more comfortable in dealing with global commerce. Some 30% expressed goals to expand sales outside of their home countries, whereas in the United States just 10% are looking to expand sales outside the U.S.



According to a recent survey, the U.S. market has become increasingly attractive to manufacturing companies.

TECHNOLOGY

IoT to triple the number of connected industrial control devices by 2020

According to ABI Research, the increasing adoption of IoT within industrial settings will result in a substantial growth of the number of connected

industrial devices, in particular industrial control devices like PLCs.

The research firm estimates that over the period from 2014 to 2020,

the number of connected industrial controllers will triple, growing at an average rate of 20%.

"Industrial networks are characterized by a large variety of technologies and communication protocols," said Eugenio Pasqua, research analyst at ABI Research. "As a consequence, there is typically little interoperability with conventional networks, but also between different industrial networks. Sharing data among different facilities or with the higher levels of an enterprise remains a very challenging task."

The technological advances of the past decade are, however, slowly changing this. The diffusion of Ethernet and IP-based industrial protocols, as well as the improved intelligence of industrial devices, have reduced the differences between conventional and industrial networks. This enables an easier interconnection between enterprise IT applications and OT systems.

"Through the adoption of IoT technologies, industrial organizations can make better use of the huge amount of data generated inside their facilities and extract more meaningful information," Pasqua said. "This allows a better vision of what happens along the whole supply chain, achieving better performance at lower operating costs and the ability to react faster to changes or issues."

SECURITY

ISA to offer cybersecurity courses and certificate programs

The International Society of Automation (ISA) has introduced its expanded suite of industrial automation and control system (IACS) cybersecurity training, including three new technical training courses with associated certificate programs.

The three new ISA industrial cybersecurity training courses include:

- Assessing the Cybersecurity of New or Existing IACS Systems
- IACS Cybersecurity Design & Implementation
- IACS Cybersecurity Operations

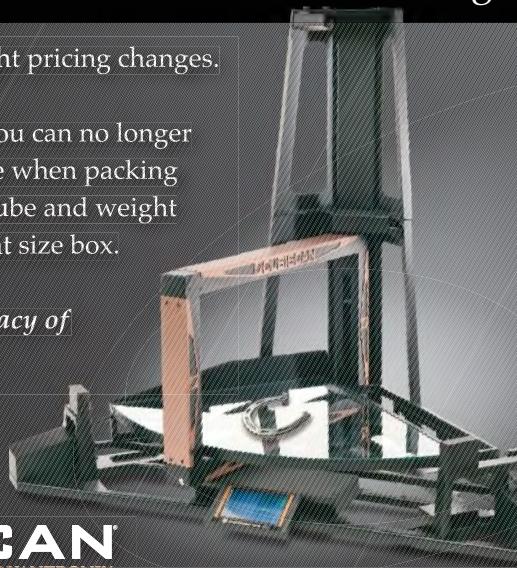


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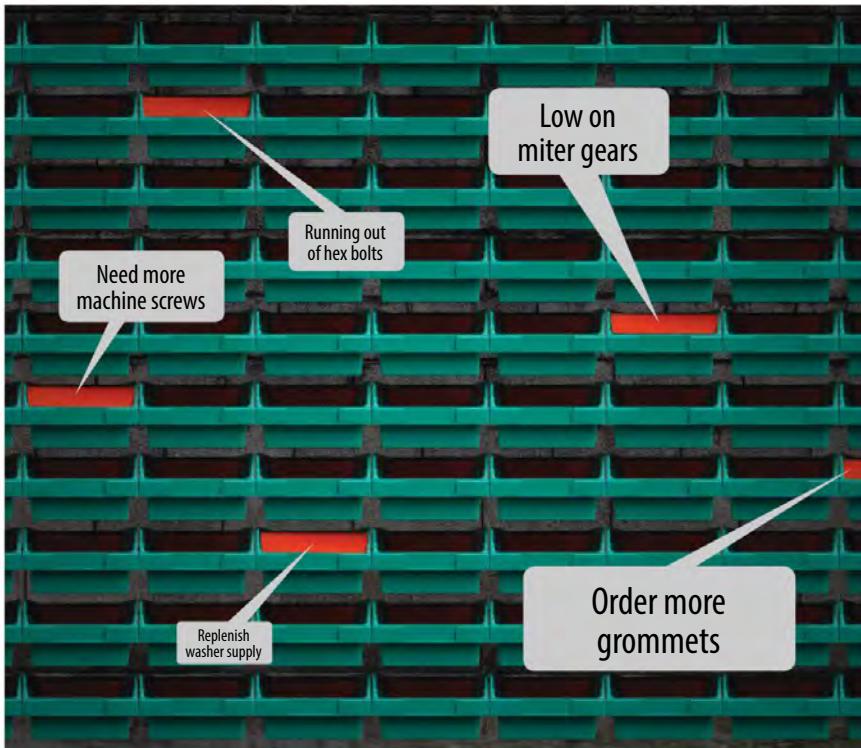
& Maintenance

"No organization has a more complete set of industrial cybersecurity courses and certificate programs needed to develop a highly skilled industrial cybersecurity workforce than ISA," said Dalton Wilson, ISA's direc-

tor of education services. "We now provide everything from a general overview of industrial automation security to detailed instruction on how to best leverage ISA's series of industrial cybersecurity standards through a full-circle exploration of IACS assessment,

design, implementation, operations and management."

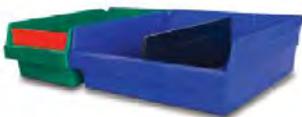
The ever-rising volume of industrial cyberattacks combined with the increasing diversity and sophistication of cyber warfare tactics have generated a tremendous demand for qualified industrial cybersecurity professionals.



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In fact, the demand for cybersecurity professionals is growing 12 times faster than the overall job market.

DATA CAPTURE

Machine vision market in NA has record start to 2015

North American sales of machine vision systems and components grew 22% in Q1 of 2015, the market's highest first quarter total in history, according to new statistics issued by AIA, the industry's trade group.

Total machine vision sales include sales of machine vision systems and components. The machine vision systems category saw a year-over-year increase of 24%. Machine vision systems include smart cameras and application-specific machine vision (ASMV) systems. Similarly, machine vision components had a strong quarter with 11% growth over the first quarter of 2014. The leading categories were lighting (28%), cameras (11%) and software (8%).

"Industry experts remain bullish on machine vision components for the next two quarters," said Alex Shikany, AIA's director of market analysis. "Less so for machine vision systems however, where 55% of survey respondents believe the category will be flat, 25% expect an increase, and 20% expect a decline." □



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THINK AHEAD



15HST9851

A guardrail's looks can be deceiving

As adoption increases, efforts to clarify industrial equipment guardrail standards are underway.

By **Josh Bond**, Senior Editor

It's generally accepted that the ideal sidewalk includes a physical barrier like a curb or strip of grass between the sidewalk and the road. "You've never seen one that's just a painted line between pedestrians and cars," says Frank Oorreel, president of Boplan USA. "Why wouldn't you also want a physical barrier in your workplace?"

Other than for elevated platform applications, facilities with mixed pedestrian and industrial equipment traffic in the United States simply aren't subject to any barrier-related regulations. While no additional standards exist in Europe, the use of guardrails to create pathways for a pedestrian is much more predominant. That said, Oorreel suggests stateside product acceptance among the growing number of polymer guardrail suppliers is just as good as when they were launched in Europe, or better.

"Companies are very keen to adhering to standards and regulations, but the United States has no regulations whatsoever governing level work floors where lift trucks can create a hazardous environment," Oorreel says. "When that is the case, if it perceives no need, a company will usually not stress over it until something happens. Until they hit a wall, damage a \$1 million machine or—worst of all—cause an injury, they are unlikely to look for solutions."

Because of the increased risk of contact day to day, many facilities are considering guardrail installations with an eye toward infrastructure protection, Oorreel says. Although the standards and related testing are nonexistent, Oorreel says some manufacturers claim that "heavy duty" guardrails are generally expected to resist a 10,000- to 13,000-pound lift truck traveling at 4 mph. However, this is still a vague description since even the word "traveling" does not specify if the truck is moving forward, backward or at an angle.



In any case, what is most dangerous is speed, not weight, Oorreel says. "Any engineer will show you a formula proving speed is the key," he says. "Four miles per hour with 10,000 pounds is one thing, but what if the trucks are moving faster? For now, impact ratings have little meaning."

Even more concerning, Oorreel suggests, is that too many existing steel guardrail installations fall victim to the same oversight; with each minor impact, whatever impact rating the guardrail had initially is depleted.

"Even daily, small impacts slowly erode the rating, and there's no readout saying '25% of rating remaining,'" Oorreel says. "Rigid structures transfer impacts to the floor, and the anchors take the brunt. We've seen many 'heavy duty' guardrails loose enough to move with your hand, and they will definitely not be ready for 'the big one.'"

Oorreel admits guardrails are not something people are crazy about in general, but that could change. "We're not alone in the market, and it won't be long before there are more offerings," he says. "The more guardrails, steel or polymer or what have you, the more everybody wins."

Josh Bond is Modern's senior editor and can be reached at jbond@peerlessmedia.com



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Make permanent, readable marks on beverages

Using the right printer for beverage marking can address the challenges of pairing ink to substrate while also securing product traceability.

By Sara Pearson Specter, Editor at Large

Beverage bottlers—including producers of beer, soft drinks and waters—need to mark their primary packaging with product and date codes for identification, traceability or with more complex codes for brand promotion.

In addition to operating in highly demanding production environments, the challenge for producers has been achieving consistent mark contrast, legibility and durability against proliferating packaging types. Marks must be permanent and readable whatever the substrate, including metal cans, traditional or returnable glass, plastic bottles, pouches, boxes (also called liquid bricks), coated papers and caps.

The most commonly used primary beverage unit printing technology is continuous ink jet (CIJ), which typically requires a specific, dedicated ink formulation to achieve the best printing on each type of packaging, explains Michael Esnault, product marketing team leader for Markem-Imaje.

“Having to stock multiple types of inks introduces the potential for error, should an operator choose the wrong one when refilling a printer,” Esnault says. “That type of mistake is often not caught until after a production run is complete, causing product recalls or waste. A mark that initially looks perfect could be partially erased within 24 hours if the wrong ink was used.”

To address that issue, Markem-Imaje plans to introduce the new 9450 S CIJ printer for beverage marking at Pack Expo in September. The printer will launch with a full set of inks, including a quick drying, high-adhesion, high-contrast black ink that imprints universally on all substrates.

“The ability to use the same ink throughout a beverage manufacturing operation—on the can, plastic bottle



and glass bottle lines—makes it easier to order and stock additional ink, and prevents confusion about which ink to use with each line,” he says.

The printer also imprints other colors, including orange and white for better contrast on darker colored bottles, such as brown returnable glass used with beer. Housed in a stainless steel cabinet and IP-rated against dust and water, it is suitable for washdowns and humid environments. Additionally, its operating speed accommodates seasonal production cycles.

“It marks two lines of variable information on up to 120,000 units per hour, helping facilities keep up with greater production demands during warmer months,” adds Esnault.

Sara Pearson Specter is an editor at large with Modern and can be reached at sara@saraspecter.com.

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Move it better.

Lift truck priorities: Building the lift truck

Lift trucks used to be about brawn. The lift truck of the future will be about intelligence, automation and software. And, the future is closer than you think.

By **Bob Trebilcock**,
Executive Editor

Surely you remember the line from the Planet Fitness commercial: “I lift things up and put them down.” It’s spoken by a brawny weightlifter with all the finesse of a crowbar to a windshield.

You might think of your fleet of lift trucks in the same way: all brawn, no brains. They pick things up and put them down. What could be simpler, right?

Think again. Today’s lift trucks—and the lift truck technology on the drawing board—are anything but simple. Sure, lift trucks still pick things up and put them down, but they also collect a wealth of information about those lifts while tracking the performance of the operator and monitoring the mechanical and power systems. And, they are no longer machines unto themselves: The lift truck is now capable of communicating in real time with other warehouse and manufacturing systems.

As Brett Wood, chair of the Industrial Truck Association and president and CEO of Toyota Material Handling North America, puts it in this issue’s “60 Seconds With” interview (p. 82), “lift trucks are becoming more connected...and we expect to see more

automation and integrated solutions in the market.”

To get a sense of what the lift truck of the future might look like, *Modern* talked to eight industry players, including four lift truck suppliers, a battery manufacturer, a battery charger maker, an attachment manufacturer and a provider of fleet management solutions. We asked them all a simple question: What are your priorities for the next one to five years—what is the project you’re working on to take your product into the future? Here’s what we learned.

Yale: Telemetry, vision and GPS

In an era of expanded digital networks, smart connected devices and integrated systems, businesses are turning to data-driven intelligence to guide decisions. “If you don’t know about it, you can’t fix it,” says Mick McCormick, vice president of warehouse solutions for Yale Materials Handling Corp. “As information becomes increasingly important to fleet management, the availability of telemetry data is critical to improving efficiency and our customer’s bottom line.”

That is already apparent in telemetry programs that collect and transmit

of the future

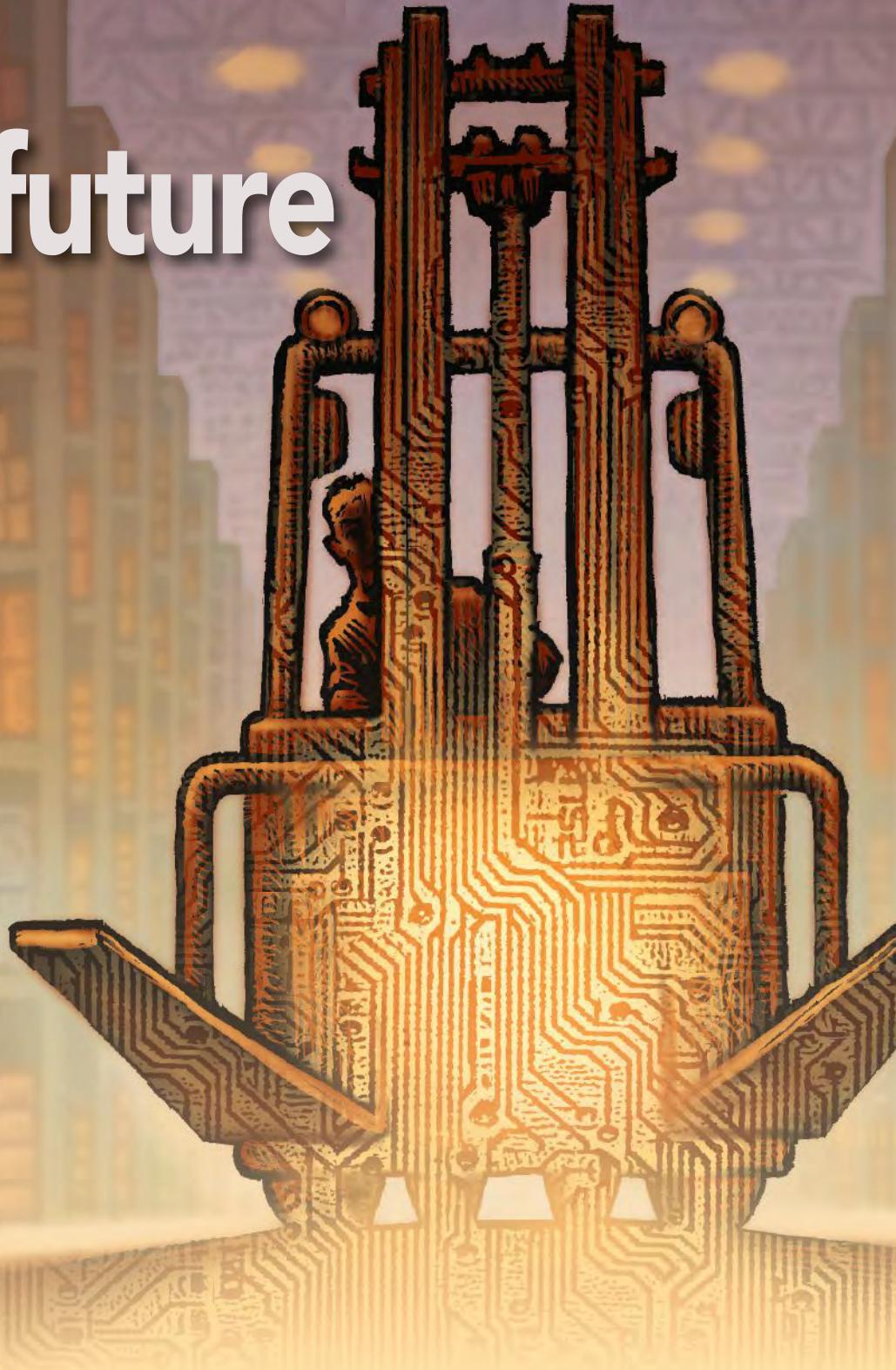
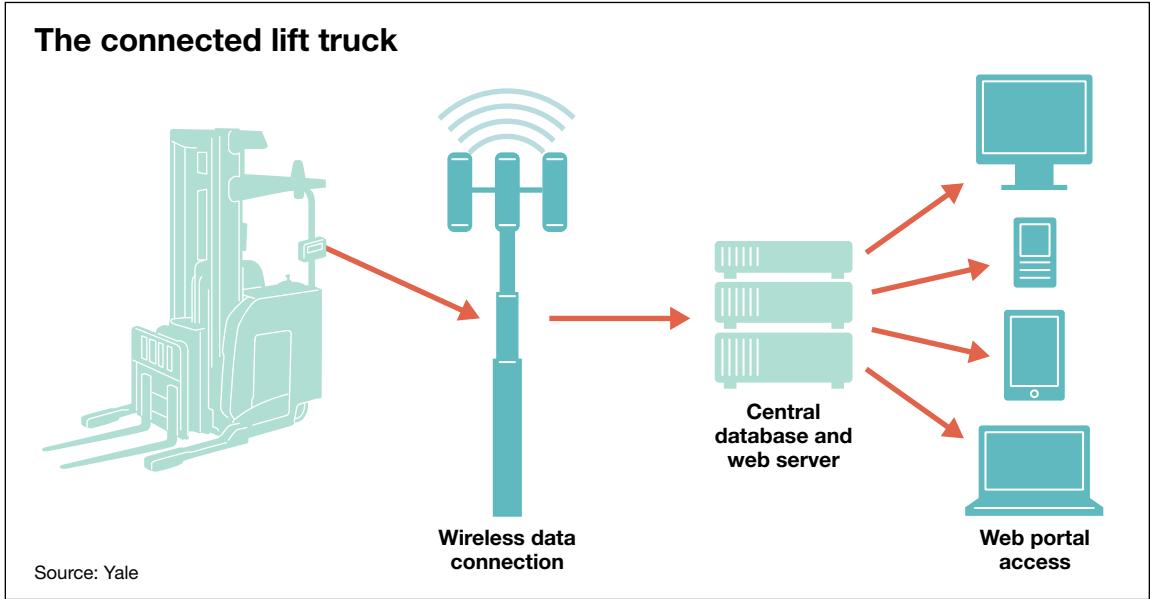
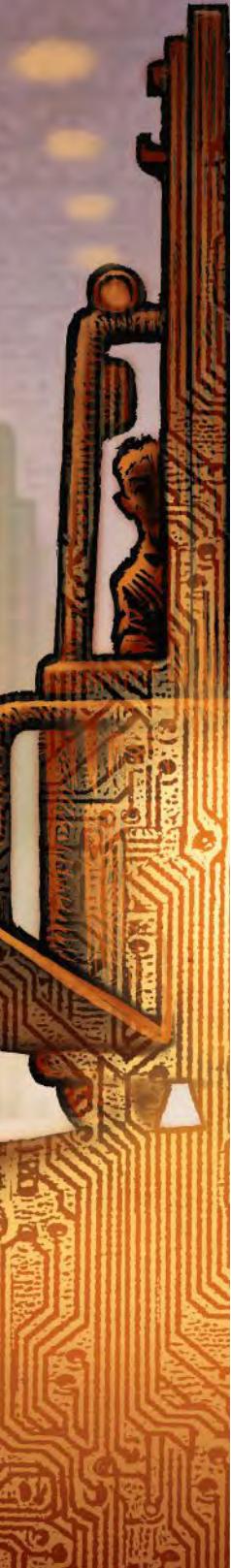


