

## Evaluating Warehouse Technology By Jon Schreibfeder

Distributors buy products and then sell them at a higher cost to generate profits. As was discussed in module 18, any material that is purchased that cannot be sold or used to sell other products is “lost” material. Lost material includes inventory that is not only lost but also stolen, broken or is somehow made unusable or unsalable. Lost material is an additional cost to the distributor. Like any other cost this additional expense lowers profits and can even result in the company losing money. But these losses do not only involve material. One of a distributor’s biggest operating expenses is warehouse labor. Inefficient use of labor resulting in lost productivity also results in unnecessary cost increases.

A warehouse management system (WMS) has the potential to minimize a distributor’s cost of inventory control. Inventory control is the process of protecting the material that is contained in your warehouse and minimizing the cost of filling orders. The savings provided by a properly implemented “best practice” WMS system can far exceed the cost of the hardware, software and training. This module will explore some of the benefits a distributor can realize from a WMS system and how to evaluate if it would be a good investment for your company. Let’s start on the receiving dock where incoming shipments arrive from suppliers.

### **Receiving Department Efficiencies**

Every time material is handled a distributor’s costs increase. On the receiving dock:

- Handling the same package two or three times before it gets to its normal storage location doubles or triples the distributor’s costs
- Every time a piece or package of an item is handled there is a chance that the inventory will be misplaced or damaged resulting in “lost” material

A WMS system can minimize these costs by:

**Cross Docking Material** – Cross docking is the process of filling existing sales, transfer and production orders while material is still on the receiving dock. Labor is not wasted by putting material away and then immediately pulling it out of stock to fill orders. The risk of damage is also reduced as the inventory used to fill the outgoing orders is handled fewer times. Finally, cross docking ensures that incoming stock is used to fill the intended outgoing order. If incoming material that is committed for a specific customer is put away in the warehouse there is always the chance that it will inadvertently be given to another customer.

A good WMS system notifies the receiving clerk of the quantities of items on an incoming order that have been reserved for specific customer orders. It will create the picking orders and packing slips to fill these orders. Afterward the system will notify the receiving clerk of other existing orders that can be filled from the portion of the incoming shipment that remains on the receiving dock. The orders to be filled are listed in the priority previously determined by the distributor’s management.

**Receipt Verification** – Many products are similar in appearance to other items. When a receiving clerk uses WMS technology to scan the bar codes on incoming packages the system will verify that the products being received match those listed on the purchase or transfer order. Automatic assurance that the “right” products are being received prevents the “waste” of time and labor of dealing with unwanted material.

**Directed Putaway** – One of the goals of effective inventory control is to store products to minimize the cost of filling orders. State of the art WMS systems will direct receiving personnel where to put each piece of each product received on an incoming shipment. It will then verify that the material was placed in the right location by having the putaway clerk scan both the bar code on the material and the bin location. By directing material putaway the WMS system:

**Minimizes the risk of loss** – The WMS system remembers where each piece of each product has been stored

**Maximizes the use of available storage space** – The system not only tracks how much space is available but also determines the accessibility of each location. Best practice WMS systems ensure that items that are pulled most often are located in the most accessible bin locations. Slower moving products and material that needs to be placed in overstock or bulk storage is directed to less accessible bin locations.

## **Material Storage Efficiencies**

One of the biggest unnecessary wastes of time involves warehouse personnel searching for lost material. Material located in the wrong location is also often forgotten and reaches its expiration date before it can be sold or used. A good WMS system helps warehouse management effectively control the space in the warehouse to minimize lost, damaged and expired material as well as minimize the cost of filling orders. A WMS system will identify and determine the space required for three types of storage bins:

**Fixed Locations:** These “pick” bin locations contain quantities of stocked items used to fill current orders. WMS systems will utilize forecast demand and product volume information to determine the best type of storage unit (e.g., shelf, pallet rack, etc.) and the space required in that storage unit to contain enough of each item to fill orders for a specific number of days.

