

A C K E R M A N  
**WAREHOUSING  
FORUM**

*The industry publication dedicated to helping warehouse managers and their bosses improve productivity and manage more profitably with tips, comments and articles written by practicing professionals.*

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## ***Voice Recognition Technology -- Its Application In The Warehouse***

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*Editor's Note: This article borrows heavily from two excellent research papers and other important sources. Marc Wulfraat published "Voice Technology" in the Distribution Center ©2002 by KOM International, Inc. [www.komintl.com](http://www.komintl.com). Sam Flanders of Warehouse Management Consultants published "Voice Directed Picking", ©2002, [www.2wmc.com](http://www.2wmc.com). Ken Finkel of Voxware, Inc. ([www.voxware.com](http://www.voxware.com)) provided metrics from users of his systems. Paul Schwartz and Mark Vanden Heuvel of Warehouse Specialists Inc. ([www.wsinc.com](http://www.wsinc.com)) gave us information on implementation of voice technology in a third-party warehouse. Joe Andraski of OIM International provided information about implementation of warehouse management software. We first wrote about this product in October—write to us if you need a copy. KBA*

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Voice recognition technology is a method of performing order selection and other warehouse tasks by using verbal commands that are given to or received from a human. A worker wears a headset with a microphone, as well as a small control unit worn around the waist. Voice communication is transmitted to and from a host computer via RF (radio frequency) transmission.

### ***How does it work?***

The host computer converts text-based instructions into speech commands either through a pre-recorded text file or with text-to-speech conversion software. These instructions are placed into a prioritized queue for assignment to warehouse workers. The worker confirms that the command has been executed by speaking into the headset.

For example, the host computer might be an outbound shipping order that would normally be printed on a pick list. The worker is verbally instructed where to move to make the first pick. He or she confirms the location by stating the random check digits that appear on the rack beam above the product's pick location. If the check digits match the expected response, the system instructs the selector on the quantity to pick. The operator confirms that the quantity has been picked by repeating the number.

In one variation of voice recognition technology, a countdown approach is used. Instead of confirming that 5 items are picked, the worker counts out: "5-4-3-2-1." This eliminates pick errors on the part of the worker that are quantity related.

If the pick location is empty or short of the required quantity, the operator reports this and proceeds to the next pick. Ideally, the software triggers a number to replenish this pick location. If the operator forgets or does not hear the command, he can request that the instruction be repeated. When necessary, other information such as catch weights or serial numbers can be entered by voice as the product is handled.

### ***The range of applications***

The most widely used application of voice recognition technology is order selection, and the technology can handle at least three varieties: full case order picking, split case picking, or the picking of uncartoned merchandise such as garments or tires. Voice systems are also used for receiving. They can be used for put away and replenishment forklift operations. What's more, they also are used in package sortation, particularly for non-labeled packages, as well as cycle counting.

### ***What are the competitive options to voice?***

Two common alternatives to voice recognition are bar code scanning and pick-to-light systems. Today, scanning



Courtesy of Vocollect

devices are somewhat less expensive than speech recognition terminals, and therefore they represent a more cost effective solution for small distribution operations. Because the scanner is faster than a human can read or talk, bar coding makes sense when a great deal of information (such as long serial numbers, lot numbers, or other product descriptions) must be captured with each transaction.

Pick-to-light systems are designed for the split-case picking of product stored in case-flow racks. The worker picks an order by responding to a light that indicates the location and the quantity. When the product has been selected, the operator pushes a button to signal completion and waits for the next location to illuminate. This technology allows picking speed of 300 to 500 lines per hour (one every 10 seconds), and speech technology cannot always match this velocity. However, pick to light is a less flexible solution because it requires a fixed-equipment installation should the equipment need to be moved. If more SKUs are added, the pick-to-light installation must be modified at substantial expense.

### ***Can you justify the cost of voice?***

The majority of voice technology users surveyed by KOM International cite order accuracy as the primary benefit of the technology, and with a reduction in picking errors between 70% and 90% and short-shipments by about the same, users cost justify the investment.