Illustration by Phil Foster



The connected lift truck communicates information about the performance of the truck and the operator to a central server. That information is available through the cloud on computers and mobile devices, like smart phones and tablets.

operational data, such as the Yale Vision wireless asset management system. While many facilities have yet to use fleet data to its fullest potential, improvements to its telemetry technology is among Yale's priorities for the future.

"Telematics offers the potential to build a more visible and quantifiable understanding of operations," McCormick says. "When applied to fleets of equipment, this data can help bring lower costs and competitive benefits to decrease

a customer's total cost of operations." By monitoring a variety of metrics including idle time, safety procedures and impacts, the use of Yale's telemetry system can help operations manage costs, protect assets and optimize productivity.

Yale also plans to add a satellite-based global positioning system (GPS) feature to its vision system. That feature will allow customers to know what their lift trucks are doing, where they have been and any faults that have occurred. This will allow them to uncover insights about high-risk collision areas and route inefficiency, providing actionable real-time data that enables informed, responsive management decisions.



Next generation attachments are smarter, safer and more productive while also reducing product damage.

Cascade: Smarter attachments
Automation extends beyond the truck itself. Attachment makers like Cascade are also incorporating more intelligence into the products that extend the capabilities of the lift truck. This translates into smarter, safer and more productive operations that simultaneously reduce product damage.

"The key is to enable lift truck and attachment systems to do more while minimizing decision making by the operator," says Martin Boyd, senior corporate marketing manager for Cascade. "That means more automation."

To get there, Cascade's R&D efforts are focused on what the attachment can do to gather more information about the products

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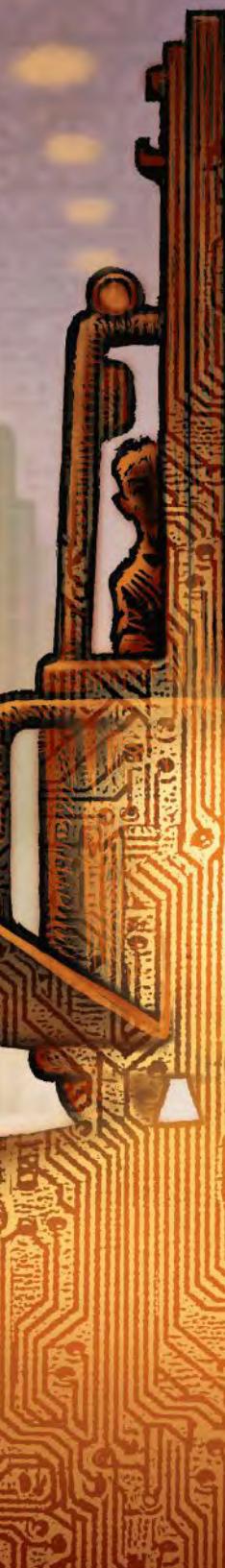
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being handled, such as the clamp force requirements and load configurations, and then communicate that information to the lift truck. “We’re working on improving the handshake between the attachment and the lift truck, where there have been some barriers in the past,” Boyd says. “Those efforts will be the key toward achieving a true smart attachment in the future.”

In practice, when an operator drives up to a load, the attachment would have the capability to automatically identify the characteristics of a product and adjust the clamp force to safely carry the load without damaging the product. “We have Touch Force Control (TFC) technology today that is not fully automated, but makes it easier and more intuitive for the operator to visually identify the product and set the clamp force within two or three screen touches,” Boyd says. “Down the road, the ultimate goal is for the equipment to do all of that automatically.”

**Jungheinrich warehouse products group:
Driving picking productivity**

We don’t always think of the lift truck when we think about ways to improve picking processes, but with an explosion of stock keeping units in full pallet and case picking operations, order selectors are visiting more picking locations than ever, says Perry Ardito, general manager of Jungheinrich’s warehouse products group for Mitsubishi Caterpillar Forklift America.

“In the past, an order selector would pick full pallets and bulk stack them for shipping,” Ardito says. “Now, there are more than 140 different SKUs just for bottled water that have to be visited. There’s a need to get the operator to all those pick locations as productively and efficiently as possible.”

Five years ago, Jungheinrich introduced their Warehouse Navigation system that semi-automates processes once handled by the operator, even with an operator still on board. For instance, when a warehouse management system (WMS) sends an order to the lift truck for picking or putaway, the on-board navigation system determines the best path for travel.

Once the operator enters the very narrow aisle rack system, the navigation system takes over the operation of the truck to pick the right pallet from the right location. “The driver doesn’t have to search for the pick location or level for the pallet,” Ardito explains. “But, he is still there in case an adjustment needs to be made.” The system feeds back information to the WMS for reporting and analysis. “We feel that as more people get a sense of the benefits that can be derived from semi-automated solution like this, they’ll look to full automation in the future to get further benefits,” he says.



Semi-automated trucks can determine the best path after the operator inputs a location.

EnerSys: The telematic battery

The growth of the electric lift truck market has been one of the biggest stories in the industry over the last five years. As a result, the battery that provides power during a shift is the most important asset on a lift truck.

“Once you’ve figured out the requirements for your lift truck, the efficiency of the power package has the most impact on your operations,” says Lynda Stevens, director of information systems for EnerSys. “Our priority has been to work in parallel with emerging technologies like lithium ion and fuel cells to develop battery management tools that prolong the life of the battery systems currently in use on most trucks.”

EnerSys is applying the same telematics used in fleet management to measure, monitor and report on the condition of batteries. “We can now look at how the battery is reacting to the work it has to do to understand whether a battery needs to be replaced because it is underperforming or needs to be tested because we see something is happening,” Stevens says. Telematics solutions will also provide feedback that enables customers to optimize their battery charging, changing and watering processes to extend the life of the battery.

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In the near future, the data being collected from the batteries will be streamed to a cloud-based portal where it is analyzed for dashboard reporting with very specific KPIs that affect profitability and performance. “A performance KPI can illustrate battery life and how it’s trending,” says Stevens. “If they want to look further into that, we can drill down into other areas for root causes, like how is the user discharging or watering the batteries.” Ultimately, that information can be used to track efficiency across multiple facilities and to create an action plan and benchmarks to improve battery performance.

Crown Equipment: Automated decision making

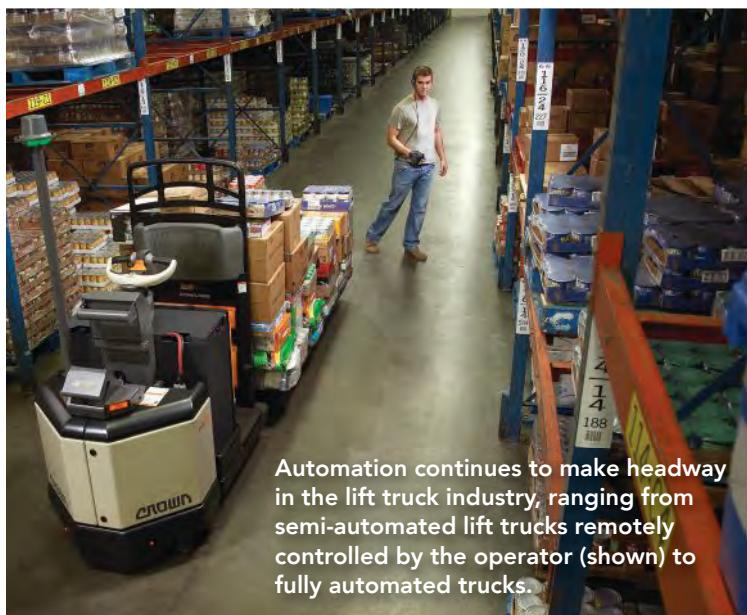
Distribution centers are inherently chaotic places. There is constant movement—not all of it predictable—as product moves from the receiving dock to the shipping dock. As those movements become more complex, a continuum of handling systems from manual, conventional materials handling to highly automated systems is created.

The lift truck is increasingly called upon to connect to those other systems to help bring order to the chaos. “What we’re all trying to do is make the lift truck more efficient and add to productivity,” says Jim Gaskell, director of global technology business development for Crown Equipment Corp. “There’s a limit to that before you tear the warehouse down and completely automate.”

InfoLink, Crown’s telematics offering, provides tools to track what the operator is doing with the lift truck, including compliance, impacts and productivity, and performance of the fleet. That allows managers to make better decisions to optimize operations and their fleets.

In the next iteration, these systems will deliver information to the operators as well, such as indicators for excessive speed or impacts so that operators can modify their behavior without a supervisor getting involved.

Similarly, Crown has developed semi-automated solutions, like a special glove that allows an order selector to remotely operate a pallet truck while walking up and down a pick zone. “If you’re going to full automation, you’re talking about the need to completely redesign a warehouse,” says Gaskell.



Automation continues to make headway in the lift truck industry, ranging from semi-automated lift trucks remotely controlled by the operator (shown) to fully automated trucks.

“But, there are still warehouses that can’t make the switch to full automation. Our role is to create solutions, like QuickPick, that push the lift truck as far as we can go before going to full automation.”

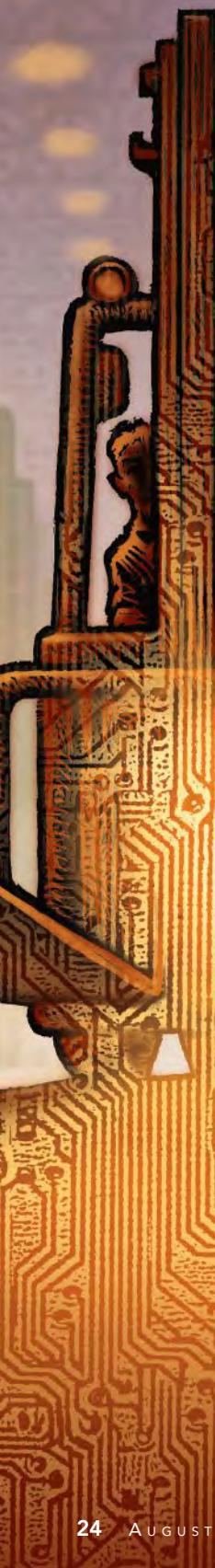
Delta-Q: Intelligent charging

The battery charger of the past was a dumb product. Basically, it had one function: To provide a one-way flow of energy from the grid to the battery. That’s not meant to be an insult any more than some computer workstations are referred to as dumb terminals. But, in the context to the smarter lift truck, it could be apropos.

The next generation of chargers is as intelligent as the trucks they’re charging. “As a charger manufacturer, we look at how we fit into the evolving picture of intelligence as a component of fleet management,” says Ken Fielding, president and CEO of Delta-Q Technologies. “We not only have to deliver a quality charge day in and day out, we also have to capture and track daily charge events so that a user can learn things from the charge history.”

The chargers Delta-Q is producing today are connected devices with storage and communication capabilities. Analytical capabilities are coming next. “We think that, over time, we’ll be able to provide analysis that will help fleet managers with predictive maintenance,” says Fielding. “For instance, if we’re looking at daily charges and can identify volt levels that aren’t being returned, we can pinpoint which cell might have an issue within the battery pack.”

And, like the lift truck that can make automatic adjustments based on information it is receiving from a warehouse management system, Fielding sees a charger that can deliver a controlled charge based on the knowledge it builds up over time.





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“We’re deploying a prototype this year with a two-way flow of information through the cloud,” he says. “We’ll analyze the information we receive from these deployed chargers and then make recommendations about changes to the charger. Initially, the analysis and recommendations will be done by people. But over time, we expect to develop algorithms to automate the process.”

**Toyota Material Handling:
Safety and productivity**

Lift truck customers are looking beyond the purchase price to realize the true cost of ownership, according to Scott Carlin, electric product planning and product support manager for Toyota Material Handling USA. They also need to see the value of their purchase. This means looking at safety features, environmental performance, energy efficiency, productivity levels, downtime, maintenance costs and more.

Carlin says that in the research and design process, safety remains a top priority for Toyota. “Ergonomics will continue to be emphasized as the

operator’s comfort plays a large role in productivity,” he says. “Concern for the well-being of employees and the company’s bottom line will result in forklifts being considered based on safety features and low operating costs.”

Power is also top of mind. Toyota is introducing a number of new electric trucks, pallet jacks and



Chargers of the past provided one-way flow of energy to the battery. Tomorrow’s chargers include data storage and communication capabilities for smarter charging and decision making.