**Random Locations:** Where each fixed location will hold one or more specific items random locations can hold any item if space is available. Random locations are typically used to hold bulk and surplus quantities of products that cannot fit in an item’s assigned fixed location.

**Holding Locations:** Holding locations contain products that are owned by the distributor but are not currently available for sale or use. Material in holding locations includes items that need to be inspected, reworked or returned to a vendor. *It is imperative that material in holding bins is not included the quantity displayed to salespeople and other users as being available for sale or use.*

There are several ways in which effective bin location assignment reduces losses of material and time:

- Fixed bins can be restocked to capacity on a scheduled basis so that pickers do not have to waste time making repeated trips to random locations to retrieve material needed to fill orders
- Bin refilling personnel can be notified of the exact random storage location of surplus or bulk quantities of a product. This eliminates “treasure hunt” like searching for material and minimizes the time necessary to replenish fixed bin locations as well as fill orders for large quantities of an item
- Material in holding bins can be closely monitored (i.e., the date the material was placed in the holding bin, the date the next action for this material should be taken, etc.). This allows management to be sure that material flows out of holding bins to be processed before it is too old and must be liquidated.

### **Order Fulfillment Efficiencies**

Most warehouse activity involves filling outgoing orders. An effective WMS system will minimize time and material losses associated with order filling activities. Features that lead to savings include:

**Product Verification.** The bar code or voice recognition features of a WMS system verify that the item being pulled from stock is the one called for on the sales or transfer order. Time is not lost in correcting situations where material was picked in error. Lost sales resulting from disappointed customers are also minimized as the correct quantity of the right items is consistently pulled from stock to fill orders.

**Lot Tracking of Material.** It is imperative that items with expiration dates be filled on a FIFO (i.e., first in – first out) basis. A “lot” contains quantities of a product that were produced by a manufacturer at the same time in the same production run. A WMS system will direct the order pickers to the locations and the lots that contain the quantities of products with the shortest shelf life. The result: the elimination of overlooked quantities of now expired products that must be liquidated. The tracking of lot numbers by a WMS system also allows a distributor to easily meet government or industry product tracking requirements.

**Directed Order Picking.** A good WMS system directs an order picker along the most efficient path through the warehouse when picking orders. To minimize order fulfillment time, the system will send the order picker to the location that has the oldest stock or contains the entire quantity needed to fill the product. Backtracking and “dead head” time (i.e., the amount of time workers spend traveling through the warehouse without material) is minimized.

**Wave Picking.** Wave picking is the process of an order picker filling multiple one or two line orders in one pass through the warehouse. The WMS system provides a single packing list with the total quantity of each item that must be pulled from stock as well as how it must be allocated between the orders being filled.

**Zone Picking.** Many warehouses contain hundreds of thousands of square feet in storage space. Others are comprised of multiple floors or buildings in which material is stored. It doesn't make sense to send a single order picker through the facility to fill a single order. To alleviate this problem a WMS system can utilize zone picking. When utilizing zone picking, the system creates separate picking documents for each area of the warehouse. The picker in each area fills the items stored in his or her section and sends the material by conveyor to the shipping and staging area where the material on the order from each section is consolidated, verified for accuracy and packaged for shipment.

### **Accuracy Efficiencies**

It is critical that the quantities of an item in a distributor's computer system agree with what is physically in the warehouse. Losses from inaccurate on-hand quantities include:

- Time spent looking for lost material
- Time spent running out to the warehouse to physically check that a specific quantity of a product is available rather than relying on the quantity displayed on the screen of an inventory inquiry
- The cost of replacement material that must be ordered to replace quantities of products that were lost or simply disappeared from stock

Because WMS systems require that material is "scanned" into and out of each location the chances of material being lost or misplaced are greatly reduced. The system "knows" where every piece of every product is located at any point in time. But WMS systems also allow distributors to quickly and efficiently ensure that on-hand quantities remain accurate through comprehensive cycle counting programs. Cycle counting is the process of counting the on-hand quantities of a specific number of products every day. Various WMS systems feature different cycle counting methods:

**Rank Based Cycle Counts** – Every time someone goes to a bin to fill and order there is the chance that a mistake will happen. For example, the wrong quantity of the product may be removed from the bin location. Indeed, those items in your warehouse with the most accurate counts are probably your slowest moving products and dead stock. In a rank based cycle counting program the WMS system will identify those products that experience the most activity and automatically schedule these products to be frequently counted. High value products and products with a history of count discrepancies may be added to the group of products that is counted most often.

**Random Based Cycle Counts** – There are unfortunate circumstances where management suspects employees of theft. One of the best deterrents of inventory pilferage is to randomly count products. If a dishonest employee doesn't know what products will be counted on a specific day, he or she will be less inclined to steal material. Most WMS systems include several methods of randomly selecting products to be counted.

**Continual Cycle Counts** – Distributors do not make money cycle counting products. Cycle counting is an expense of doing business. Continual cycle counting incorporates count verification into the order picking process. The WMS system monitors when there should be a low quantity of a product in a bin after a quantity to be picked has been removed from that bin. The WMS system then requests that the order picker verify the remaining quantity in the location before proceeding to pick the next item on the order.

Regardless of the method(s) chosen, the process of continually verifying inventory accuracy through a WMS cycle counting program provides a more accurate inventory at a lower cost than a traditional full physical inventory. In a full physical inventory, normal operations are suspended while all employees try to count all of your items in a limited amount of time. Overtime costs and lost productivity due to the shutdown increase the distributor's costs while hampering customer service.

### **Evaluating the Investment in Technology**

WMS systems and other technological solutions can be very attractive, but remember “all that glitters is not gold.” Enhancements to any system must also be cost effective. Most companies want new warehouse technology to pay for itself by lowering the cost of filling orders or some other material-handling operation. In other words, the savings received for implementing the new tools has to be greater than the cost of the new equipment, training and other implementation charges. You can utilize a Total Warehouse Cost Index (TWCI) to determine the cost difference in operating a warehouse with and without the new technology. The TWCI is calculated with the formula:

Total Warehouse Operating Cost per Month ÷ Line Items Successfully Shipped per Month

The total warehouse operating cost per month includes:

- Total Warehouse Labor. *Note that this includes all warehouse labor that is not involved in some sort of assembly or value added process. This includes shipping, receiving and counting. That is, all of the functions that support the filling and shipping of orders.*
- Warehouse Taxes
- Warehouse Utilities
- Expensed Equipment
- Warehouse Space
- Depreciation on Capital Investments [most capital investments are depreciated (i.e., the costs are expensed) over a five to seven year period]
- Expensed Software
- Expensed Training
- Expensed Warehouse-Related IT Costs

Line items shipped successfully include all line items which did not experience a problem. Problems include:

- Wrong quantity was shipped
- Wrong product was shipped
- Customer received damaged material
- Customer did not receive proper documentation
- Material delivered to the wrong address

The line items with errors are subtracted because they represent wasted effort! You normally have to send out a replacement shipment or take some other remedial action. It costs you twice as much to fill the order!

New technology will add to your capital equipment investment and other expenses. But will it reduce your total labor expense? If it does your total warehouse operating cost may be lower. If the new technology provides additional capacity or reduces your errors, it may increase the number of line items successfully shipped. Let's look at an example:

Currently a warehouse is filling 10,000 line items per month with an average of 400 errors. The total warehouse operating cost is \$62,380 per month. The TWCI is \$6.50 per line item:

$$\$62,380 \div (10,000 - 400) = \$6.50$$

The company is anticipating a 30% increase in business over the next year. This means that 13,000 line items will be shipped. Using their current system, the company will have to add two additional warehouse people (\$4,800 additional labor expense) and an additional \$1,000 in other expenses (it is assumed that the error rate will remain the same). The projected TWCI at the end of the year will be reduced to \$5.46 per line item (it is assumed that errors will also increase by 30% to 520 per month):

$$(\$62,380 + \$4,800 + \$1,000) \div (13,000 - 520) = \$5.46$$

Note that the TWCI tends to decrease when the volume of orders increases (up to a "saturation point where people and material can no longer efficiently move in your warehouse). But could this distributor save more by implementing new technology?

