



Warehousing and Distribution



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Introduction

Overview

Once thought of as simply storage places, the modern warehouse is much more than that. It is a vital link in a company's supply chain. The warehouse of the 21st century manages its inventory by moving it in and out of the facility as quickly as possible. Not all warehouses are the same. Each deals with different products, different equipment, and different management styles. Determining which of the methods of inventory management will work best is a complex task. Therefore, understanding the concepts of inventory management is critical.

In this unit, you will learn about warehouses, warehouse operations, material handling equipment, inventory, and inventory management. It will also focus on key warehousing jobs: Receiving, Put-away or Locating, Picking, Material Handling, Staging, Shipping and Inventory Control. The guide also contains basic documentation that is a part of these jobs and a glossary of terms.

Objectives

The information, activities and practice provided during this unit will enable you to:

1. State the mission of a warehouse.
2. Understand the concept and processes involved in inventory management.
3. Describe the two types of warehouses.
4. Describe the basic functions of warehousing and distribution.

Notes:



Warehouses

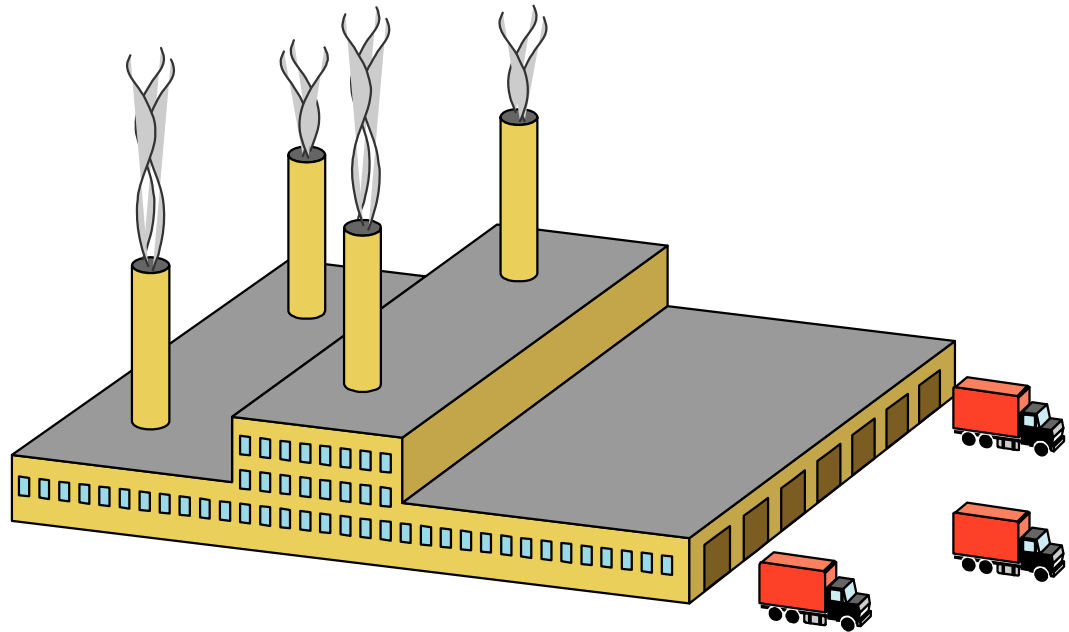
Some warehouses may be used simply to store goods for extended periods of time or to speed the distribution of goods. Others may provide additional services to improve the value of the goods.

There are two basic types of warehouses.

- Warehouses that are located at or near manufacturing facilities.
- Warehouses that are located in the “field” and are often called “distribution centers.”

Warehouses Co-located with Manufacturer

As the storage area for raw materials, work-in-process and finished goods, warehouses that are co-located with the manufacturer are closely involved with the day-to-day operation of production. Systems must be in place to expedite and control the movement of raw material from the warehouse to the production area, work-in-process from machine to machine and finished goods to the warehouse. In addition, warehouse personnel must be kept aware of production schedule changes to enable them to plan for increases or decreases in the level of service they provide to manufacturing.