Increased productivity is usually cited as the second greatest benefit. The most unique advantage of voice over other technologies is that it keeps both of the order selectors' hands free as they complete their tasks, allowing them to focus on travel and products, rather than on keyboards, displays, or pick lists. This not only increases their productivity, but minimizes visual fatigue as well.

As a result, many operators report gains of 5% to 15% in productivity with voice recognition technology. Productivity gains are higher in refrigerated warehouses where workers wear gloves. Gains also are higher in situations where the order selectors must read and record each item's case weight.

Flexibility usually is cited as the third most important advantage of voice technology. It can be used for many different types of applications without any change in hardware. An individual worker might perform receiving with a voice unit in the morning, and then move to order picking with the same equipment in the afternoon. The equipment can be used anywhere in the warehouse where there is a suitable radio signal. It can be used with any product, including items that have no bar codes or are poorly marked. Unlike scanners, voice technology functions well in facilities that have less than ideal lighting.

Training is more cost effective than other order selection options. With conventional order selection, experienced workers usually walk alongside a new hire for designated training. Because voice directed commands prompt the worker, just as a trainer would prompt a trainee, fewer training hours are required. What's more, companies interviewed by KOM International reported that new hires were able to achieve the standard productivity rate in about three weeks, although they required seven weeks under the previous system.

Some voice systems can switch quickly from individual order picking to batch picking. Batching of orders can greatly reduce travel time. In a batch picking situation, the instruction might say "pick five, distribute 2 to order A, 1 to order D, 2 to order F."

Elimination of paper is possible with the voice technology. The pick list is always eliminated, and some users can also stop the printing of pick labels or bar-code labels.

In addition, improved ergonomics and safety result from the ability to work with hands and eyes free to focus on the order selection function. This advantage is particularly valuable when order selection involves heavy merchandise and mobile equipment.

Some companies have enjoyed an unexpected reduction in employee turnover as well. A younger generation of workers appreciate the "cool" factor of using high-tech equipment. They are pleased to be part of a more sophisticated job function.

In most applications, voice systems allow real-time transmission of inventory information. Just as soon as product is moved, inventory records can be adjusted. This feature is particularly valuable in high-volume operations where the timing of replenishment is closely synchronized with order picking.

The cost of voice recognition technology is related to the number of users, not to the number of SKUs or locations. In contrast, the purchase of pick-to-light or automated storage and retrieval (AS/RS) systems becomes more costly as the number of items increases. Therefore, voice becomes particularly attractive for a warehouse that has a large number of SKUs.

Furthermore, voice systems can accommodate multiple languages and is advantageous for distribution centers with a significant number of non-English speaking workers. Each operator has the ability to record an individual voice template in the language of his choice. However, we suspect that some immigrants who are learning English will want to use the system to perfect their understanding and speaking ability in their new language.

### ***Why do some managers reject voice?***

There are seven frequently heard objections to voice recognition technology.

- The most common objection is that "voice is a 'leading edge' technology." Yet voice recognition has been used in Japanese warehouses for at least 20 years. Initial American research on speech technology dates back to World War II, and its application in warehouses in the U.S. is about 10 years old with successful installations in many large distribution centers.
- "Voice could not be as fast as other technology solutions." As stated earlier, there are cases where scanning or pick-to-light may be faster. However, in general, voice is as fast or faster than any other solution, and accuracy is always improved.
- "I can't afford it!" The cost of voice has been a primary objection to the technology, but prices have decreased in the past few years, and rapid paybacks are frequently reported. Warehouse Specialists Inc., a third-party warehouse operator, estimates a

payback between 13 and 16 months for its system in Wisconsin.

- “Our people won’t like it.” Research with users finds exactly the opposite, as reported earlier.
- “It won’t work in our noisy warehouse.” I observed a voice system operating successfully in a grocery warehouse that had above-average noise levels. Most systems are designed to function in a noisy environment.
- “Headsets will create safety issues.” The headset covers only one ear, and it is designed to allow the selector to hear other noise. Voice systems comply with OSHA requirements.
- “I already have a warehouse management system (WMS), and we don’t want the confusion of two systems.” Voice systems are designed to complement existing inventory or warehouse management software. Properly installed, they will supplement existing systems rather than trying to replace them or compete with them.

