

## Robots In The Warehouse

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For centuries, the robot has been included in literature. Homer wrote about the concept, and Leonardo da Vinci made sketches of a mechanical man more than 500 years ago. The word *robot* is adapted from the Czech term for work. The popular 20th-century image was created in Karel Capek's 1920 era drama about robots. By mid-century, with technological advances, transistors and circuit integrators made it possible to turn some of the dreams into reality. Today, many industries find a growing number of practical uses for robots. Perhaps the most dramatic use of these is the automobile assembly line, where an increasing number of operations have been automated.

As we consider automation in the warehouse, the primary focus is on jobs that are labor-intensive, or those that must be performed in a hostile environment, such as a zero degree freezer. An early showcase of warehouse automation was a freezer warehouse adjacent to a bakery. Rather than saving labor, the purpose was to eliminate unpleasant jobs in the freezer.

### Justifying The Investment

Three questions should be asked when considering the use of automated equipment:

- Is there enough volume to justify the investment?
- Is the equipment sufficiently flexible to adapt to changing needs?
- What are the costs and challenges in maintaining the equipment?

Initially, the question of volume must be addressed. Because robotic equipment is expensive, it is important to determine whether or not there is a return on investment resulting from reduced unit cost and movement of enough units to pay for the system within a reasonable length of time. One unfortunate example was a fulfillment company that made an eight figure investment in computers and sortation equipment, with the expectation that sufficient business would be attracted to pay for it. When the expected volume did not materialize, the company was liquidated, and most of the investment in specialized auto-

mation was lost.

Flexibility is next in importance. Your company must relate the investment in automation to its core business and its growth strategy. Unless you can guarantee that the product flowing through your distribution center will never change its size and shape, programming for flexibility is absolutely essential.

While the cost of equipment must be considered, the cost of maintaining it is equally important. If the equipment breaks down, how will the work be completed? The risk of breakdown is reduced by adding extra equipment, and keeping it available should one or more of the materials handling units fail. How quickly can a breakdown be repaired? What is the extra cost of providing necessary backup to keep the center operating?

### What's Really Working?

That is the subtitle of a 2007 research paper about warehouse automation published by Aberdeen Group.

Most systems exist in order to reduce labor costs and improve accuracy in order picking operations. Increasingly, these systems also address the inbound problem, focusing on accurate put away and replenishment. Four pressure points are identified as important reasons to seek an automated solution. They are as follows:

- We are running out of space.
- Customers need their orders faster; we need to shorten order cycle time.
- We cannot keep up with the higher order volume.
- Labor is very costly or simply not available.

Speed, accuracy and reduced labor costs are the primary goals for those who plan to automate a warehouse.

The researchers applied the PACE framework to analyze automation. The acronym describes Pressures, Actions, Capabilities and Enablers.

For example, when the pressure is from a warehouse that is running low on space, the action is the need to store more material in the same amount of space. The capability is to utilize a greater percentage of the available cubic feet in the building. Enablers could include vertical carousels or vertical lift modules.

If the pressure is to speed up customer orders, the action is to take steps to reduce order cycle time. The capability is to have ready access to product in a forward pick area. Enablers might include voice directed picking and pick-to-light.

When the pressure is that increased volume of orders cannot be met, the action is to adopt a system with greater throughput. The capability is to redesign a materials handling system with greater capacity. Enablers will include conveyors and sortation equipment.

When the pressure is from costly or scarce labor, the action is to automate wherever practical. Capability includes both faster pick rates and a system that allows rapid training, as well as work simplification to allow employment of less skilled people. Enablers include voice directed picking and pick-to-light.

Finally, researchers considered the next steps in warehouse automation. First, choose efficient pick methodology to improve both accuracy and speed in the order selection process. Second, consider automation in the shipping area, including manifesting systems. Third, consider automating reverse logistics, the processing of customer returns.

### ***Who Has It Now?***

We identified several companies that provide robotic solutions for warehouse automation.

Egemin is a Belgian company with its US office in Holland, Michigan. Among its many products is a robotic trailer loading vehicle designed to place pallets or unit loads in a trailer or intermodal container. The system will adapt to the need for pinwheel loads or other specialized loading requirements.

Jervis B. Webb Co., based in suburban Detroit, has developed robotic lift trucks that can move loads from production line to bulk warehouse locations, storage rack, or staging areas. The “Smartloader” vehicle can also remove loads from storage and take them to a truck staging area. In some systems, the vehicle can also load units into a trailer. The vehicle uses both an inertial guidance system and an onboard vehicle control computer. Paths can be installed and modified relatively easily. We have seen this product in action, and it is amazing.