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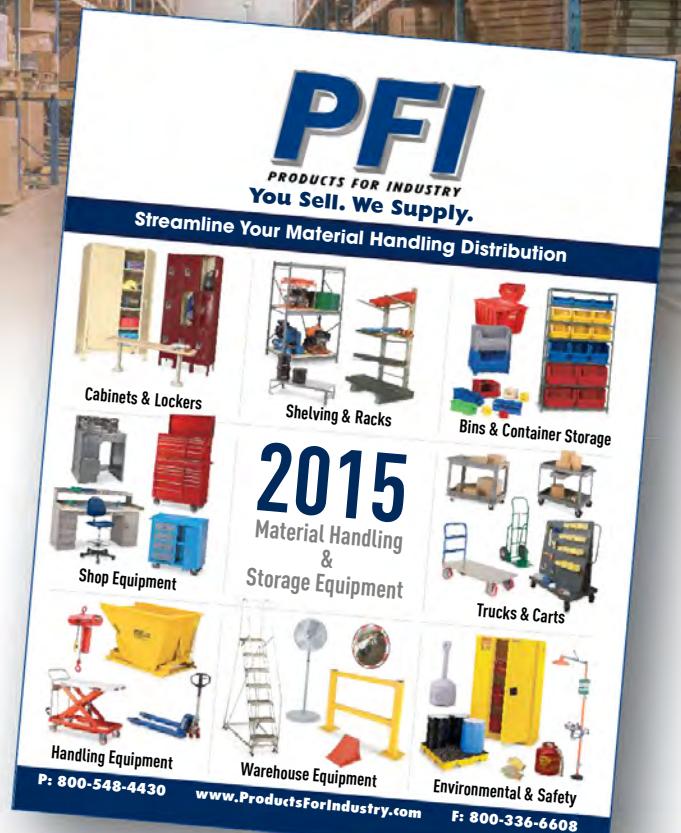
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walkies this year and continues to investigate new power technologies, such as lithium and fuel cell batteries. And, it launched its T-Matics solution to increase productivity and profitability, and create significant safety and operational benefits for forklift fleet owners.

“Toyota is known for its safety, quality and production systems,” Carlin says. “We are also forward thinking and customer focused. It is very important for Toyota to exceed our customers’ expectations. When our customers succeed, we succeed.”

Keytroller: Cloud-based accountability

Driver accountability has been an important component of fleet management systems for years, says Terry Wickman, president of Keytroller. “In the old days, anyone could jump on a forklift and drive it,” Wickman recalls. “From the time we introduced our first system 20 years ago, we made sure that only trained and authorized operators had access to the equipment. Over the years, that’s made a huge difference in the amount of product damage and end user experiences.”

More recently, Keytroller added Wi-Fi camera

technology to its solution that records up to 36 hours of continuous video and can be triggered by an event such as excessive speed, shutdown of the truck or an impact. “If a driver has an impact, the system will capture the 20 seconds before and after the event and can e-mail it to a supervisor, who can review what happened,” Wickman says. “It also allows an operator to capture images of an event, such as the condition of product that’s being loaded or a load that’s just arrived and is damaged.”

The next step in the evolution of fleet management is to integrate indoor GPS technology into a cloud-based Wi-Fi technology that will enable a user to follow the movement of a lift truck inside a building in real time and track its location to within 5 feet.

“The system will build on the Wi-Fi camera technology,” Wickman says. “An end user will be able to see when an operator picked up a load and where it was dropped off, all in real time.” And, because of the GPS technology, a manager will be able to do post operations analysis to see if operators are taking the most efficient routes. “That type of analysis can lead to productivity gains,” Wickman says. □

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Lift truck user survey: Readers report steady growth

Lift truck purchases remain steady in 2015 as companies look to upgrade or replace vehicles while also putting more into their training, technology and maintenance programs.

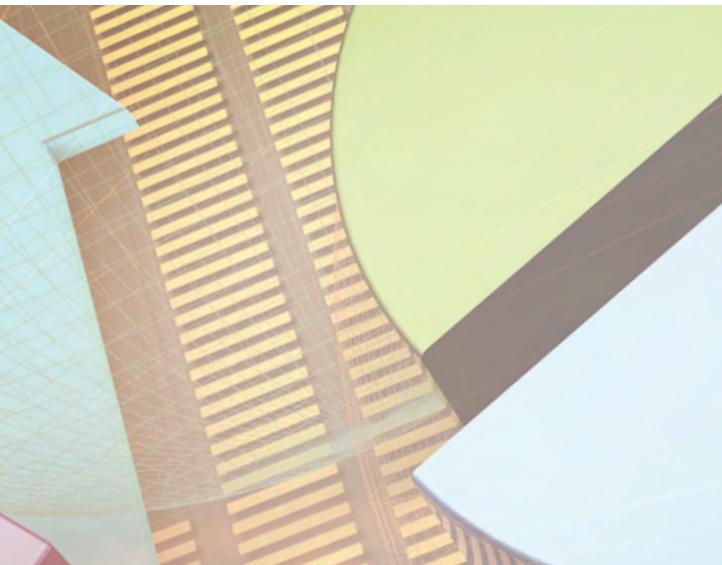
By **Bridget McCrea**,
Contributing Editor

As the vehicles that companies rely on to move product around in today's quick-response, omni-channel-focused warehouses and DCs, lift trucks play a critical role in the overall supply chain. With equipment buying trends fluctuating year over year and with uncertainty over the strength and longevity of the economic recovery keeping companies in "cautious but optimistic" mode, the lift truck sector continues to see steady increases in purchase commitments, lease transactions and the use of technology and metrics to work more efficiently.

Although spending on lift trucks is expected to be lower in 2015 (using 2014's survey results as a basis), the outlook among *Modern's* readers is largely positive across a number of different measures. For *Modern's* annual "Lift Truck Acquisition & Usage Study," conducted by Peerless Research Group (PRG) in June, we asked readers about the key aspects of lift truck procurement, operation and maintenance. In recent years, the survey has highlighted trends like the increasing dominance of electric lift trucks; the use of technology to track key performance, maintenance and metrics; leasing/buying trends; training and maintenance plans.

In 2015, the types of lift trucks in use at their facilities are:

- electric-powered rider trucks including counterbalanced,





sit-down and stand-up types (63%);

- electric-powered pallet trucks including walkies, riders, low and high lift, and reach types (50%); and
- electric-powered narrow-aisle trucks including order-pickers, side-loaders, turret trucks, stackers and reach trucks (41%).

Other types of lift trucks in use include IC-powered counterbalanced lift trucks, electric and IC-powered rider-type tow tractors, and rough terrain lift trucks.

By the numbers

In 2015, nearly 20% of companies plan to spend \$50,000 to \$99,999 on lift trucks while 52% expect to allocate less than \$50,000 to such purchases. An additional 14% will spend \$100,000 to \$249,999 and 8% will allocate \$250,000 to \$499,999. In 2014, 46% of companies spent less than \$50,000, while 14% planned to spend more than \$250,000.

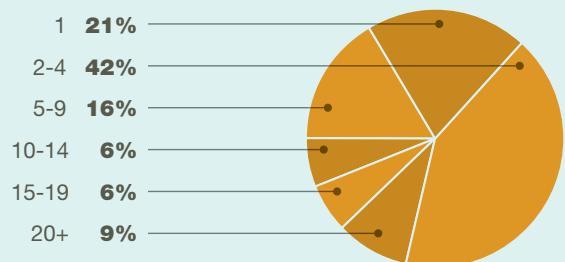
Currently, the number of lift trucks in use at the typical

Are you likely to buy or lease lift trucks within the next 12-24 months?



Source: Peerless Research Group (PRG)

About how many lift trucks do you plan to buy in the next 24 months?



Source: Peerless Research Group (PRG)

facility ranges from three to nine (30%), 25 to 49 (15%), and less than three (17%). The average number of lift trucks in use is 23 per facility. One year ago, the average respondent operated a fleet of 24 lift trucks and planned to acquire an additional seven units over the coming two years. The bulk of companies planned to buy between five and 19 units while 9% said they were going to purchase more than 20 and 68% planned to acquire four or fewer lift trucks.

When asked if they were likely to buy or lease lift trucks within the next 12 to 24 months, 63% of companies said yes and 37% said no. The former is down compared to 2014, when 70% of respondents indicated that they were likely to buy or lease within the coming 12 to 24 months. According to the survey, the highest percentage of respondents (41%) plan to purchase two to four lift trucks, while 20% expect to buy one lift truck, and 16% will acquire between five and nine vehicles.

When it comes to replacing their lift trucks, 24% of companies do so within eight years of purchasing the vehicles, while 32% wait 10 years or more to make this move. Another 15% replace their vehicles within 10 years or less. The majority of companies (61.5%) buy their lift trucks, while 17% lease and 21.5% use a combination of both acquisition strategies.

When asked why they purchase their lift trucks, 39% said it's a financial decision/for accounting purposes, 28% responded that they have low hour usage for their lift trucks, 28% said it's what they've always done, and 25% said they get better ROI.

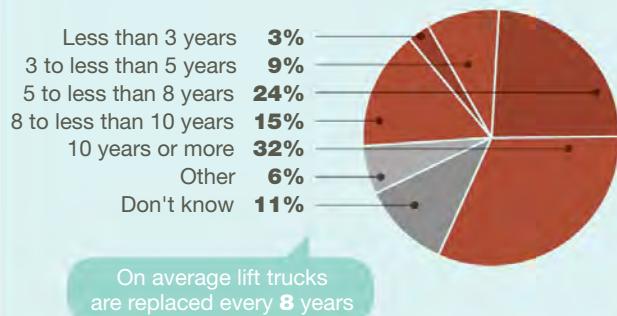
The practices used for lift truck rotation or disposal include reselling the lift trucks that are replaced (41%), the dealer taking older ones when the new lift trucks are delivered (39%), and companies holding onto/storing lift trucks that are replaced just in case they are needed at a later date (24%). Another 19.5% hold on to replaced lift trucks and then use them for parts.

Lease versus buy

According to the survey, 66% of companies do not operate a core fleet of lift trucks while another 34% have taken this route. When asked why they lease their lift trucks, 69% of companies cite flexibility (while reducing upfront investment) as their primary driver, followed by less maintenance costs/service being included in the lease (33%), corporate policy (28%), and the fact that it allows them to use their current technology (25%).

By comparison, in 2014 about 42% of respondents operated a "core" fleet of regularly used lift trucks in addition to a less-utilized reserve fleet. For those that buy their lift trucks outright, 30% said the dealer takes an older unit when a new one is dropped off. Another 20% said they held onto old lift trucks for parts and more than 50% said they would resell the

How often do you typically replace your lift truck(s)?



Source: Peerless Research Group (PRG)

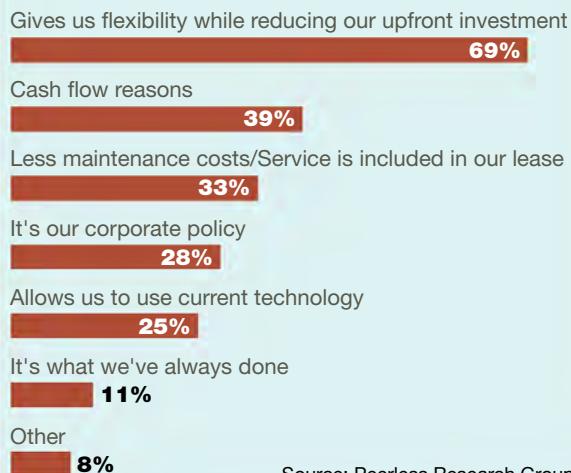
Do you operate a core fleet (a fleet you use regularly vs. a less-utilized reserve fleet) of lift trucks?



Source: Peerless Research Group (PRG)

Why do you lease your lift trucks?

(Choose all that apply)



Source: Peerless Research Group (PRG)

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replaced lift trucks. When it comes to buying and leasing lift trucks, 87% do so based on the situation (sometimes lease/sometimes buy), 27% said it's for cost/cash flow reasons, and 9% have a lease-to-buy program in place. These sentiments echo those of last year's respondents, 24% of which said they buy lift trucks for the affordability factor.

When asked to what extent the economy or market conditions factor into their lift truck acquisition strategies, nearly 60% of respondents said such issues have little or no impact on the process while 21% said their purchase decisions are impacted to some extent, and another 19% said their purchase decisions are impacted to a great extent.

In 2014, 60% of readers indicated that the economy had little or no impact on how they acquire lift trucks, whereas 19% said the economy influences their decisions to some extent and 21% said it impacted such decisions to a great extent.

Making purchase decisions

To purchase their lift trucks, 82% of respondents buy directly from dealers and 22% purchase direct from manufacturers. And when expanding their fleets, 40% of companies are "somewhat likely" to evaluate manufacturers whose lift trucks they are not currently using, while 25% responded they're "very likely" to do so.

When adding trucks, 17% of companies said they "aren't very likely" to evaluate current providers, while another 12% are "extremely likely" to do so. These results are similar to those of 2014, when 23% were "very unlikely" or "not at all likely" to consider new suppliers.

When asked whether they use an approved vendor list or "short list" when buying lift trucks, 48% do and 52% do not. Last year, 53% worked with a short list. Also, in assessing whether they've had cause to remove a vendor from their "short list" in the last two years, 78% said no and 22% said yes (compared to 28% who said yes in 2014).

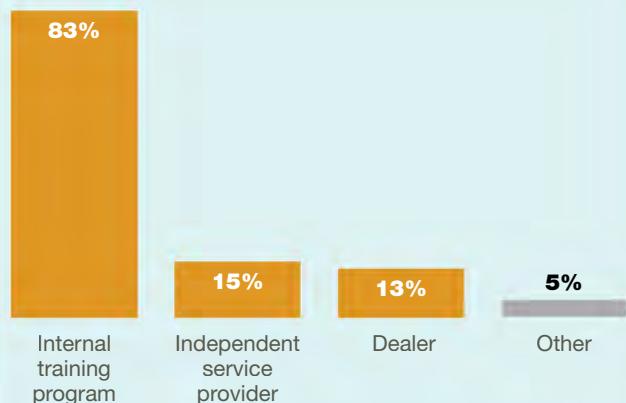
To service and maintain their lift trucks, 40% of companies outsource the task to their lift truck dealers, 37% rely on their in-house staff, and 22% outsource to maintenance/service contractors. After reviewing the types of lift truck parts that they're likely to purchase in the next 12 months, 72.5% of companies said they'll buy wheels and tires, 61% plan to acquire batteries and battery accessories, 47% expect to purchase tune-up parts, 43% plan to buy brake components, and 42% plan to acquire chemicals, lubricants and oil.

Training and software

To train their lift truck operators, 83% of readers rely on internal training programs while 15% turn to independent service providers, and 13% work with dealers. When asked whether they've

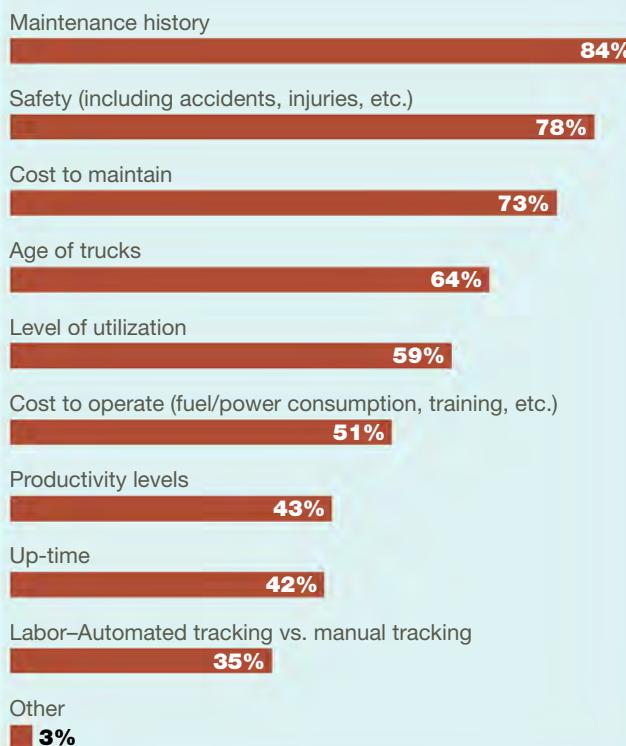
adopted—or, if they're planning to implement—technology to help with fleet management, 57% of companies responded no and 43% responded yes. The latter number ticked up slightly

How are you training your lift truck operators?



Source: Peerless Research Group (PRG)

What are you tracking?



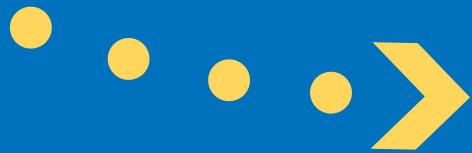
Source: Peerless Research Group (PRG)

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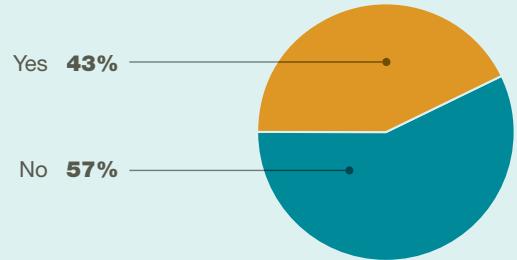
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over 2014, when just 41% said they had adopted, or plan to adopt, such technology.

Survey respondents have mixed feelings about their fleet management software implementations, with 39.5% calling the process “somewhat successful” and 28% saying it was “very successful.” Another 16% called the implementations “extremely successful” and 12% don’t feel that their implementations were successful at all.