### ***Warehouse management integration***

In most, but not all warehousing situations, voice technology is relatively easy to integrate with existing WMS solutions supporting radio frequency tasks. At the same time, some WMS suppliers may claim an alliance partnership that does not really exist. Therefore, ample homework is recommended, using computer simulation to take a “test drive” of the integration capability.

The key question, however, is whether or not the WMS solution can take full advantage of all the features of voice technology. For example, will it provide real-time information transfer on each pick transaction? If so, will the timing of replenishment be synchronized with the order picking operation? How will a short pick be dealt with? When the picker indicates a shortage situation, the system should do three things: (1) replenish the pick location, (2) order a new pick task, and (3) direct a cycle count to discover why the discrepancy occurred.

### ***How much should a voice system cost?***

KOM International reports that the hardware for each order selector will cost \$5,000 to \$6,000 per unit. The

software interface to make it comparable with existing systems will cost about \$30,000. Installation of the RF network, if it does not already exist, will cost \$20,000, plus \$3,000 for every 40,000 square feet of warehouse. Training and implementation could range from \$30,000 up to \$100,000, depending on the size of the operation and the number of software modifications needed. Warehouse Specialists Inc. reported a total cost of approximately \$5,000 per order selector for the acquisition of its system, which operates in tandem with a Provia WMS.

### ***Justifying the investment***

One foodservice distributor reported that with voice recognition technology, the number of mispicks moved from .74 per 1000 to .18 per 1000, and shortages moved from 1.02 per 1000 to .49 per 1000. At the same time, productivity increased from 107 cases per man-hour to 119. In the same warehouse, training costs were reduced by 60% and worker turnover was reduced by 47%.

In another case example, a company ships 500,000 cases per week at a cost of \$15 per case or \$7,500,000 per week. If order accuracy is 99.3%, mispicks cost \$683,000 in lost sales at retail. By bringing order accuracy up to 99.8%, annual lost sales are reduced to \$195,000. This is a gain of \$488,000, versus an estimated \$450,000 to implement speech technology in this warehouse. Therefore, reduced lost retail sales alone will pay for the system in the first year. Then improved productivity, reduced training costs, reduced customer returns and improved retention of people add to the savings advantages.

#### **Suppliers of Voice System Software**

Vocollect Pittsburgh, PA	(412) 829-8145
Voxware Princeton, NJ	(609) 514-4100
Syvo Denver, CO	(303) 938-1110

## ***The WMS Is No Longer An Option***

Unfortunately, there are still a number of third-party warehouse operators who claim that they can survive by using their client’s Warehouse Management Systems (WMS). The old argument is that each client wants their work done on a system unique to them, and therefore if the warehouse used yet another system there will be redundancy, needless expense, and maybe even chaotic performance. We are past that point.

Steve Mulaik of The Progress Group helps make this case in an article that he wrote for IWLA’s Newsgram. No matter what kind of system the customer may have, the warehouse operator has much to gain by using any internal WMS—especially since an internal WMS will be de-

signed to prevent order picking errors, a feature not common in most clients’ systems.

What’s more, clients’ systems probably won’t illustrate the best order picking path in the warehouse, simply because no two warehouses are alike. It cannot guide you on the size and dimensions of zones for the same reason.

But what about the cost? How can the smaller operator afford to buy a WMS? With the development of ASPs (see our Vol. 15, No. 12 or write if you need a copy), the smallest operator can purchase a system and pay for it with a fee for each warehouse transaction. Would anybody consider using a warehouse that did not have a single lift truck? Today, the WMS is just as essential as the lift truck.



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# WAREHOUSING TIPS

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## *A Wolf In Sheep's Clothing*

By Bruce Greenfield, B. Greenfield & Associates, (bgrnfl@aol.com)

You do your best to make sure your warehouse employees are honest. You check references from past employers, run police background checks, and interview every applicant personally. But consider this:

- People don't give bad references. Even if this were not so, in our litigious society, former employers often won't do more than verify position and dates of employment.
- Background checks reveal convictions of crimes, and the smarter thieves don't always get caught.
- While personal interviews are essential, it's not always easy to spot one's potential for dishonesty.