This company finds that implementing a WMS system will increase depreciation and other expenses by \$5,000 per month. At the same time, it promises to reduce labor expense by \$1,100 per month (even though more line items will be shipped). The company will still incur other additional expenses of \$1,000. This means that total warehouse operating expenses will increase by \$4,900 (\$5,000 - \$1,100 + \$1,000). Other companies that previously implemented this WMS system report a line item picking error rate of 2% and the capability to process up to 20,000 line items per month with the configuration this firm is implementing. As a result, there is plenty capacity to handle the distributor's planned expansion. The projected TWCI at the end of the year will be \$5.28 per line item:

$$(\$62,380 + \$5,000 - \$1,100 + \$1,000) \div (13,000 - 260) = \$5.28$$

In this case the implementation of automation will reduce overall costs (if indeed labor and errors are reduced). But what if there were no labor savings of \$1,100 and the error rate remained 4%? The TWCI would then be:

$$(62,380 + \$5,000 + \$1,000) \div (13,000 - 520) = \$5.48$$

In this last scenario, the company's cost of filling an order will actually be higher after implementing the new technology (\$5.48 after implementing technology versus \$5.46 before implementing technology). *It is very important not only to calculate the TWCI before and after the implementation of new technology, but verify that any claims of savings are well documented and you can see them proven at other installations of the system!*

## Test Your Knowledge

1. A WMS system will do which of the following (choose all that apply):
  - a. Direct putaway personnel as to which bin should store new received material
  - b. Inform receiving personnel what recently received material can be used to fill existing customer orders
  - c. Ensure that material for outgoing orders is picked on a FIFO (first in -first out) basis
  - d. Inform buyers as to when to order products and how much to order
2. True or False: A WMS system always pays for itself in savings within 12 months of implementation
3. What is the Total Warehouse Cost Index for this facility:
  - Total Warehouse Operating Cost per Month = \$75,000
  - Average Line Items Shipped per Month = 11,000
  - Average Picking Errors per Month = 500
4. After the implementation of a WMS system the facility experienced the following results:
  - Total Warehouse Operating Cost per Month = \$82,000
  - Average Line Items Shipped per Month = 13,500
  - Average Picking Errors per Month = 150

Was the WMS system a good investment?

Answers:

1. A WMS system will do which of the following (choose all that apply):
  - a. Direct putaway personnel as to which bin should store new received material
  - b. Inform receiving personnel what recently received material can be used to fill existing customer orders
  - c. Ensure that material for outgoing orders is picked on a FIFO (first in -first out) basis
  - d. Inform buyers as to when to order products and how much to order
2. True or **False**: A WMS system always pays for itself in savings within 12 months of implementation

3. What is the Total Warehouse Cost Index for this facility:

- Total Warehouse Operating Cost per Month = \$75,000
- Average Line Items Shipped per Month = 11,000
- Average Picking Errors per Month = 500

$$\$75,000 \div (11,000 - 500) = \$7.14 \text{ per line item}$$

4. After the implementation of a WMS system the facility experienced the following results:

- Total Warehouse Operating Cost per Month = \$82,000
- Average Line Items Shipped per Month = 13,500
- Average Picking Errors per Month = 150

$$\text{TWCI} = \$82,000 \div (13,500 - 150) = \$6.14 \text{ per line item}$$

Was the WMS system a good investment? **Yes. Order fulfillment costs were reduced by \$1 per line item**