When tracking forklift data for maintenance, repair and replacement, 84% of companies (down from 86% in 2014) look at maintenance history, 78% (up from 65% last year) assess safety (including accidents, injuries, etc.), 73% (down from 75% last year) look at cost to maintain the equipment, and 64% consider truck age into the equation. □

Have you adopted or are you planning to implement technology to help you manage your fleet?



Source: Peerless Research Group (PRG)

About the survey

Peerless Research Group (PRG) received a total of 205 qualified responses to this year’s survey. A qualified response was defined as an individual who was personally involved in the evaluation, selection, and/or procurement of lift trucks for their facility. Among the companies surveyed, 40.5% were manufacturers, 34% were DCs, and 17% were in warehousing. Primary products or services included

food, beverage and tobacco (12%), fabricated metals (7%), industrial machinery (6.5%), and chemicals/pharmaceuticals (5%). Most of the companies employed less than 50 people (28%), while 19% had 50 to 99 workers, and 18% employed between 100 and 249 people. Their annual revenues ranged from less than \$5 million (17.6%) to \$5 billion or more (8.5%).

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TOP

20

lift truck suppliers

Currency conversions obscure some sizable revenue gains among foreign companies, but overall growth in unit sales matches 2013's strong performance.

By Josh Bond,
Senior Editor

Don't let the numbers fool you: 2014 was a good year for the lift truck industry. The combined value of *Modern's* list of the Top 20 lift truck suppliers is down 3.5% this year, but nearly all reporting companies noted unfavorable currency conversions that in many cases turned gains into losses. In actuality, those companies often saw double-digit growth in unit sales. According to the 2014 World Industrial Truck Statistics (WITS) figures, global orders and shipments increased by almost 8%, a rate that has

steadily grown in recent years from the low single digits.

Brett Wood, chairman of the Industrial Truck Association (ITA) and president and CEO of Toyota Material Handling North America, says the global market continues to be relatively robust, with 1 million unit sales in 2014. "This is in part a reflection of the strength of certain economies, especially here in the United States," he says. "Lift truck sales will always coincide with general economic trends, and it is encouraging to see the steady recovery since the recession period in 2009."

Top 20 industrial lift truck suppliers

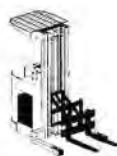
2014 Rank	Company	2013 Rank	2013 Revenue (in millions)	2014 Revenue* (in millions)	North American brands
1	Toyota Industries Corporation	1	\$7,706	\$7,712	Toyota, Raymond
2	KION Group	2	\$6,111	\$5,314	Linde
3	Jungheinrich AG	3	\$3,158	\$3,033	Sold in NA by MCFA
4	Hyster-Yale Materials Handling, Inc.	4	\$2,666	\$2,767	Hyster, Yale
5	Crown Equipment Corp.	5	\$2,400	\$2,500	Crown, Hamech
6	Mitsubishi Nichiyu Forklift Co., Ltd.	6	\$1,956	\$2,159	Mitsubishi, CAT, Jungheinrich (NA only)
7	UniCarriers Americas Corporation	7	\$1,689	\$1,533	Nissan, TCM, Barrett, Atlet, UniCarriers
8	Anhui Forklift Truck Group Corp.	8	\$1,089	\$1,123	Heli
9	Hangcha Group Co., Ltd.	9	\$998	\$971	HC, Hangcha
10	Komatsu Ltd.	10	\$900	\$900*	Komatsu
11	Clark Material Handling International, Inc.	11	\$708	\$741	Clark
12	Doosan Industrial Vehicle	12	\$707	\$683	Doosan
13	Hyundai Heavy Industries	13	\$477	\$477*	Hyundai
14	Lonking Forklift Co., Ltd.	14	\$198	\$190	Lonking
14	Combilift Ltd.	16	\$170	\$190	Combilift
16	Tailift	15	\$181	\$181*	Tailift, World-Lift
17	Hubtex	17	\$108	\$108*	Hubtex
18	Hytsu	18	\$82	\$82*	Hytsu
19	Godrej & Boyce Manufacturing	19	\$76	\$76*	Not available in North America
20	Paletrons Equipment	20	\$69	\$69*	Paletrons

* 2014 revenues not available by press time. Figure based on foreign exchanges rates as of 12/31/14.

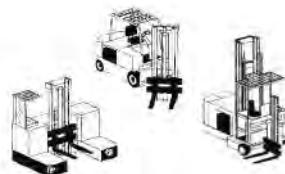
Class 2, Lift Code - 2
Order Picker



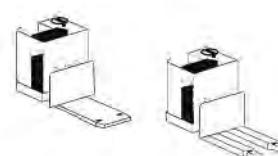
Class 2, Lift Code - 3
Reach Type Outrigger



Class 2, Lift Code - 4
Side Loaders, Turret Trucks, Swing Mast and Convertible Turret/Stock Pickers



Class 2, Lift Code - 6
Low Lift Pallet and Platform (Rider)



Class 3, Lift Code - 1
Low Lift Platform





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Wood also predicts increased consolidation, whether through acquisitions, mergers or partnerships. On the heels of this statement, *Modern* learned that Mitsubishi Heavy Industries and Mitsubishi Nichiyu Forklift have jointly acquired UniCarriers, which will result in the companies holding respective stakes in UniCarriers of 65% and 35%.

Following a series of big mergers in recent years (TCM/Nissan became UniCarriers, Mitsubishi Heavy Industries and Nippon Yusoki became Mitsubishi Nichiyu), this year's rankings remain relatively unchanged. However, lift truck manufacturers continue to broaden product offerings, and a series of acquisitions illustrate a desire to further expand capabilities. Examples include KION's acquisition of the handling automation division of Egemin Group and Hyster-Yale's acquisition of Nuvera, a fuel cell specialist.

There is more evidence suggesting a surge of innovation the lift truck space. In the ITA's "2014 Business Trends" survey, more than two thirds of members noted that fleet size in general is getting smaller—despite strong sales. The survey indicated the top drivers of fleet reduction include improved truck productivity, better usage of fleet data and warehouse automation.

Aside from the strength of the dollar, a lot could change in the next year. And although the numbers might suggest otherwise, the lift truck industry is flourishing even as it rapidly changes shape.

The Top 10

Toyota Industries Corp. (TICO) is once again No. 1 on our list, reporting virtually identical revenues that belie a 14% increase in the company's materials handling segment and a reported 11.6% increase in unit sales.

In September of 2014, TICO, parent company of Toyota Material Handling USA, announced it had acquired the forklift business of 15th-place Tailift. Operating mainly in Taiwan and China, Tailift manufactures electric and internal combustion forklifts as well as industrial machine tools. Established in 1973, the company employs 1,000 workers, and Tailift's forklift department has a production capacity of 28,000 forklifts per year.

Second-place finisher KION Group reported revenues 13% below those of last year, creating a more than \$2 billion gap between the list's leaders. In 2011, Toyota's annual revenues were 5% ahead of KION.

Citing growth in western Europe and China, KION reported early 2015 results, which showed Q1 rev-

Worldwide lift truck market

Region	Orders			Shipments		
	2014	2013	% Increase	2014	2013	% Increase
Europe (53 countries/territories)	344,533	315,455	9.22%	338,378	316,534	6.9%
Americas (55 countries/territories)	267,716	253,096	5.78%	255,549	238,455	7.17%
Asia (43 countries/territories)	438,327	401,252	9.24%	432,098	394,054	9.65%
Africa (56 countries/territories)	19,346	18,960	2.04%	18,480	18,903	-2.24%
Oceania (29 countries/territories)	18,444	21,014	-12.23%	18,524	20,835	-11.09%
Total (236 countries/territories)	1,088,366	1,009,777	7.78%	1,063,029	988,781	7.51%

Source: These figures are provided by the World Industrial Truck Statistics (WITS) organization.

ITA's lift truck classifications

Class 1, Lift Code - 1

Counterbalanced Rider Type, Stand Up



Class 1, Lift Code - 4

Three Wheel Electric Trucks, Sit Down



Class 1, Lift Code - 5

Counterbalanced Rider, Cushion Tires, Sit Down



Class 1, Lift Code - 6

Counterbalanced Rider, Pneumatic or Either Type Tire, Sit Down



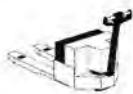
Class 2, Lift Code - 1

High Lift Straddle



ITA class of trucks manufactured					
World headquarters	Class 1	Class 2	Class 3	Class 4	Class 5
Aichi, Japan	x	x	x	x	x
Wiesbaden, Germany	x	x	x	x	x
Hamburg, Germany	x	x	x		x
Cleveland, Ohio	x	x	x	x	x
New Bremen, Ohio	x	x	x	x	x
Kyoto, Japan	x	x	x	x	x
Tokyo, Japan	x	x	x	x	x
Hefei, Anhui, China	x	x	x	x	x
Hangzhou, China	x	x	x	x	x
Tokyo, Japan	x	x	x	x	x
Seoul, South Korea	x	x	x	x	x
Seoul, South Korea	x	x	x	x	x
Ulsan, South Korea	x	x		x	x
Shanghai, China	x	x		x	x
Monaghan, Ireland		x	x		x
Taichung, Taiwan	x		x	x	x
Fulda, Germany	x	x	x	x	x
Shanghai, China	x	x	x	x	x
Mumbai, India	x	x	x	x	x
Cravinhos, Brazil		x	x		

Class 3, Lift Code - 2
Low Lift Walkie Pallet



Class 3, Lift Code - 3
Tractors (Draw Bar Pull Under 999 lbs.)



Class 3, Lift Code - 4
Low Lift Walkie/Center Control



Class 3, Lift Code - 5
Reach Type Outrigger



Class 3, Lift Code - 6
High Lift Straddle



venues 7% above the same period in 2014 and order intake 13.4% higher than in Q4 2014.

“Our strong position in western Europe and China, combined with our successful multi-brand strategy, enabled us to maintain the momentum of our record 2014 results as we entered the first quarter of 2015,” said Gordon Riske, SEO of KION Group. “The marked rise in revenue and order intake reflects the strength of our position in the new truck and service businesses, in emerging and developed markets.”

KION also highlighted its recent acquisition of the handling automation division of automation specialist Egemin Group. The division, to be named Egemin Automation, offers automated warehouse systems, automatic guided vehicles and in-floor chain conveyor solutions.

The rest of the top 10 held their rankings from last year, with No. 3 Jungheinrich reporting 9.1% year-on-year revenue growth in euro, which corresponds to a 4% decrease year-on-year in U.S. dollars. The company reported 15% growth in the number of units produced in 2014 and 9% growth in order intake.

A statement from 4th-place Hyster-Yale Materials

Handling pointed to significant increases in “an unexpectedly strong North America market, partially offset by a decrease in European shipments, primarily in Eastern Europe.” Hyster-Yale’s operating company, NACCO Materials Handling Group (NMHG), also acquired Nuvera Fuel Cells in late 2014. Massachusetts-based Nuvera is focused on fuel cell stacks, related systems, on-site hydrogen production and dispensing systems.

According to a release, NMHG intends to commercialize Nuvera’s research and technology through the rapid integration of fuel cell technology across large parts of the company’s lift truck product range. It expects to be able to offer integrated, factory-fitted fuel-cell solutions, associated hydrogen generation and delivery capability, and aftermarket solutions designed to fit most electric-powered lift truck brands.

In sixth place, Mitsubishi Nichiyu grew 10%, which a statement from the company explained was a result of accounting changes. Some subsidiaries adjusted their fiscal calendar to match the parent company, which added three months of revenue for the first year of the calendar change adoption.

In its third year on our list, No. 7 UniCarriers (the

ITA’s lift truck classes

The Industrial Truck Association (ITA, www.indtrk.org) has defined seven classes of lift trucks, or forklifts, which are defined by the type of engine, work environment, operator position and equipment characteristics.

Forklift classes include:

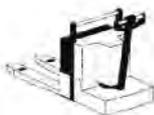
- **Class 1:** electric motor trucks with cushion or pneumatic tires
- **Class 2:** electric motor narrow aisle trucks with solid tires
- **Class 3:** electric hand trucks or hand/rider trucks with solid tires
- **Class 4:** internal combustion engine sit down rider forklifts with cushion tires, suitable for indoor use on hard surfaces
- **Class 5:** internal combustion engine sit down rider forklifts with pneumatic tires, suitable for outdoor use on rough surfaces
- **Class 6:** electric or internal combustion engine powered, rider units with the ability to tow (rather than lift) at least 1,000 pounds
- **Class 7:** almost exclusively powered by diesel engines with pneumatic tires, these units are suitable for rough terrain and used outdoors.

Since mostly classes 1 through 5 are used in materials handling applications inside the four walls, *Modern* has only specified those on our table.

Class 3, Lift Code - 7
High Lift Counterbalanced



Class 3, Lift Code - 8
Low Lift Walkie/Rider Pallet



Class 4, Lift Code - 3
Fork, Counterbalanced (Cushion Tire)



Class 5, Lift Code - 4
Fork, Counterbalanced (Pneumatic Tire)



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result of a 2012 merger between Nissan Forklift and TCM) reported revenues of \$1.53 billion, a 9% decrease from 2013.

Following unit-digit increases in revenues last year, No. 8 Anhui Forklift, the Chinese makers of Heli forklifts, reported revenues of \$1.123 billion, a 3% increase. Ninth-place Hangcha Group also saw revenues hold steady at \$971 million, a year after it grew by \$150 million.

Rounding out the Top 10 for the second consecutive year is Komatsu. Although it was unable to confirm figures by press time, a company representative said 2014 revenues would be comparable to the \$900 million it reported in 2013.

Notable performances since 2012

Factors such as currency conversion rates and restructurings can influence a comparison of revenues over the past few years. That said, in its six consecutive years at the top of our list, Toyota's revenues have grown by 68%, and 12% since 2012. Holding firm to second place over the same period, KION's 2014 revenues are 15% lower than in 2012, following strong performances in 2012 and 2013.

Tied for No. 14, Combilift has posted double-digit percentage increases for each of the last three years, growing 32% in that time. The company has effectively doubled revenues since 2009. The next highest growth rate over the past three years goes to No. 14 Lonking, which is up 21% since 2012. Lonking representatives report that the slightly lower 2014 revenues contradict a 19% year-over-year growth in revenues and a 22% increase in the number of units shipped, for a total of 22,110.

Hyster-Yale, Crown, Anhui and Hangcha also achieved double-digit growth since 2012.

Electric vs. internal combustion

According to Wood, the worldwide market for Class 1 electric counterbalanced trucks and Class 3 electric hand trucks continue to enjoy double-digit growth. The industry continues to see growth in the overall electric lift truck category, he says, due to regulations related to emissions, sustainability initiatives and technological advancements in electric lift truck components including batteries.

Globally, the more mature markets have embraced electric vehicles faster than the emerging markets, Wood suggests. For example, the Asian market is made up of only 35% electric lift trucks, while the North American market is 60% electric and European market is 80% electric. The overall worldwide market is 45% electric. "So, even with the trend toward more electric, 55% of the

global customers still prefer engine-powered lift trucks, especially in emerging markets that have more outdoor applications," Wood says. "The industry remains committed to sustainability—not only through innovative products but also throughout manufacturers' operations with initiatives like zero land-fill waste programs. Sustainability is the new normal in all aspects of lift truck manufacturing."

Growth by region

WITS tracks quarterly and monthly statistics on lift truck sales, and is compiled by six trade groups based in North America, Brazil, Japan, Korea, Europe and China. According to the 2014 WITS figures, global orders increased by almost 8%, up slightly from last year and representing more than 1 million units. In 2012, shipments were flat and in 2013 they increased 5%. In 2014, more than 1 million units were shipped, a 7.5% increase.

Additional highlights of the WITS figures include:

- Following a nearly flat year, orders and shipments to Europe spiked in 2014, up 9% and 7% respectively.
- The Americas, which last year kept pace with double-digit growth in Asia, shipped a quarter of a million units, a 7% increase.
- According to figures from the ITA, 184,979 units of Class 1 through 5 lift trucks were U.S. factory shipments, as compared to 172,073 units in 2013, an increase of 7.5%.
- Asia hovers around 10% growth for the second year in a row after volume decreases of a few percentage points in 2012. The region still accounts for 40% of global shipments.
- In Oceania (Australia and nearby islands), shipments and orders continued falling from 2012 highs, reporting more than 20% decreases in orders and shipments over the span of two years. □

How the suppliers are ranked

To be eligible for *Modern's* annual Top 20 lift truck suppliers ranking, companies must manufacture and sell lift trucks in at least one of the Industrial Truck Association's seven truck classes: electric motor rider; electric motor hand trucks; internal combustion engine; pneumatic tire; electric and internal combustion engine tow tractors; and rough terrain lift trucks.

Rankings are based on worldwide revenue from powered industrial trucks during each company's most recent fiscal year. Revenue figures submitted in foreign currency are calculated using the Dec. 31, 2014 exchange rate.