So what's the solution? Consider testing employees for honesty and integrity.

According to a study conducted by the Michigan State University School of Business, pre-employment psychological or personality testing is the single greatest predictor of future success, by a three-to-one margin over interviews, past experience, or education. Such tests also can measure honesty and integrity, not only in new hires but also your current staff.

A good honesty assessment tool should have these characteristics:

- Measures for evaluating *behaviorally-based attitudes* towards honesty and integrity.
- Statistics showing that the assessment is both *reliable* and *non-discriminatory*.
- A built-in *validity scale* to ensure truthful answers.
- Suggested *questions for interviews* after testing.
- *Timely test administration*, preferably in-house.
- A *cost effective*, fee to allow for comprehensive use with current employees in your organization.

One such instrument is the Insure Survey, part of the Hiring Suite package developed by Advanced Psychometrics Incorporated. Benefits reported by users of the Insure Survey include reduced employee theft, lower absenteeism and tardiness, reduced workplace alcohol and drug abuse, and improved workplace safety. The test includes 124 objective questions (i.e., yes/no or strongly agree, agree, etc. answers), takes less than a half-hour to complete, a few minutes to score, and costs \$15-18 per person. (Compare that to the potential costs of hiring mistakes.)

Employees and applicants will either fill out a paper survey form or answer the questions on-line at a PC. The test is scored on a PC as well, and is now available through the World Wide Web.

The respondent is graded on four attributes: integrity, reliability, work ethic, and substance abuse, with sample responses supporting the scores. It also provides a report which gives an overall summary of the results, targeted questions to ask during a follow-up interview based on the

test responses, and it includes a distortion factor to measure an applicant's truthfulness while taking the survey.

In addition, the Hiring Suite package also includes companion assessment tools designed to measure basic work-related skills (mathematics, vocabulary, problem solving, and spelling), and personality traits essential to success in any position. These can be used independently or in conjunction with the Insure Survey.

So help is out there. Take advantage of these proven assessment tools. They are affordable, available, and easy to use. After all, you owe it to yourself and your company to do everything you can to keep "a wolf in sheep's clothing" from coming through your door—and leaving with who knows what? Keep us informed of your experiences or recommendations on similar honesty assessment instruments that have worked well for you. The author invites your email response to the address shown above.



## *Keeping A Trucker Friendly Warehouse*

The warehouse operator who maintains a trucker friendly warehouse will benefit in many ways. Therefore we were intrigued by a new product that helps truckers eliminate the need to keep their diesel engines idling. It is difficult to shut down diesel engines in cold weather because they may be difficult to restart. Furthermore, power may be needed for cabin heat, A/C, or to power a cargo refrigerator unit. So diesel tractors are often idling when the rig is not on the road, but idling engines are expensive, smelly and noisy. IdleAire is a new product designed to provide all of the services usually maintained by an idling engine. The product is permanently installed in truck parking lots, with a console designed to place in the window of the cab. Some of these units are installed at travel plazas along the New York State Thruway. Truckers using these devices pay a fee of \$1.40 per hour, and they can pay by swiping a credit card at the console. This fee is 20 percent less than the fuel cost per hour for an idling engine. Furthermore, the device offers two extra features: power for cellphones, computers, televisions or other small appliances and a block heater to warm the engine's oil. Warehouse operators installing this product may find an active market among visiting truckers.



## *Freight rate increases — problem or opportunity?*

This summer has seen an unusual amount of pricing changes in the trucking industry, particularly for LTL carriers. Consultant Ray Bohman reports that these rate increases range from 5.5% up to 7.3%, and many carriers have also raised their minimum fees. Warehouse operators should remember that one of the prime justifications for a distribution center is to save freight costs. In the years before rate deregulation, many third-party warehouse operators used freight consolidation programs to save money for their customers. Freight consolidation went into decline after deregulation, but increasing costs might create a renaissance. Stay tuned!