Courtesy of Jervis B. Webb Company

Kiva Systems produces mobile fulfillment systems, small robots that pick up shelving pods and deliver them to the order picker. Once the desired quantity is selected, the robot returns the shelving pods to a forward storage area. In several distribution centers, implementation of the Kiva product has tripled the picking speed. At the same time, picking accuracy is improved, and the order cycle time is reduced.



Courtesy of Kiva Systems

Seegrid Corp. produces automatic guided vehicles. The name *Seegrid* refers to the ability of the vehicle to tightly control itself, or “see,” within a detailed grid of the operating space. The technology uses intelligent software, rather than expensive hardware, resulting in great flexibility and relatively low cost. The technology is currently used by GENCO in one of its major return centers.



Courtesy of Seegrid Corporation

Paketroboter is a parcel handling robot developed at Bremen Institute of Industrial Technology in Germany and manufactured by ThyssenKrupp Krause. It is able to pick up loose parcels of different sizes and weights, removing them from a trailer and placing them on a conveyor. The system is currently used by DHL.

### ***Putting It All Together***

Each of the systems described in this article will reduce headcount through the use of machines. Most of them accomplish this by replacing human travel with robotic travel. In some situations, they move the part to the order picker, rather than move the picker to the part. All of them are flexible, capable of adapting to changing products and different conditions. Presumably, those who buy these robots expect and receive a reasonable payback.

While Karel Capek’s steel robot is no longer alive and well, we may see more of the labor intensive warehouse work performed by machines designed to work without a human operator.

# ***KEN'S COMMENTS***



## ***Loyalty***

There was a time when a typical employee joined a company with the hope of staying until retirement. Some researchers claim that young people today have no loyalty and expect to change jobs every few years. Yet, even today, there are some companies that take pride in the number of people who join their ranks and never leave. How do they create loyal employees at a time when many believe loyalty is dead?

It starts at the top. It's all about how you behave, and how you treat your employees. If severe discipline is the price that must be paid for management error, today's worker may seek a more tolerant environment. Mistakes should be considered as steps in management growth, not events that deserve punishment. Effective leaders never embarrass a subordinate. This does not mean that improper behavior is not corrected; rather, it means that job performance is praised in public and criticized in private. Executives who are dedicated to helping their direct reports grow are likely to keep those people on the team.

Honesty is important. Most people will not work for a boss who demonstrates lack of integrity. The leader sets the example. If that example is not admirable, the followers will seek a better leader.

Consistency and reliability also are important. Workers want to follow a predictable leader, not one who is changeable or unreliable.

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# ***WAREHOUSING TIPS***

## ***Developing A Storage Strategy***

Three policies always should be observed in locating stock within a warehouse:

- Segregate by product velocity
- Store similar products together
- Plan for replenishment

In nearly every inventory, 80% of the activity occurs with 20% of the items. Sometimes the concentration is even more extreme. Nearly every information system used today has the capability of quickly producing an activity report that will identify the fastest moving items. If these items are not segregated, warehouse workers may find themselves walking past slow-moving items in order to select the fast movers. The result is wasted travel and wasted time.

Items that are handled in a similar manner also should be stored together. For example, product that is always shipped in full pallet quantities is stored in a separate area

Finally, the effective leader is as open with employees as possible. Sharing information is a sign of trust. Everybody hates surprises, and people will accept bad news better than the discovery that information was withheld.



## ***Logistics As The Physical Internet***

Some time has passed since *The Economist* published a 12-page survey about global logistics. The copy, as well as the title, compared logistics to the Internet. Just as the Internet has been a force to move information around the world, journalists observed that global logistics service providers such as DHL, FedEx, and UPS are performing a similar service with merchandise. It is not surprising that the journalists focused primarily on the largest companies that provide and use logistics services. They pointed out that there is a direct relationship between inventory and information. They also observed that the supply chain is quite fragile, and that a break in any of the links will have serious consequences.



## ***Service Guarantees***

It is rare to find a company with a true guarantee of service. While overnight carriers once featured such guarantees, they now have mechanisms in place to prevent shippers from filing claims. As consultants, we have guaranteed our work on nearly every proposal, promising the buyer that we either will provide satisfactory service or perform the job at no fee. Guarantees can be simple, but they also must be credible. If the delivery is not made on schedule, the cost is absorbed by the vendor. We wonder how many new customers a warehousing company might attract by offering a service guarantee that is backed up by performance.