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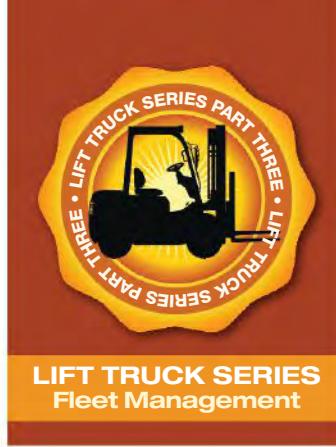
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10:00 AM	Welcome
10:30 AM	OPENING KEYNOTE: Economic Forecast for the Supply Chain Brian Beaulieu , ITR Economics
11:30 AM	Networking Lunch Sponsored by: 
1:00 PM	What Will It Take for Purchasing to Get a 'Seat at the Table'? Rob Handfield , Supply Chain Resource Cooperative, Poole College of Management, NC State University
2:00 PM	Reshoring and Rebalancing Global Supply Chains Rosemary Coates , Reshoring Institute
3:00 PM	Break
3:30 PM	Supply Chain Innovation Scott Sopher , Deloitte Consulting LLP
4:30 PM	Transportation Logistics: Freight Outlook Kevin Zweier , Chainalytics
5:30 PM	Research presented by SCMR and Platinum Sponsor: 
6:00 PM	Networking Reception

Tuesday, November 3	
8:30 AM	Supply Chain 2020: When Uncertainty is a Certain Factor Lawrence Lapide , MIT Center for Transportation and Logistics (CTL)
9:30 AM	Supply Chain Priorities Roundtable John Caltagirone , Loyola University Chicago
10:30 AM	Break
11:00 AM	Supply Chain Sustainability: Future Challenges and Opportunities John Bell , University of Tennessee
12:00 PM	Lunch: Supply Chain Reader Research Presentation Bob Trebilcock , Supply Chain Management Review Sponsored by: 
1:00 PM	CLOSING KEYNOTE: Culture is the Future of Supply Chain Steven Melnyk , Michigan State University

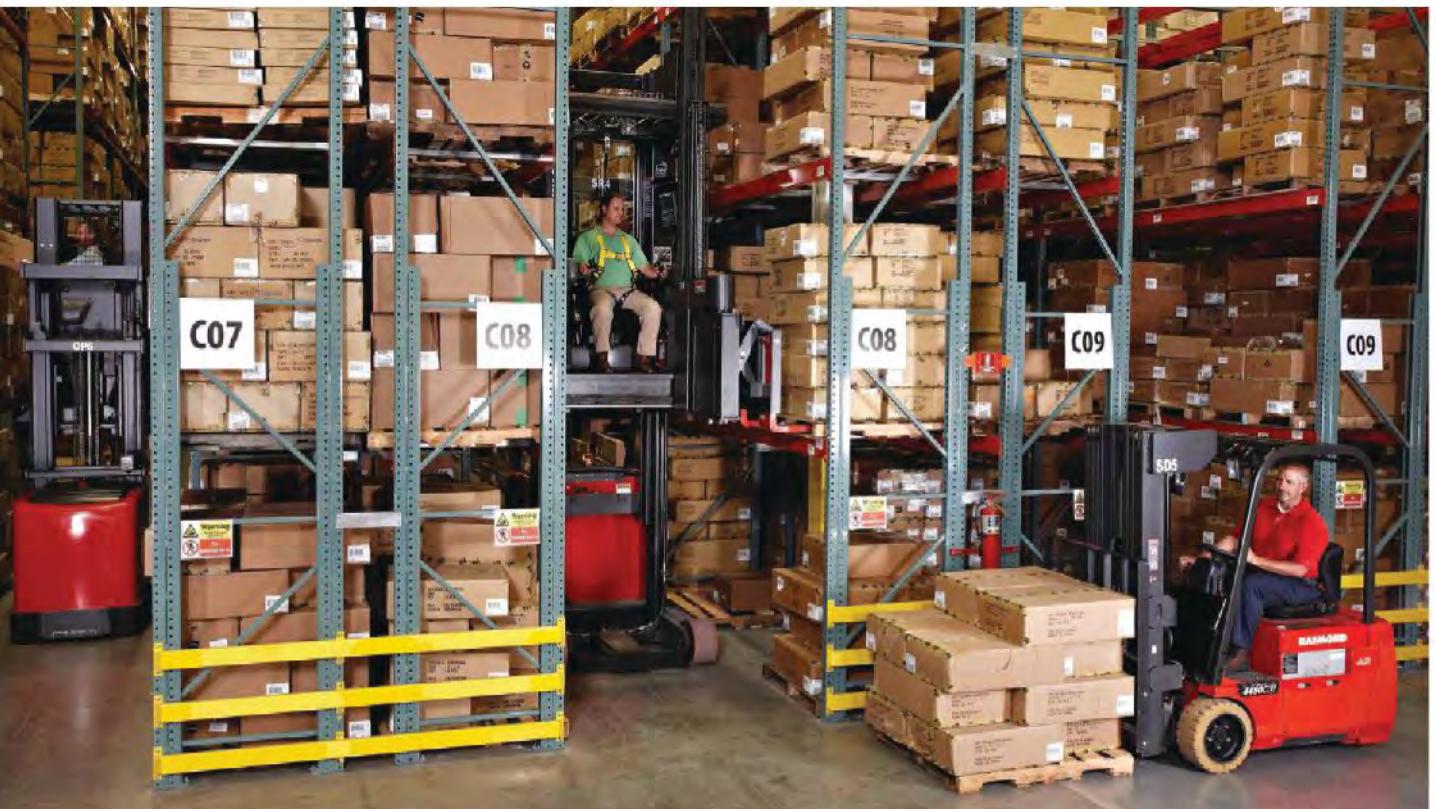
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Fleet-footed operations

Having sprouted from mere lift truck maintenance, fleet management is now budding into a powerful and integral part of labor management.



Josh Bond, Senior Editor

With the benefit of hindsight, fleet management might have been named differently at the outset. Perhaps “equipment productivity management,” or “employee visibility and accountability management.” The state of the practice has evolved past mere hour meter readings, impact sensors and even sophisticated, real-time telematics. The purview of fleet management now encompasses everything the lift truck touches in an organization—which is just about everything.

“If you ask 10 people, you will get 10 definitions of what fleet management means,” says Pat DeSutter, vice president of fleet service and aftermarket for Yale Materials Handling Corp. “In general, it’s becoming more about business solutions, not just fleet attributes. ‘Fleet management,’ in the sense we traditionally talked about it, is now woven into the entire fabric of an organization.”

At the same time, software and intelligent solutions elsewhere in a facility collaborate with fleet management solutions to improve the efficiency of each system. As lift truck users study connections between the costs and performance of equipment, technicians and operators, they work to unify disparate fleet management systems, a theme seen throughout the materials handling industry.

“Each of those fleet management pieces doesn’t have to be world class,” says Torrence Smith, senior manager of fleet management services for Mitsubishi Caterpillar Forklift America. “But if you glue them all together, it will become world class because you’ll be doing something almost nobody else is.”

We still have a long way to go before operations, operators, purchasing, technicians, dealers, service providers, third-party fleet managers and solution providers work in perfect harmony. The industry is still settling into its increasingly broad adoption of basic fleet management tools and telemetry devices, some of which now cost a quarter of what they did 10 years ago. Once these solutions help right-size a fleet and reduce maintenance costs, the next big cost center is labor.

There’s a hole in the labor cost bucket

It’s widely accepted that the operator makes up about 70% of the total cost of ownership of any lift truck. It is less obvious that common, well-intentioned practices can inflate those costs dramatically. For example, if six people and lift trucks are allocated to shipping, at any given time only four of them might be needed. Although the two “floaters” might be quick to respond when needed, the wasted time can add up fast.

“Lift truck operators will do what they are told, so if they are assigned to shipping, they will clock in and try to get pallets onto outbound trucks,” says Ken Ehrman, founder and president of I.D. Systems. “Meanwhile, if there’s a panic



on the other side of the facility, that operator might have no knowledge or ability to react.”

If tracking a lift truck, a company might measure 50% utilization, Ehrman says, but they might deem this acceptable because of the nature of the operator’s job. “If you then learn that a similar facility is at 30% utilization and another is at 70%, why would you assume there’s no opportunity to improve on your 50%?”

Systems that enable dynamic labor reassignment are great, but even simple directives can have an immediate impact. “If a lift truck operator doesn’t have materials to move, what do we expect him or her to do?” asks Mike McKean, fleet management sales and marketing manager for Toyota Material Handling USA. It could be as simple as “grab a broom,” McKean says, but expectations should be set and supported. In fact, this is most critical when introducing new fleet man-



When supported by integrated hardware and software, fleet management becomes less a discrete discipline and more a team effort.

agement technologies.

“For operators, it could appear that someone decided to deploy an access control solution and one day it just showed up on a new truck,” McKean says. “The only things they’re told is they

need a key fob to get on or off, and they can do checklists on the same device. If the leadership perspective is focused on what’s in it for the company, the operator can be left wondering ‘what’s in it for me?’”

Whether cross-trained or not, ideally you direct an operator to the next task as quickly as possible. This direction is often monitored with engineered labor standards based on time studies of tasks. However, given the pace of change in warehousing and DC environments, Ehrman says these standards are often off by 60%. Before relying on a warehouse management system (WMS) or labor management system (LMS) to orchestrate activity, it is essential those systems have accurate data.

“There is a lot of low-hanging fruit,” DeSutter says, “and the advancement

of telematics will be rooted in labor management. I would suggest the value of these systems will lead the industry toward embedding that functionality standard in lift trucks, rather than offering them as an option.”

Hard data and soft standards

When supported by integrated hardware and software, fleet management becomes less a discrete discipline and more a team effort. John Rosenberger, manager of iWarehouse Gateway and global telematics for The Raymond Corp., notes some blurring of what he calls “application scope.”

“Traditionally, as recently as 2012 or so, fleet management meant telematics reporting,” he says. “With the growth of WMS and LMS, we now see a lot of gray areas where some of the higher-level applications are taking over those telematics functions.”

Combining and coordinating multiple systems can seem overwhelming, so customers have been pushing back on suppliers’ attempts to create proprietary solutions. Steven LaFevers,

Distributor improves productivity in cold storage facility with new fleet

Byrne Dairy, a producer and distributor of milk, cream, ice cream and other dairy products, sought efficiencies in its cold storage DC in central New York. To fine-tune materials handling processes, the company focused on product putaways and order picking and looked to improve the pallet racking systems and lift truck fleet.

Byrne Dairy works with more than 250 local family farms an average of 35 miles from its original fluid milk plant in Syracuse. This 100,000-square-foot facility receives and processes 50 million pounds of milk each month and operates 24/7.

Productivity at the facility was constrained by the layout of the two inventory rooms, which housed pallet rack. The rooms were designed with narrow aisles, and wire-guided turret trucks required most of the aisle space. This prevented multiple lift trucks from operating at once and caused bottlenecks.

Mike Relyea, director of warehouse operations at the facility, says the impact of product travel time was a concern throughout the facility’s existing 9,000 pallet positions and 16 loading docks. Lift trucks needed to operate in multiple environments, including cold storage areas maintained at 35°F.

The new fleet (The Raymond Corp., raymondcorp.com)

includes one end-rider pallet truck for floor-level, primary picking to process daily orders and three reach trucks for moving pallets from the dock into the racking reserves, and for moving reserves down to primary locations on the floor level. A new three-deep, push-back rack (Speedrack, speedrack.net) was selected to enable lift truck operators to quickly slot and house products vertically.

During the four-week installation of the racking systems, the facility remained in operation. Each reach truck is equipped with an onboard camera and fork-tip laser guide. When operators raise lift truck forks above 12 feet, a laser line displays on the pallet to show the fork position. The reach trucks use AC motors for both lift and drive, and are capable of moving more pallets per charge in cold environments.

Because of the optimized layout in two inventory rooms, multiple lift trucks can now maneuver in the aisles at once, creating a 50% increase in efficiency for product putaway and 30% increase in productivity for order picking. The project also reduced the average number of handling touches.

“The gains in efficiency have been the most important result, but feedback from the folks on the floor also has been extremely positive,” Relyea says. We have exceeded the results we were striving for.”



Once fleet management tools help right-size a fleet and reduce maintenance costs, the next big cost center is labor.

telematics solutions manager for Hyster, says customers do not want enclosed ecosystems of data.

“They prefer one password with all KPIs visible in as few avenues as possible,” he says. “They want productivity measures from the truck tied to the WMS, tracking load movement and operator activity. I think the next evolution will be capturing not only the cost and operator behavior, but every inch of physical movement on that truck.”

For example, consider the connection between a fleet, labor standards and slotting. If a product’s position is rearranged so it’s 10 seconds further from a picker, the traditional approach would require an engineer to remeasure that standard, Rosenberger says. A unified system can recognize that the task used to take 25 seconds, but the last six runs took 35 seconds after it was re-slotted. It can then update accordingly or, at least, send an alert.

“Telematics, LMS, WMS, what have you, won’t get rid of stop watches and engineered labor standards overnight, any more than all warehouses will be lights-out next year,” Rosenberger says. “But if you integrate those systems, you

can create a self-regulating labor standard mechanism.”

Smoothing out the bumps

All the productivity in the world is not worth compromising safety, and curbing

vehicle abuse requires cultural change management more than technology. Abuse damage can account for 30% to 40% of a fleet’s operating cost, according to Jim Gaskell, director of Global Insite products for Crown Equipment.



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A good first step involves examining maintenance data to target misuse or abuse. Managers can then use that information to coach operators.

“Many will find that a very small percentage of operators will own most of that damage, maybe 5% or 10%,” Gaskell says. “If you have a collision, a system that shuts the lift truck down and activates a flashing light is a powerful deterrent. It’s not uncommon to very quickly reduce impact damage by 80%.”

Access control systems can add accountability, says Terry Wickman, president of Keytroller, but management must use the data to continuously reinforce safe practices. The message to operators should be positive, not punitive.

“One customer told us that operators would come directly to management to report incidents before man-



Access control systems can add accountability, but managers must use the data to continuously reinforce safe practices.

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agers were even able to follow up on the system's notification," Wickman says.

But since humans make mistakes, Wickman describes some simple ways technology can boost safety. He notes the increased desire to improve pedestrian safety throughout the industry. As a result, automatic zone controllers have been used to control different top speeds for lift trucks in different areas of a facility. Wireless warning alarms positioned in high traffic pedestrian areas might also be set to activate when a forklift comes within a preset range of 15 to 75 feet.

Despite the common misconception, enhanced safety does not need to come at the expense of productivity, according to Brian Markison, director of North American sales for UniCarriers. In fact, the two can often increase simultaneously.

"The traditional thinking was that

if you needed high productivity, you needed high speed," Markison says. "As paths are optimized, there are ever fewer long runs from one side of a facility to another where speed helps. Instead, you see more short, start-and-stop movements, and those are what you want to manage."

Operator training and culture also impact another key cost center. Markison suggests the checks paid to fuel companies for propane are under increasing scrutiny.

"The reality is that an operator preparing for a six-hour shift might change the tank first thing just so he doesn't have to worry about doing it mid-shift," Markison says. "He might have just given half a tank back to the fuel company, but that will only be reconciled later when the bill comes."

Markison recommends an effective low-LP indicator and enforcement of

the mentality that an operator will not swap tanks until they are empty. Some lift truck suppliers also offer economy modes for internal combustion lift trucks that regulate top speeds and acceleration. "The gas pedal is typically either fully up or fully down," he says. "Economy modes can create fuel savings of 10% to 15% with virtually no change in productivity." □

Companies mentioned in this article

- Crown Equipment
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- I.D. Systems
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Touch screen tablets that meet the military MIL-STD-810 ruggedness standard are becoming a more common sight on lift trucks.

Flexible mobility

Data collection devices for the warehouse have long been RF enabled and mobile, but heavily focused on simple data capture routines. Now tablets, smart phones and other devices are supporting richer apps and management activity, while wearable, wireless printers give warehouse workers the capability to perform efficient, on-demand printing.

By Roberto Michel, Editor at Large



The consumerization of information technology—the trend of smart phones and tablets driving technology more so than business software—is being felt in warehouses and distribution centers. Traditional radio frequency (RF)-enabled data collection devices, either in handheld form or mounted on a lift truck, are still widely used, but newer device types, which include rugged tablets with newer operating systems (OS), are catching on.

“The big advantage of rugged tablets is that now you’re able to present a lot more information than you could with a smaller, rugged mobile computer,” says Dave Green, chief operating officer with Supply Chain Services, a provider of data collection solutions. “Now with a rugged tablet, you can do supply chain monitoring, access management applications and dashboards, and monitor warehouse conditions and labor productivity trends.”