# KEN'S COMMENTS

## *Consider Why Before How*



We recently heard a good presentation on the implementation of WMS software, and one of the conclusions was somewhat surprising. In addition to outlining the “nuts and bolts” of system implementation, the presenter placed particular emphasis on the “why” of the system selection decision.

These days, most companies have developed a mission and vision statement, and even those that haven’t surely have some understanding of short and long-term goals. Consideration of the mission should be the first step in any selection of a new system, whether it involves software, hardware or just operating procedures. Ask yourself why you need a system in the first-place? What will it do that you could not have accomplished without it? How will it support your company mission? It is tempting to get so wrapped up in the minutiae of system function that we overlook the big picture.

Consider these examples:

- If your company is dedicated to providing distribution services at the lowest possible cost, your decision on systems will be quite different from a company whose prime mission is to provide the finest customer service.
- If your goal is to reduce order cycle time, the system needs to be different from that adopted by a company that is concentrating on error reduction.
- If your goal is to increase market share, some of your decisions will be different from those taken by a company that has the prime goal of improving profit performance.

Remember that systems vendors get paid for making a sale. Most of them will show concern about whether the system is right for you, but others have a motivation to sell that outweighs their concern about implementation. By placing the “why” first, you’ll have a clearer sense of priorities, which will guide you through the purchasing process and help you avoid buying a square peg that will not fit in the existing round hole.



## *Experimentation In Warehousing?*

Warehousing has never been a business noted for innovation. In the minds of most observers, it is a highly traditional, slow changing industry.

At the same time, warehousing has changed more in the past two decades than in the previous century. We tend to forget that there remain significant opportunities for innovation in this industry. Since warehousing is essentially

the management of space and time, the experiments should be centered on better ways to use both.

More than three decades ago, a warehousing operator in Ohio experimented to develop a new method of storing automobile engines. The result was significantly higher storage density and a material handling cost which was no higher than the methods previously used. Because the experiment was successful, the auto manufacturer soon became the largest client for the warehousing company.

Far more innovation opportunities exist today. The only things required are a willingness to take a risk and the ability to combine new and traditional technologies.



## *Value Shift*

A characteristic of the 21st century is the changes in values of services rendered. A leading hotel chain reports that it makes more profit on the rental of in-room television movies than it does on its restaurants. Yet restaurants have been part of the hotel since the beginning of time, and rental movies are a relatively new service. Similar shifts in values can be seen in the warehousing industry. There may have been a time when reduction of order cycle was seldom discussed, but few would question its enormous importance today. Inventory visibility was an unknown concept until recently, but now software experts promise that visibility is an essential part of today’s supply chain culture. Managing inventory has always been an important part of warehousing, but today information has superseded inventory. It is this emphasis on information that has caused most of the changes in warehousing.



## *Raising Productivity— It’s All About Balance*

Articles and speeches on productivity usually concentrate on hardware. Spend \$10 million for pick modules, conveyors, sorters, palletizers and depalletizers and you can hope to achieve a payback in 4-6 years.

But what about some simpler solutions? “Hurry up and wait” is a phrase associated with the military, but it may be the biggest thief of productivity in warehouse operations. It happens when one or more segments of the handling system runs at a slower rate than others. For example, the order picker in zone 1 picks at 200 cases per hour and the picker in zone 2 has a rate of 175 cases per hour. This imbalance, if not corrected, creates the waste of time resulting from waiting. But imbalances are correctable, and it does not take a multi-million dollar investment to do this.

Improved scheduling is the easiest way to restore a balance. When there is a bottleneck, use more bottles. Space can be used to save time – staging can serve as an accumulator when one operation is slower than another. Sometimes extra people can restore the balance.

Whenever you see someone waiting in your warehouse, find out why. Then look at all the options to widen the bottleneck. Look at ways to alter the sequence to reduce or eliminate the waiting. This will materially improve productivity, and often you can do this with little or no capital investment!

## Closing the 3PL expectation gap

By D.C. Ruriani, *Inbound Logistics* June 2002, pg. 64.