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from product that is shipped in case or less than case quantities. Hard to handle items, such as ladders or long pipe, are best stored in cantilever rack. Product with higher risk of theft is stored in a security cage.

Every storage location must be replenished. Consider the process of moving stock from an overflow storage area to a picking location. The best storage layouts are designed to facilitate this process.



## ***Needles In A Haystack***

Writers on information technology frequently discuss the magic of "visibility." Today's warehouse and transportation management systems allow the user to identify the location of single units. But we can be blinded by data while being starved for information. We don't need to know where every box is, but we may need to know where one particular unit is located right now. In appraising visibility, it is important to find out how you can use spotlights rather than floodlights, or how to find a critical item without disrupting the operation. In effect, we need to learn how to find the needle in the haystack.

## Can't We Just Get Along?

By Bob Trebilcock, *Modern Materials Handling*, March 2008, pg. 59.

Based on interviews with logistics service providers, this article provides an unusual portrait of a failure, and steps taken to develop successful partnerships. An automotive supplier who closed its network of private distribution centers and turned the job over to a contractor failed because the manufacturer did not properly define requirements or establish key performance indicators. This resulted in missed deadlines, project overruns, and the failure to meet expectations that were not adequately defined. Several steps are required for successful outsourcing. The first is to determine, at the corporate level, whether or not logistics outsourcing is right for your company. The next step is to document internal processes and benchmark existing internal costs. Many companies do not know their internal logistics costs, and in these cases some engineering is required. The result of this research is the creation of a specification document in which the expectations of both parties are outlined. Four pricing models should be considered: Traditional unit pricing, activity-based costing, cost-plus pricing, or gain sharing. Periodic review meetings provide an opportunity to discuss necessary changes or to address immediate problems.



## Trends in 3 PL/Customer Relationships

By Armstrong & Associates, January 2008, 16 pages, [www.3PLogistics.com](http://www.3PLogistics.com)

This report is a statistical analysis of facts contained in Armstrong's two "Who's Who" research volumes for North American and International logistics service providers. In reviewing the data, remember that Armstrong considers only the larger companies, and many of these are primarily transportation firms. The details of this report can be useful to logistics service providers who want guidelines for marketing.

This topic is addressed through an analysis of the top Fortune 500 buyers of logistics services. The largest industry segment, both in dollar volume and number of providers, is automotive. Four of the five largest buyers belong to that industry. The second-largest in both the dollar volume and number of providers is the technological segment, which includes electronics, electrical equipment, computers, and office equipment. Consumer packaged goods (CPG) ranks third in number of providers but somewhat lower in total revenue. Retail is third in revenue but much smaller in number of providers. Transportation management continues to be the most frequently outsourced logistics service, followed by warehousing, and then by value added services.

## What Got You Here, Won't Get You There

By Marshall Goldsmith, ©2007, Hyperion Books.

The author is an executive coach, and the text is a primer on the coaching process. His first law is: "People will do something - including changing their behavior - only if it can be demonstrated that doing so is in their own best interests as defined by their own personal values."

Most leaders don't need to learn what to do, instead, they need to learn what to stop. A list of twenty common flaws follows:

- Winning every argument
- Adding too much value (micromanaging)
- Passing judgment
- Making destructive comments
- Starting with "no, but, however"
- Telling the world how smart we are
- Speaking when angry
- Negativity "let me explain why that won't work"
- Withholding information
- Failing to give proper recognition
- Claiming credit we don't deserve
- Making excuses
- Clinging to the past
- Playing favorites
- Refusing to express regret
- Not listening
- Failing to express gratitude
- Punishing the messenger
- Passing the buck
- An excessive need to be "me"

One of the problems with feedback is that the emphasis is on the past, not a positive future. Productive feedback requires these four commitments:

- Let go of the past
- Tell the truth
- Be supportive, not negative
- Pick something to improve yourself

When you receive feedback, never express an opinion. Simply say "thank you."

Listening is described as the skill that separates the great from the near-great.



## The Search Is On For Alternative Fuels

By Peter Bradley, *DC Velocity*, Nov. 2007, pg. 29.

A patent process to convert coal into a liquid fuel was awarded to two German scientists in 1925! Such processes are being revisited in the 21st century. UPS is experimenting with a fleet of hybrid delivery vehicles. The 21st Century Truck Partnership is an industry-government collaboration for research. Eleven nonpetroleum fuel sources are described.