Others agree that DCs call for a mix of mobile device types, from more traditional units to the latest rugged tablets. Mike Maris, senior director of transportation and logistics with Zebra Technologies, says rugged tablets can serve multiple roles. A supervisor can use one, someone doing quality control procedures can use one, but the same model can be mounted to a lift truck where a large, rugged touchscreen is an effective user interface, even if the truck operator must wear gloves for working in cold storage.

Maris agrees that a big advantage of tablets is that they give managers access to dashboards and applications while they are out on the front lines. “Now tablets have become the supervisor’s desktop out on the floor,” says Maris.

The evolution of mobile devices for the warehouse isn’t all about tablets, however, especially consumer-grade devices. After a wave of excitement about consumer smart phones and tablets in DCs, some companies are reverting to highly ruggedized tablets or phones that meet standards such as MIL-STD-810, or they are using them more selectively and pairing them with protective sleds.

Other devices such as smart glasses are also hitting the DC, and on printing side of data collection, smaller, wearable mobile printers are gaining momentum to support processes like reverse logistics. This environment makes for more device choices for users to sift through, but also permits greater flexibility to tackle today’s complexities.

Manage on the go

In a recent survey of warehouse data collection trends that Peerless Research Group (PRG) conducted for Supply Chain Services, the key findings included a significant increase in plans to use rugged industrial tablets, as well plans to access higher level applications such as labor management system (LMS) software.

In the study, 37% of respondents said they had plans to deploy industrial grade tablets, while only 29% planned more consumer grade tablets. Meanwhile, when asked the most important qualities in a device, ruggedness/durability and scanning performance tied as the leading characteristics.

In effect, the shine appears to be off rapid adoption of consumer-grade tablets and smart phones in warehouses, at least for data collection heavy tasks. Green says clients are realizing that while consumer devices might carry a lower initial price point, and have slick user interfaces and a powerful OS, they fall short on qualities like ruggedness, battery life and scan performance.

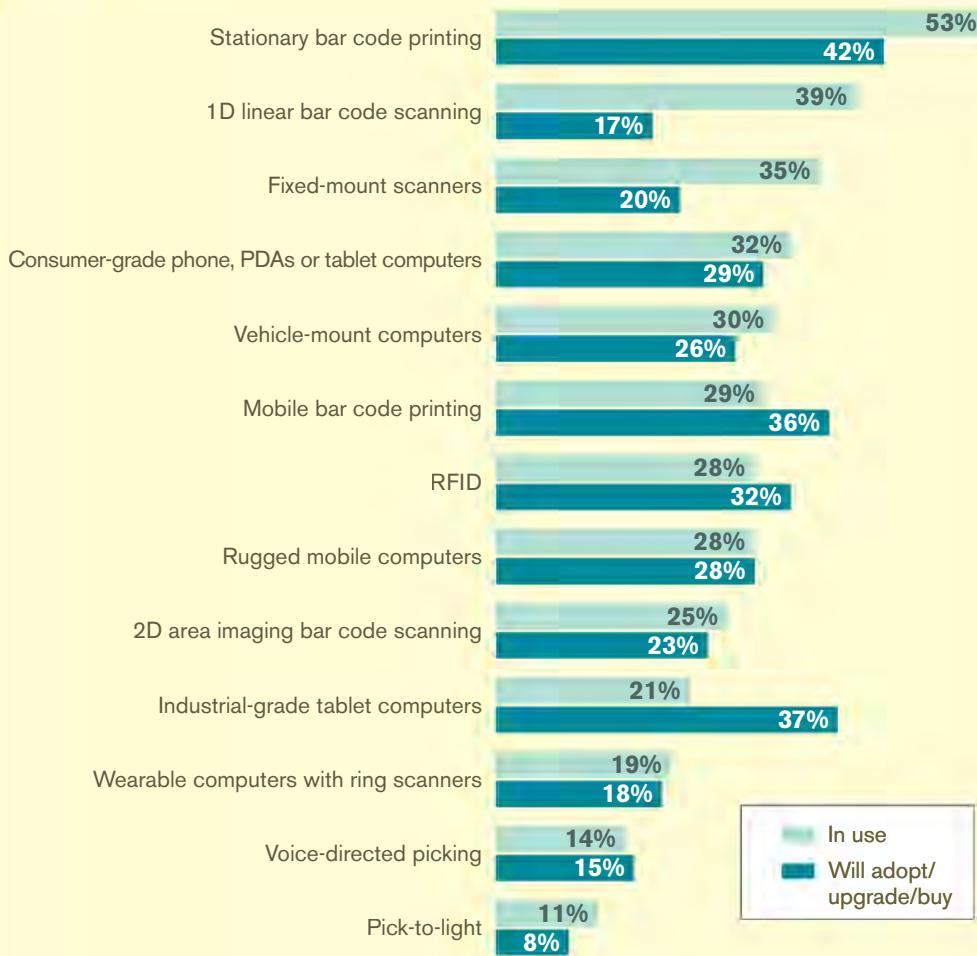
“Not only do rugged industrial tablets have a long battery life to begin with, they also typically offer a ‘hot swappable’ capability so that if you do run low toward the end of a shift, you can swap out the battery without missing a beat,” says Green. “That’s something you can’t do with consumer-grade devices.”

Bruce Stubbs, director of industry marketing for Honeywell Scanning and Mobility, agrees that for some tasks, a more rugged, industrial handheld or vehicle mount unit (VMU) is best way to go to ensure low total cost of ownership because they last for years, can be powered from lift trucks without special converter gear, and support terminal emulation.

However, for some roles, such as managers or someone doing inventory control, a tablet or smart phone with a protective sled might work well. “There are some instances where a tablet might make sense, but to just use one in typical consumer form without putting it into a sled would become counter-productive,” says Stubbs.

VMUs today are, in many cases, ruggedized tablets that use an OS, such as Android or Windows 7 or 8.1, and have touchscreens. These rugged tablets make it possible for warehouse management system (WMS) suppliers to devise bigger, color-coded displays, maps of the best routes to take in case of bottlenecks, or pictures that show the operator what

**Data collection technology:
Current usage/plans for adoption/upgrades/purchase**



Source: PRG survey commissioned by Supply Chain Services

Industrial grade tablets and mobile bar code printers are two of the leading data collection technologies that users plan to adopt.

to pick, says Maris. “You need to think about how to use the fuller capabilities of these larger touchscreens to present color-coded buttons, or graphics, or product images on a screen to support greater speed and accuracy,” he says.

Panasonic’s lineup of Toughbook tablets is seeing use in warehouses both as a VMU and by managers, says Dan Diliberti, Panasonic’s senior category manager for mobility products. The tablets have multiple vehicle mount options, can be detached for mobile use for tasks

like receiving or inventory counts, and also can be slipped into a docking station with a keyboard to function as a PC to do e-mail or access reports.

While one product won’t fit all mobility needs in a warehouse, a rugged tablet with scanning capability and mounting/docking options can fill diverse needs that in the past would have required a mix of rugged VMUs, rugged handhelds and more conventional laptops or PCs, contends Diliberti. “What used to take a purpose-built device can now be met

by rugged, multi-purpose device,” he says.

It’s important that mobile device providers offer end user organizations a stable product lifecycle so that the user company can buy a device and be sure it will be fully supported for several years without frequent OS upgrades or a push to get onto the next-generation hardware. “Enterprise users want to use their devices for five to seven years,” says Diliberti. “They want stability around the investments they’ve made in the units.”

In rugged form, the consensus is that tablets have their place in the warehouse, especially when it comes to supporting managers who want to get out on the floor to check conditions before pulling the trigger on changes like labor reassignments, says Jason Franklin, Intelligrated’s product manager for labor and business intelligence solutions. “It’s about having information on hand while you’re actually witnessing conditions, so you can make better decisions,” he says. “We call it having actionable information at the point of contact.”

Flexibility = productivity

Of course, multi-channel fulfillment is changing data collection requirements, with more need to track reverse logistics, apply labels to small orders and generally account for more complex movement of goods. In some DCs, notes Stubbs, there are specific dock doors for returned materials, with a staging area near those doors.

For these situations, a rugged RF handheld with a camera-based imager that can capture an image, or scan 1D or 2D codes is a good solution, especially when paired

with a small, wearable printer, he adds. "On the fly you can create the right label to put on an item or package being returned so that the next person moving it can scan that label and take it where it needs to go next," says Stubbs.

These small mobile printers, often called "belt printers," are widely used in route sales and delivery, says Green, but are seeing increasing use in warehouses because of the productivity benefit of not forcing workers to sift through a stack of preprinted labels to find the right label to apply, or walk to a stationary printer to generate more labels if they've run out.

There are multiple reasons why labels might need to be printed on demand, says Green. In receiving, labels might need to be applied to support putaway and inventory control within the DC. And to facilitate crossdocking, there may be labels that need to be applied to goods. Many DCs also see seasonality surges that require expansion of pack/ship lanes, and small mobile printers can be a solution versus installing fixed, wired printers.

For lift truck operators especially, says Green, travel to a fixed printer can be a productivity drain, since they have to stop, park the truck in a safe place, and walk to a print station to get more labels. "With mobile bar code printing, the right labels are being printed on demand, exactly when and where they are needed," says Green.

One logistics client of Supply Chain Services did a productivity study of how much time could be saved unloading trucks and applying labels to the inbound goods using small mobile printers versus stacks of preprinted labels, says Green. The company found that the time saved was more than 50%.

Another means of efficiently tracking moves is to monitor lift trucks in real time. Real-time locating systems (RTLS) use optical technology and bar codes mounted on a warehouse ceiling to precisely track the movement of lift trucks within up to a 1-inch accuracy,



Smart glasses can speed up order picking by allowing hands-free operation and keeping pickers focused on value-added picking tasks.

and can generate management reports to identify trends, says Bill Leber, manager of business development for warehouse solutions with Swisslog, which partners with RTLS vendor TotalTrax on an RTLS for lift trucks that integrates with WMS.

By integrating RTLS with WMS, says Leber, it becomes easy to track movement of goods that in the past would have been hard to accomplish without extensive manual inputs into a WMS. For example, many DCs have overflow areas marked off on open floor space where goods can temporarily be placed by lift truck operators if an aisle gets congested or goods can't be put away for some other reason.

If those trucks are being tracked by an RTLS that is integrated with WMS, all a lift truck operator has to do when leaving goods in an overflow area is to drop the goods and make a quick input that the goods were dropped off. The RTLS automatically conveys to the WMS the exact location of the goods. "Two key benefits we see in the use of RTLS is to have it talking to the WMS and also the management reports," says Leber. "These two factors bring a greater level of control over your operations."

Wearable technology

Smart glasses are another new mobile device technology that can be used for order picking. For industrial users, Google Glass smart glasses are available,

and so are smart glasses from providers such as Vuzix. For picking, smart glasses can be more productive than conventional RF handhelds because the operation is hands free, says Jan Junker, chief marketing officer for Ubimax, which offers a smart glasses picking solution.

"The primary productivity benefits comes from the hands-free operation," says Junker. "The users can have their hands free for performing work tasks, but they can still see in the display the information they need for their tasks."

DHL ran a production pilot using Ubimax's xPick picking solution at a warehouse in Bergen op Zoom, the Netherlands, that involved filling orders for printer replacement parts. In the three-week pilot, 10 order pickers were equipped with devices from Google and Vuzix, using xPick to replace order picking normally done with pick lists and wireless handheld scanners. DHL measured a 25% average improvement in picking efficiency, says Junker, mainly due to the hands-free operation.

Smart glasses can be used by lift truck operators, says Junker, but the productivity increase versus smart glass picking by pickers on foot tends to be less dramatic. This is because with lift trucks, the picks tend to be further apart, and thus there is more travel time between picks during which the hands-free picking benefit isn't coming into play. Secondly, adds Junker, a mounted terminal already frees the hands of the operator to some extent.

While smart glasses are new to warehouses, another “hands-free” picking technology—voice solutions—have been widely deployed. “There is still a strong trend to replace RF scanning with voice because of the hands-free benefits,” says Doug Brown,

Intelligrated’s director of product strategy for voice solutions. “When it comes to lift trucks, a key advantage of being hands free is that it’s easier to move about the facility safely because operators do not have to take eyes off where they are headed to glance at a screen.”

Intelligrated sees smart warehouse glasses as being in the “early market” stage, but sees potential since they are hands free, says Brown. The company also has worked to “abstract” the hardware “end point” technology for a picking solution from the underlying pick process the end user company wants to achieve, adds Brown. By abstracting the hardware from the process at the warehouse execution system (WES) software level, adds Brown, it’s possible to have one layer of software that can drive different pick technologies, including RF-scanning, voice and pick-to-light.

Ultimately, the market should keep an open mind about mobile devices

and data collection for DCs, since no single technology is right for every application. But for sure, the market has changed from the days when mobility meant RF-enabled terminals with small monochrome screens, terminal emulation and laser scanning. As Stubbs concludes, “That’s why we offer a wide variety of solutions, so that we can apply the technology that will enable best practices and deliver lowest cost of ownership.” □



Consumer-grade tablets and smart phones can be protected with “sleds” that also extend battery life and provide for push button scanning.

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By **Josh Bond**,
Senior Editor

Intelligent lighting illuminates aerospace distribution center

DC cuts lighting-related energy by 91% annually with new fixtures and software.

Dassault Falcon Jet is a subsidiary of Dassault Aviation (France), the world's leading aerospace company. After covering 65,000 square feet of distribution space with an intelligent lighting system, the 24/7 facility significantly reduced energy and maintenance costs.

Headquartered adjacent to the Teterboro Airport in Little Ferry, N.J., the 172,000-square-foot facility houses nearly 400 employees and includes a demonstrator-based flight operations department and DC, which holds a large inventory of Falcon jet spare parts. The management team searched for a more efficient replacement for the legacy lighting—a combination of metal halides and T8 fluorescents—that was driving up costs. In addition to excessive energy use, maintenance added another 10% to operating costs.

The team evaluated standard LEDs, LEDs with add-on motion sensors, and intelligent LEDs. The new lighting system (Digital Lumens, digitallumens.com) has improved lighting quality in high bay and low bay areas, and it can dim, turn off, schedule lighting, or dynamically adjust in low-occupancy areas where facility personnel enter and exit 30 to 40 seconds at a time.

“A lot of my job involves trying to save money and improve facility operations, so the biggest goal for this project was to save on electricity,” says James Mosca, facility manager. “As soon as we saw what we could be spending for intelligent LEDs compared to what we were spending for the metal halides, it was an obvious choice for us.”

While maintaining 30 to 45 foot candles of light, the facility has reduced its lighting-related costs by 91% annually, saving \$53,691 in annual energy costs, \$9,251 in annual maintenance savings and



a total of 547,868 kWh per year. Mosca notes the new system's lighting energy management software, which provides facility-wide intelligence, offers the ability to control all fixtures in all spaces and operational patterns and energy usage.

“Having the ability to change the schedules and the light levels anywhere in the facility is very helpful,” Mosca says. “Also, being able to see the amount of electricity used and pull data to show exactly what these new lights are doing for us is incredible.” □

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By **Josh Bond**,
Senior Editor

New lights ease maintenance burden in underground DC

Cold storage facility saves \$100,000 annually with LED lighting upgrade.



At two of its cold storage facilities, Arkansas-based Zero Mountain Cold Storage relied on nearly 600 antiquated 400W metal halide fixtures to light its huge warehouses, one in a former underground limestone mine. New LED high bay fixtures in both facilities now use much less energy and require minimal maintenance.

The previous fixtures consumed excessive amounts of electricity and required near-constant replacement costing as much as \$10,000 per year in manpower alone. Because of the lights' slow warm-up time, Zero Mountain Cold Storage was forced to keep them on 24/7. The old fixtures' heat output caused the cooling condensers to work even harder, wasting even more energy and producing moisture and frost buildup in some areas.

The new lights (Dialight, dialight.com) reduced energy consumption by 70% and are expected to provide 10 years of maintenance-free performance. With their instant-on capability, the fixtures can also be turned off when not needed or equipped

with occupancy sensors to immediately come on at full lumen output.

"Our crews were impressed by how quick and easy it was to change out each fixture, and they're looking forward to not having to change light bulbs all the time," says Tony Parrish, facility manager at the Johnson underground location. "This will definitely free up time to perform more critical maintenance needs that contribute to efficient facility operation."

Because of the improved light output compared to the old fixtures, Zero Mountain was able to reduce the number of fixtures needed to light the same space by more than 20%. With 70% greater efficiency per-fixture, Zero Mountain shaved 1.3 million kWh off its combined energy bill, saving \$86,000 in electricity costs alone across the two facilities, bringing total annual savings to nearly \$100,000. The addition of occupancy sensors is expected to reduce energy consumption by another 30% to 40%. The company has already approved upgrades at two more sites. □

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By **Josh Bond**,
Senior Editor

Automation makeover boosts efficiency for multiple facilities



Manufacturer transports materials with near-lights-out automatic guided vehicle system.