Based on an interview with Michael J. Gardner of APL Logistics, this article provides 10 tips to help you get what you need from your third-party logistics (3PL) relationship:

- ① Before you send an RFP (request for proposal) send an RFI (request for information).
- ② Be forthcoming about issues that could affect your logistics operation.
- ③ Be specific.
- ④ Use training to empower your 3PL personnel.
- ⑤ Treat your providers as partners.
- ⑥ Don't push for a quick response to the RFP.
- ⑦ Ask the bidder for solutions – leaving room for creativity.
- ⑧ Be diligent about collecting accurate data.
- ⑨ Maintain communication with your 3PL.
- ⑩ Try to fix the problem instead of immediately looking for a new partner.

## The Shadow Organization in Logistics

By Jo Ellen Gabel and Saul Pilnick, copyright 2002 by CLM, 372 pp., softcover, non-member unit cost \$75.

This well-written text demonstrates the pervasiveness of corporate cultures and the enormous difficulty of achieving a culture change. However, the book does a better job of describing the difficulty than it does in solving it. The book has many graphs and quotations. This quote that follows a chapter on individual power is illustrative: "like the tornado started by the flapping of butterfly wings, the power of one starts the change process." An interesting statement, but we are unaware of any tornadoes that started this way. Unfortunately, this text written by psychologists will probably be more useful to other psychologists than to the average warehouse manager.

## Change The Way You Persuade

By Gary A. Williams and Robert B. Miller, *Harvard Business Review*, May 2002, pg. 64.

The authors of this piece are the leaders of Miller-Williams Inc., a customer research firm. They claim that there are five styles of decision-making, each of which requires a different method of persuasion. They divide executives into these five categories: charismatics, thinkers, skeptics, followers, and controllers, admitting that "critics might view some of our categorizations as derogatory—after all, few executives would like being classified as followers or controllers." Then they describe how a manager would persuade those in each group. They point out that "the attention span of a charismatic can be particularly short". Similar observations are made on each category. We wondered how a reader could reliably place another person in one of these five groups.

## Warehousing Salaries and Wages

Copyright 2002, published by Warehousing Education and Research Council, [www.werc.org](http://www.werc.org), 104 pgs.

This is the second edition of a useful management survey. 382 warehouses participated in the study, versus 335 when a similar study was done two years ago. The response rate was 17 percent. The highlights page lists average and median compensation for seven salaried positions and four hourly wage positions. Subsequent pages provide substantially more detail, including breakouts by type of warehouse and geographical area.

## Handbook of Supply Chain Management

By James B. Ayers, copyright 2001 by CRC Press LLC, hardcovers, 460 pp., available from APICS or from this web site: [www.crcpress.com](http://www.crcpress.com).

This very readable text book contains 49 chapters divided into four sections: supply chain overview, the supply chain challenge, supply chain methodologies, and (supply-chain) case studies. Thirteen different authorities contributed to the text, but Ayers has skillfully edited these contributions to provide a unity of style not often found in multi-author handbooks. Well-organized and attractively presented, this book is better than most of the competitive texts on supply chain management.

## Future Capable Company

By James A. Tompkins, Ph.D., ©2001, Tompkins Press, 198 pages.

This book is directed primarily to manufacturing, but the thoughts about warehousing make it worthy of attention. The book points out the key role that warehouse management systems (WMS) play in warehouse operations. The role of warehousing and inventory management and cost reduction strategies are also addressed. The text explores 12 requirements of success for the companies of the future and then explores each of the 12 in succeeding chapters.

## Lift Truck Designers Push The Right Buttons

By Mary Aichlmayr, *Transportation & Distribution*, April 2002, pg. 40.

The most significant finding in this review of new designs in lift trucks is this statement: "If an AC truck is available for the same price, there is no reason to buy a DC truck." This new electric motor development, first offered by Toyota, was reported in The February 2001 issue of this newsletter. Now it seems that other brands of electric trucks are climbing onto the AC bandwagon. The AC motor offers higher speeds and less energy consumption.