L'Oréal, a multinational cosmetics manufacturer, recently automated six of its sites in Europe and the United States, deploying 100 automatic guided vehicles (AGVs). The facilities report increased efficiency, production, safety and comfort in their operations.

The new AGVs (Egemin, egeminusa.com) transport packaging materials such as jars, bottles, flasks, boxes, lids, caps and labels from the warehouse to the filling lines and back. When the filled boxes are stacked onto a pallet, an AGV is sent to the filling line to pick up the pallet and bring it to the wrapper line.

In nearly all sites, the AGV systems have been equipped with an automatic battery exchange system requiring no operator intervention. Combined with maintenance-free batteries, this leads to a virtual lights-out AGV system. The vehicles are compatible for lifting heights up to 2.4 meters.

The production staff can also give other assignments to the AGVs including: arrange removal of packaging materials that are no longer needed to the warehouse; supply empty pallets to the line; or

pick up cardboard that can be reused. For the transport of large and heavy intermediate bulk containers (IBCs), heavy-load AGVs are capable of lifting up to 1,200 kg. At some production sites, the AGVs also take care of transporting finished products to the warehouse and even the storage and retrieval process inside the warehouse.

To avoid accidents, the AGVs always follow the same clearly marked route and never operate outside the programmed zones. They automatically stop when they detect obstacles or when people walk into their operating range.

"The introduction of AGVs in our operations has increased operator comfort and safety," says Markus Moch, project manager at L'Oréal Karlsruhe. "Because of the standardization, we now have a much more regular transport flow and our warehouse with packaging materials looks a lot neater. The work is also more enjoyable for the operators working on the production line, as they don't need to call a colleague for help. The AGVs are not necessarily faster, but they perform the tasks smoother and safer." □

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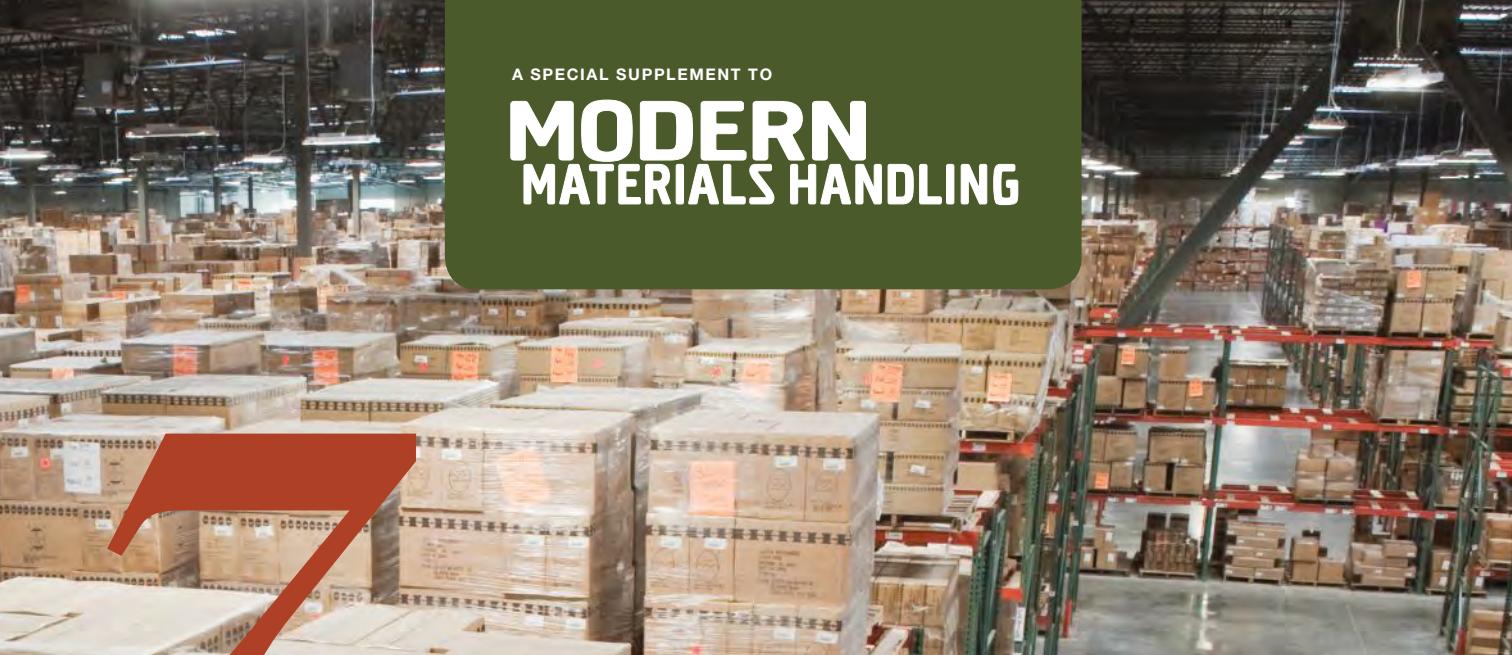
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7 ways to optimize an existing WMS

Advanced warehouse management systems (WMS) users are taking the next step and figuring out how to drive process efficiency improvements through their applications—rather than just focusing on keeping track of what’s been done. Here are seven different ways they’re making that happen.

By **Bridget McCrea**,
Contributing Editor

All the technological innovation in the world can't make organizations, small businesses or individual users actually use everything that a specific piece of hardware or software has to offer. In fact, the image of that latest and greatest piece of technology “gathering dust on the shelf” as workers go

back to doing things the way they’ve always done them is as old as technological innovation itself.

The problem transcends into the supply chain software arena, where many operations admit that their warehouse management systems (WMS) could be doing





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In a recent survey of software users, research giant Gartner asked respondents how effectively their organizations utilize business applications across a number of supply chain business functional capabilities. For WMS, 18% of respondents said that their warehouse management systems are “underutilized,” while 37% said that the platforms are “generally utilized.” And, 31% said their WMS was “fully utilized.”

“More than half of WMS users aren’t maximizing their systems,” says Dwight Klappich, research vice president for Gartner. “And while the vast majority of WMS users are satisfied with system performance, most of them are using the platforms to receive, put away, store, count, pick, pack, and ship goods. That’s all they really care about.”

However, there are managers who want and expect more from their WMS investment. According to Klappich, the more advanced WMS users are “taking the next step and figuring out how to

drive process efficiency improvements through their applications, rather than just focusing on keeping track of what’s been done.” Over the next few pages, we set out to help managers reach for that next level.

Becoming an advanced WMS user

As Klappich points out, picking the low-hanging fruit that’s dangling off your WMS is a fairly common practice for managers who just need to “get things done.”

But what if your WMS offered more? What if it could serve as a more valuable business tool across different tasks, users and even departments? Here are seven different ways that you may not have considered using your WMS:



Ramping up a homegrown WMS

In addition to the general WMS optimization strategies that we’ve outlined, there are also four specific areas that Norm Saenz, managing director at supply chain engineering and consulting firm St. Onge, says that people tend to overlook when using proprietary warehouse management systems.

“From our perspective,” says Saenz, “it’s a real shame if someone has a best-of-breed solution from Manhattan, Red Prairie or HighJump, and isn’t using all of the functionality provided by the system.”

According to Saenz, it’s not unusual for an operation to overlook key functionalities within a homegrown WMS package. “Most homegrown packages are going to have the basics, including mostly paper-based systems and inventory tracking,” he says.

Following are four key areas that

tend to get overlooked in homegrown systems and the rewards that can come as a result of these efforts.

1. Bar code scanning

- Add a radio frequency (RF) network
- Add bar codes to locations
- Apply license plates to pallets and SKU cases
- Integrate with WMS

Results that you can expect:
Increased inventory accuracy of 50% or more.

2. Directed activities

- Add functionality if not available
- Add batch processing
- Map locations within system to optimize travel
- Direct operators to stock, replenishment, and pick locations

Results that you can expect:

Increased labor productivity of 50% or more.

3. Task interleaving

- This capability is mostly available in Tier 1 WMS packages
- Can be difficult to add to legacy systems

Results that you can expect:
Increased labor productivity more than 25%.

4. Product slotting

- This functionality can be hard to add to legacy systems
- It’s easiest to bolt-on slotting tool to legacy systems
- Develop slotting rules and constraints
- Assign priority ranking to locations

Results that you can expect:
Increased labor productivity of more than 25%.

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1 In conjunction with your labor management system (LMS). Labor management has been used in warehouses for decades, but in many cases the activity takes place outside of the warehouse management tasks.

“Labor management has been about after-the-fact reporting—how many orders did we pick per person,” says Klappich. “There’s nothing wrong with that, but those results don’t tell you what you need to do for the upcoming



back-to-school or holiday rush period.” When you fold WMS and LMS together, however, warehouse managers can do a better job of predicting upcoming rushes, slow periods and other events that could affect labor decisions. Say the WMS shows that 25 tractor trailers will be arriving for loading/unloading the following morning, and that later the same day a large number of packaged orders will need to be shipped out. “Wouldn’t it be nice to know in advance that the morning’s workforce

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could be allocated to the packing area in the afternoon?” Klappich asks. “Most managers handle those decisions manually, and usually find out that there’s a problem when it’s already too late to be proactive about it.”

2 As an analytics tool. With more companies interested in using analytics and metrics to make better decisions, it makes sense for WMS to serve as a predictive and prescriptive analytical tool.

Chock full of historical information about dock scheduling and usage, for example, WMS can help managers “do a more effective job of managing inbound and outbound trailers as they come in and out of the warehouse,” says Klappich, who sees North American and Western European shippers leading the charge in this area right now.

3 To support the omni-channel trend. In most cases, the need for warehouse-oriented analytics is being driven by the growth of omni-channel distribution, says Klappich, who points to Manhattan as one WMS supplier that’s made strides in this area. “Over the last few years, Manhattan has focused on the exploding demand for omni-channel,” he says, adding that an increasing number of C-level executives are warming up to the idea of investing in WMS based specifically on how well the software supports omni-channel.

“Three years ago, these projects were getting shot down on the funding side because there were other priorities to worry about,” says Klappich. “Now, with issues like agility and adaptability becoming major issues for omni-channel operations, and because the trend is advancing so quickly, we’re seeing more companies move from rudimentary systems to full-blown WMS.”

4 As a mobile information tool. With today’s workplaces becoming more and more mobile in nature, WMS vendors are stepping up to the plate and developing solutions that

support this movement. As he looks around the warehouse management landscape, Clint Reiser, research analyst with Boston-based ARC Advisory Group, singles out Manhattan’s mobile distribution management application

as one of the more significant mobile advancements of the last year.

Using the application, operations can get real-time feeds from their WMS and LMS. Warehouse managers can then act on that information

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as needed, and right from their smart phones or tablets. "It's designed for a warehouse manager who wants quick views from both systems," says Reiser, "and it allows the manager to view data, click on it, drill down, see the tasks and individuals, and track their progress."

5 For directed putaway and replenishment. Fearful that their data may not be accurate enough to support future decisions, some operations opt to "turn off" their WMS' directed putaway and replenishment capabilities. This is a big mistake, says Norm Saenz, managing director at supply chain engineering and consultancy firm St. Onge.

"I've worked with companies that didn't want their WMS doing directed putaway because they felt the system didn't know the size of their products or their locations," says Saenz. "It was because they hadn't gone through the effort of defining those parameters for the directed putaway to be accurate."

The same scenario applies for replenishment, which also can't be handled automatically if the system doesn't contain the right information. "The whole data component of the WMS relies on accurate information," says Saenz. "Without it, the system can't make smart decisions for you."

6 To enhance warehouse automation. Driven largely by the growth in omni-channel, today's warehouses are more automated than they've ever been in the past. Bob Hood, a principal at consulting firm Capgemini, says WMS is particularly well positioned to help warehouse and distribution center managers achieve their automation goals while also supporting the growing omni-channel distribution movement.

"We're definitely seeing an uptick in the level of automation that warehouses are adopting," says Hood, who expects more operations to discard their proprietary, customized, age-old warehouse management systems in favor of newer options over the next few years.



This, in turn, will virtually ensure a higher level of automation within the warehouse or DC. "Just the act of fulfilling e-commerce orders alone requires different operating models within the DC, and that's causing shippers to up their levels of automation and eke more capacity out of their existing facilities," adds Hood.

7 For better workforce optimization. Let's face it, warehouse and DC work can be rigorous. With more than 78 million Baby Boomers heading into retirement and younger workers equipped with a healthy pool of jobs to choose from, warehouse managers need to be able to attract qualified, stable workforces.

And while a WMS may not appear to be a workforce optimization tool from the outside, Hood says that such systems can go a long way in helping shippers keep their DCs running smoothly.

"Warehouse work is hard work," says Hood, who worked recently with a firm in Southern California that was having a difficult time maintaining a stable workforce. "They're looking at further optimizing their WMS in order to be able to do more with the same level of human labor," says Hood. "Through automation, they may be able to mitigate that problem, even in a tight labor market." □



Easily reconfigure modular sorter after installation

The Steerable Wheel Sorter—engineered to accommodate cases, cartons, totes or trays weighing up to 110 pounds—can be easily reconfigured after initial implementation. Modular, the device mounts inside the universal side frame of the supplier's conveyor system. This feature allows the sorter to be easily relocated along the conveyor path if divert locations change. Capable of sorting 30 to 80 cartons per minute, the sorter's four rows of wheels turn in the forward direction when in transport mode, moving product straight on the conveyor. When a load requires diverting, the control logic simultaneously rotates and increases the speed of all the steerable wheels to accomplish a 30-degree angle divert. Once the load has diverted, the wheels rotate back to the forward direction. **Dematic, 877-725-7500, www.dematic.us.**

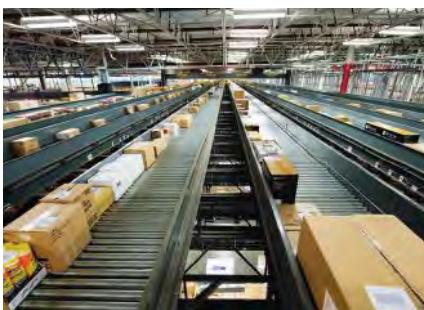
Sorter combines batch picking with bar code reading

The Batch Pick 'n Scan sorter combines efficient batch picking into totes with integrated 1D and 2D bar code reading. It includes an infeed station where an operator places the products on a V-shaped belt conveyor. After the prod-

ucts are separated, they travel through a six-sided scan tunnel to capture information that determines each item's final destination. A distributor table transports the products to the sorter, which then transfers them to order totes or



cartons at their respective destinations. Capable of handling 4,500 pieces per hour, the system handles any product measuring 10.2 x 7.1 x 7.1 inches or less. Ideal for error-free picking, generating parts lists and packing slips, the system also supports lot or serial number tracking. **Schaefer Systems International, 877-724-2327, www.ssi-schaefer.us.**



Accumulation conveyor maximizes carton control, throughput

The ZoneFlex Advanced maximizes carton control and boosts throughput in zero-pressure accumulation conveyor applications. To optimize flow of varied package types, sizes and weights, the ZoneFlex system continuously monitors and automatically responds to changing accumulation conditions. It features a new, patented neighborhood mode feature that slows down product before

accumulation to minimize damage, carton rotation and side by sides. With its ability to control the speed within each accumulation zone, the system incrementally slows product down before accumulation. This feature enables the conveyor to run at faster than typical speeds, increasing throughput by up to 45%. Other highlights include clip-in mounting, easy configuration and LED diagnostics to simplify both start up and maintenance. **Intelligrated, 866-936-7300, www.intelligrated.com.**



Automatic singulator transforms bulk parcel flow into uniform sort

The Automatic Parcel Singulator transforms bulk flow of parcels into a flow of uniformly separated, spaced and aligned parcels prior to entering the infeed to automated induction of a high-speed loop sorter. Capable of handling a variety of postal items at rates up to 3,500 items per hour, the fully automated singulator provides a single system for handling parcels, flats, totes and sealed bags from the point of collection to sorting area distribution. Its cyclical operation enables the unit to adjust parcel flow speed in response to changing demand levels. Features include variable-speed drives and an energy-conserving sleep mode. The singulator can be incorporated into new installations or added as a retrofit to an existing loop sorter induction. **The Beumer Group, 732-893-2800, www.beumergroup.com.**

Zero-pressure accumulation conveyors for medium-duty applications

Offering 3,000-pound capacity per zone, the new DCEZD-62 and DCEZD-63 two- and three-strand drag chain horizontal conveyor models are engineered for



medium-duty, zero-pressure accumulation. By maintaining contact with the chain at all times, the

conveyors prevent product skewing. They use the supplier's EZLogic system to accumulate pallets with zero back pressure, reducing the chance of product-damaging collisions. For non-reversing applications, the units incorporate

the EZDrive decentralized drive system. Other highlights include a sleep mode for increased energy efficiency and reduced wear, a catenary take-up (no manual adjustment required), and operation without compressed air. **Hytrol**, 870-935-3700, www.hytrol.com.

Lift, lower products from elevated heights with spiral conveyor

Chutemaster spiral conveyors provide a safe, secure means of lifting and lowering products to and from elevated heights, including mezzanines, with a 27-degree angle of decline. Constructed of durable, hand-laid fiberglass with a gel coating that provides long-wearing, low-friction service, the conveyors feature a steel support structure. In high humidity operations, the self-starting

characteristics of the gel coating help products flow freely, gently and safely. Capable of transporting a maximum load capacity of 50 pounds per linear foot, the spiral chutes offer three (or more) times the floor space savings over conventional decline conveyors. The size of the chute allows it to be installed in tight situations, including elevator shafts and other small spaces. Outside conveying diameters range from 40 to 126 inches; conveyor widths range from 15.25 to 55.63 inches. **Interroll**, 910-799-1100, www.interroll.us.

Towline conveyors engineered for manufacturing, distribution

A new series of Lo-Tow towline conveyors for manufacturing and distribution has been introduced. In manufacturing, the SideFinger towline assembly conveyor uses Track-Gap jam-free construction to eliminate jam-



ming by accommodating and isolating a large quantity of contaminants—such as fasteners and small parts—in the track. The Clas-SI-c towline model for warehousing and distribution supports long runs of heavy capacity conveyor to link receiving, put-away, picking and shipping departments. Additionally, the supplier has introduced a new rejuvenate and retrofit (R&R) program to update older towline systems with upgrades to controls, path and track repairs and other services. **SI Systems**, 800-532-9464, www.sih.com.



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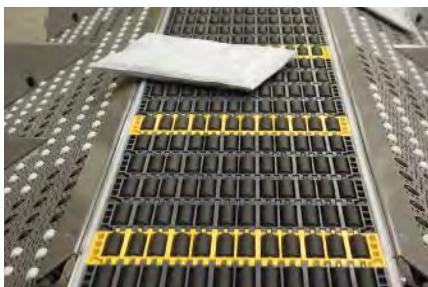


Controller prevents uncured tire adhesion to conveyors during manufacturing

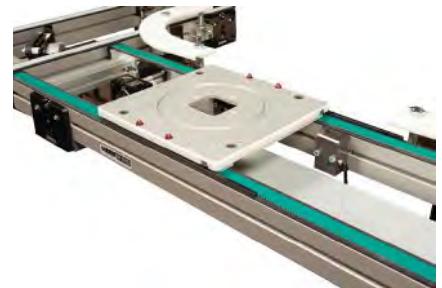
The ZoneLink3 green tire controllers control internally powered, motor-driven conveyor rollers, including the supplier's Microroller brand and those made by other suppliers. CE-compliant, the controller is engineered specifically for use with conveyors that move uncured (green) tires of any size as they exit a tire-building machine and travel to the curing molds. To prevent the soft, sticky tires from adhering to the rollers and deforming if conveyor movement stops, the controller offers a configurable rocking mode that keeps the tires in motion—even while being accumulated. The device is ideal for use in no touch/zero pressure accumulation conveyor flow applications, and features forward and reverse run modes that can override accumulation as needed. It can be implemented in new installations or retrofits of existing systems. **Holjeron**, a part of **Matthews Automation Solutions**, 800-691-8302, www.holjeron.com.

Automatically sort polybags without the risk of snags, damage

Engineered for high-speed operations, the ARB Sorter S7000 provides linear sorting of polybags, padded envelopes, flats and cartons on the same conveyor



without the risk of catching the product. The system is offered as an alternative to pushers, loop sorters and shoe sorters that have catch points that can rip and damage bags when they are diverted at high speeds. Capable of sorting bi-directionally, the sorter's tight divert centerlines minimize its installation footprint. **Intralox**, 800-535-8848, www.intralox.com.



Conveyor moves pallets with precision in assembly automation processes

Engineered for assembly automation operations, the 2200 series Precision Move Pallet System conveyor deploys a pin tracking system to guide pallets through 90-degree turns. The system also offers a fast belt change capability that eliminates the need to remove

the conveyor from the system, increasing efficiency and reducing downtime. During operation, pallets ranging in size from 6.3 to 18.9 inches move on twin dual strand timing-belt conveyors and support accumulation of up to 250 pounds. The system is ideal for applications including robotic pick-and-place, precision indexing, accurate part positioning, timed conveying as well as inspection. **Dorner**, 800-397-8664, www.dornerconveyors.com.

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Get the highest USPS discounts on small parcel shipments with sorter

Created for operations that regularly ship more than 2,000 small parcels (weighing less than 5 pounds) per day using the U.S. Postal Service, the Smalls ParcelMgr sorting system supports numerous rate categories including first class package, priority mail and flats. The system automates parcel sorting and labeling to minimize operational expenses by maximizing current and future parcel-pricing discounts. Features include automatic product gapping, in-motion weighing, optical character recognition (OCR) address and lookup, a print-and-apply labeler, and final sortation to conveyor with up to 104 outputs in increments of eight. The system is controlled and powered by the supplier's Netsort and MMT Sabre software that conforms to USPS IMB and IMPB bar codes, and Mail.dat and eVS electronic reporting. Bell and Howell, 800-220-3030, www.bellhowell.net.

High-speed bombay sorter for e-commerce distribution



The high-speed Optimus FlatSorter is engineered

to handle store replenishment, returns and e-commerce distribution of garments, accessories and lightweight parcels. The bombay sorter's trays are constructed with minimal parts to reduce maintenance and assembly time, as well as to minimize spare parts costs. In operation, the sorter's tray door opening function ensures that items are drop flat into a container or carton. A choice of two configurations is offered: single tray with capacity up to seven trays per hour, and multi tray with capacity up to 14 trays per hour. The system integrates with automated technologies including induction conveyors, bar code scanning, weight and volume measurement. Solutions for Sorting, 704-895-1254, www.sfsorting.com.

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for handling heavier loads, the systems can be configured for a variety of manufacturing and distribution operations. Lewco, 419-625-4014, www.lewcoinc.com.

Prevent product, plant contamination with sanitary tubular cable conveyor

The Flexi-Disc sanitary tubular cable conveyor for fragile bulk food and non-food handling allows rapid washdown of the system between production runs. It uses high-strength, one-piece polymer discs—affixed to polymer-coated 304 or 316 stainless steel cable—that slide within smooth stainless steel tubing to transport products gently, quietly and without dust. At the end of a conveying cycle, the discs evacuate the tubing of material to eliminate waste. All material outlets, inlets and tubing are fabri-



cated of 304 or 316 stainless steel with quick-disconnect covers and continuous welds. The conveyor may be specified as a stand-alone system, or be fully integrated with upstream and downstream equipment such as inlet hoppers, bag dump stations, dischargers, fillers, and more. Flexicon, 888-353-9426, www.flexicon.com.



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Optimized sorting system uses vacuum conveyors for item transfer

A customized transfer system, combined with a vacuum conveyor, can optimize the sorting process. The system carries and sorts small work pieces both individually and in stacks. After sorting, the vacuum conveyor moves the items in a closed loop transfer system that includes picking, transport and placing operations—without unproductive return strokes. To increase productivity, the vacuum conveyor runs at a speed of 16.4 feet per second. Montech AG, +41-0-32-681-55-42, www.montech.com.



Food-grade plastic combination chain for wash down applications

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Maintenance-free motor brakes for conveyors with frequent start/stop cycles

MagnaShear motor brakes are ideal for applications where the motor is reversed each cycle, such as loader/unloader conveyors, ship and rail car loading conveyors, trippers and pallet return conveyors. The brakes employ oil shear technology with a layer of automatic transmission fluid between the brake disc and the drive plate. As the fluid is compressed, the fluid molecules shear to impart torque to the other side. Transmitting torque between lubricated surfaces to eliminates friction wear and minimizes maintenance for longer service life, particularly on conveyors with frequent start/stop cycles. Totally enclosed, the brakes are impervious to moisture, dirt and dust. Quick mount features allow them to attach to drive motors in NEMA frame sizes 56 to 449. Force Control Industries, 513-868-0900, www.forcecontrol.com.



Nanoceramic grease provides greater friction resistance

Engineered with nanoceramic particles that act as sub-microscopic ball bearings, DayLube high-performance grease provides continuous lubrication to steel surfaces, making it especially suited for conveyors. With a much lower coefficient of friction at all temperatures than traditional polytetrafluoroethylene (PTFE) greases, the lubricant is chemically inert and environmentally friendly. It maintains viscosity across a temperature range of -40°F to 800°F and is NSF-H1 food grade certified. Available in 16-ounce tubes and jars, gallons and 5-gallon pails, it features high load-bearing properties, a low dielectric constant, does not contain metal or silicone and is resistant to steam, acids and most chemicals. Dayton Progress, 937-859-5111, www.daytonprogress.com.

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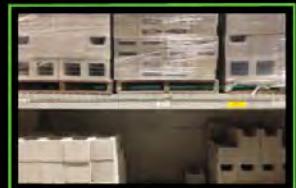
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PRODUCT Showcase

AGV navigates tight turns, narrow aisles

Capable of navigating narrow aisles with tight turns, the Tite-Space BST automatic guided vehicle tugger has a minimum turning radius of 15.7 inches. It is ideal for transporting materials and parts from storage to lineside assembly points. Features include low-profile construction, compact drive motor, 24-volt DC system powered by two 12-volt batteries, a battery tray cart for easy changing, and guidance sensors. Traveling in a single direction along an easily installed magnetic tape guidepath, the tugger reaches speeds up to 164 feet per minute and hauls a maximum weight of 1,320 pounds. For safety, it has electromagnetic braking, audible warning and flashing light, obstacle sensor, bumper switch and e-stop. **Creform, 800-839-8823, www.creform.com.**



Drum palletizer with geared hand crank

The model 82A-GT pouring palletizer now features a geared hand crank for precise tilting and pouring. Used to move drums on and off shipping pallets, spill containment pallets and dollies, the unit incorporates a V-shaped base for placement of drums at pallet corners. It tilts and pours at heights up to 26 inches, eliminating the ergonomic risks of manual handling. For dispensing, the unit rotates a drum end-over-end 360 degrees, then locks horizontally. Options include AC, DC or air-powered lift raising and a tilt brake that automatically prevents out-of-control rotation of heavy, unbalanced drums. **Morse Manufacturing, 315-437-8475, www.morsedrum.com.**



Mother/daughter carts provide flexibility

Featuring a C-frame, a corral-style mother cart can move a single daughter cart with a load up to 800 pounds. The 50 x 50-inch daughter cart—which roll on four, 8 x 2-inch polyurethane swivel wheels for easy line-side maneuvering on its four-bend

removable handle—can be manually pushed into the mother frame, then secured with two frame-mounted flip-down locks for transport.



Traveling on 6 x 2-inch low-noise polyurethane wheels (two swivel, two double rigid), the mother cart is outfitted with a self-stowing towbar, clevis and pin hitch, and additional weight in the frame for skid-free tracking when connected in trains. Both carts sport a powder paint finish. **Kinetic Technologies, 440-943-4111, www.ktecinc.com.**

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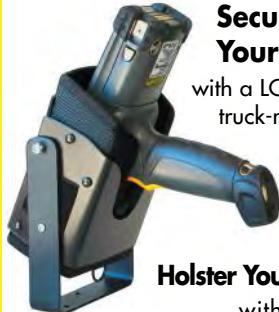
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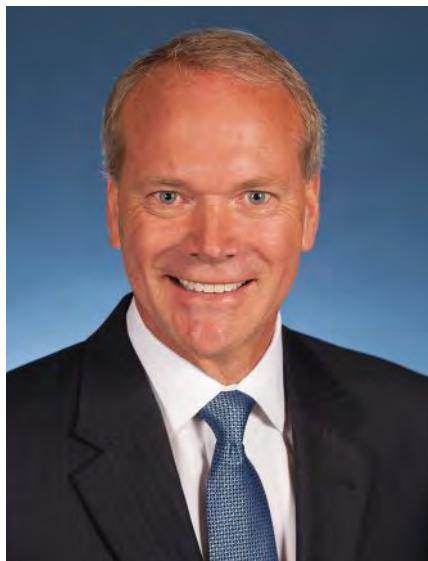
EXPERIENCE: A 26-year veteran of the lift truck industry, Wood has previously served as chairman of the ITA's General Engineering Committee. He is also currently a member of the MHI Board of Governors and MHEDA's Manufacturers Board of Advisors.

DUTIES: As ITA chairman, Wood works with the executive board to determine the strategic direction of the industry association. He is also responsible for building a consensus behind that strategic direction and providing a voice to the association's position on industry issues.

Modern: How did the lift truck industry fare in 2014, and do you have any insight into sales through the first half of 2015?

Wood: Last year was a very good year. The market was strong in all five truck classes with total North America sales exceeding 200,000 units. That represented 8% growth over the prior year. And, 2015 has been and remains a very promising year. Recent economic activity, as well as positive forecasts for the remainder of 2015, has put us on track to meet or exceed the 2014 results. Our healthy industry is also a reflection of our economy in general, as lift trucks and materials handling equipment are the heart of the overall supply chain process.

Modern: Our cover story this year is on the lift truck of the future. When you look across the industry, how do think the lift truck is evolving?



Wood: Safety is always a top priority. We will continue to see improvements in product designs, but we also need to ensure that safety programs extend beyond the forklift itself. Operator training, pedestrian awareness, object detection and metrics to measure safety should all be considered priorities. The ITA's National Forklift Safety Day was designed with this in mind and helped create awareness around safety and the safe use of lift trucks. In terms of trends and products, OEMs will continue to support the growing electric lift truck market. Lift trucks will also become more "connected" and telematics will help customers analyze their fleets and operations more effectively. Technology innovation in automation will continue to improve, and as a result, we expect to see more automation and integrated solutions.

Modern: Last year, we looked at managed services, including the way one leading OEM was managing spare parts inventory. Are maintenance services becoming more important to end users than a lift truck's specifics?

Wood: Yes, customers are becoming more service-oriented and want more turnkey solutions. They are looking

beyond the purchase price of a piece of equipment, like a lift truck, to a total package. Areas of fleet management and full maintenance continue to grow in popularity and solutions selling vs. equipment selling will help differentiate the leading OEMs.

Modern: One of the biggest issues facing the automation side of the materials handling industry is the availability of skilled technicians to maintain increasingly complex systems. Is the lift truck industry also grappling with a shortage of skilled technicians?

Wood: Workforce and labor issues are constant challenges for our industry, here and abroad. For example, there is a significant shortage of skilled technicians throughout all dealer networks. This is a shame, as our industry offers a competitive wage rate, good benefits and a stable work environment. We need to tout these qualities and more to attract the next generation of skilled labor at the lift truck dealers and at our factories.

Modern: When you look at the future of the industry, what excites you the most?

Wood: The overall innovative and dynamic products our industry constantly introduces to the supply chain world keeps me excited about the future. We offer solutions in the materials handling and logistics industry that support our country's economic growth and activity. As we strive for ever-increasing efficiencies through new technological innovations such as the Internet of Things, Big Data analysis and autonomous vehicles, keeping at the forefront and leading change is exciting. □

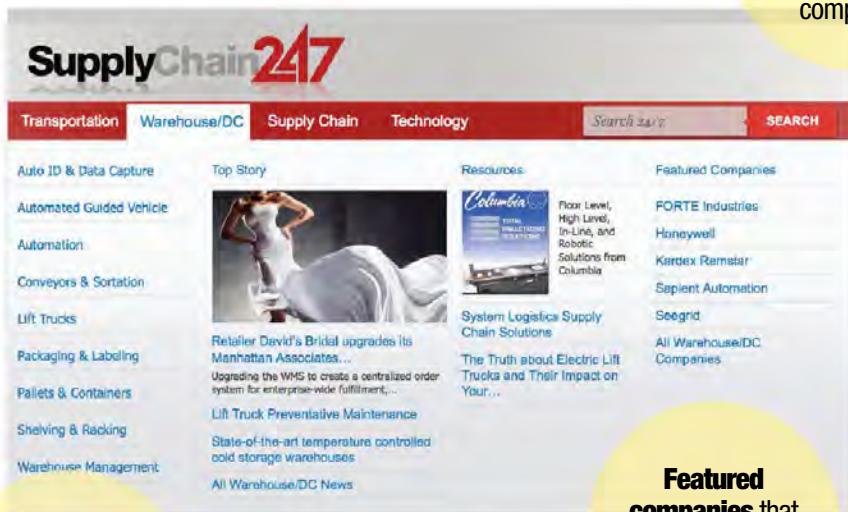
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