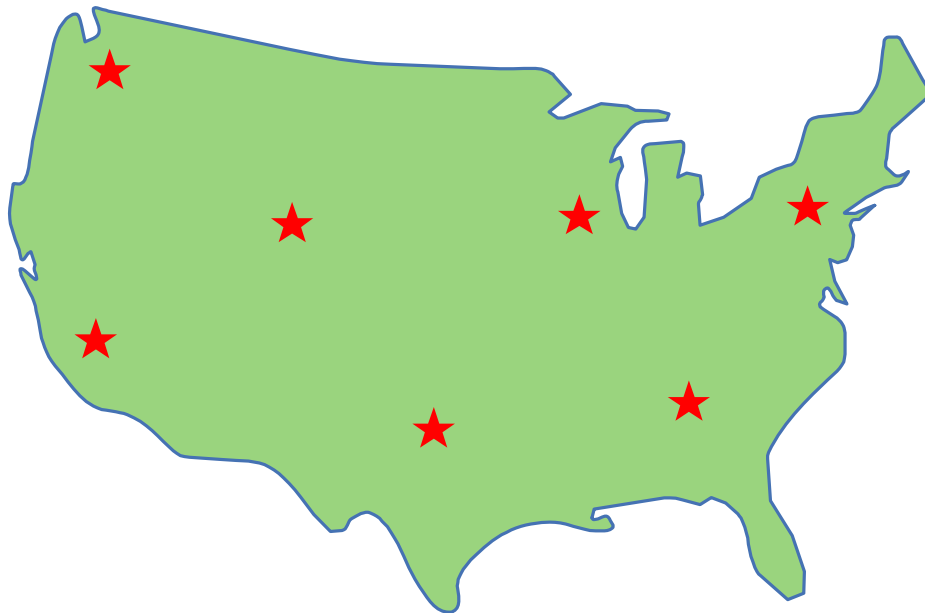
Warehouses Co-located with Manufacturers



Field Warehouses (Distribution Centers)

Located as close to the customers as possible, these warehouses are operated by suppliers, wholesalers, and retailers or may be public warehouses. These distribution centers may control a company's entire distribution system or they may be responsible for a geographical region, area or district. These warehouses offer a significant advantage over those near manufacturing facilities because they are focused on the movement of goods thus improving distribution.

The goal of field warehouses is to reduce **lead time** especially in the area of transportation.



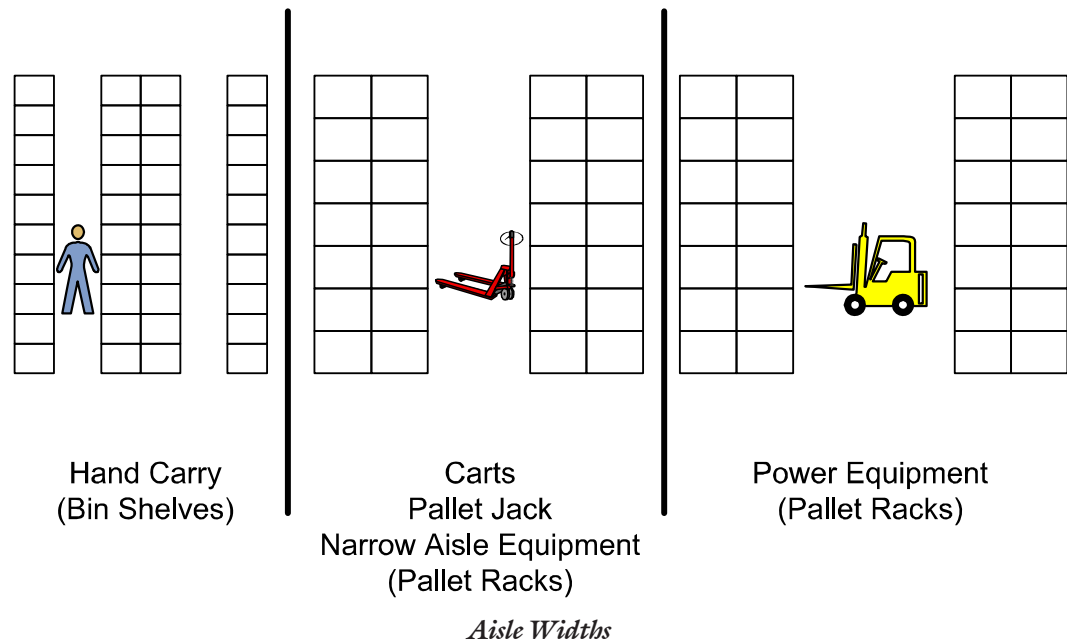
Example of Distribution Centers

Notes:



Warehouse Layout

The physical layout of a warehouse is determined by its primary function to the business. If the majority of goods are slow moving then storage is important. If goods move through the facility rapidly then handling efficiency is paramount. Since the key to warehouse design is flexibility, most warehouses are designed as a compromise between storage and material handling.



Layout Considerations

Space is not free so it is important that warehouse space is utilized as efficiently as possible. When organizing the layout of a warehouse the following areas must be considered:

- **Storage Area** is where some pallets can be stacked, others require pallet racks. Cases and smaller items may need shelves or bins. Many companies have **automated storage and retrieval systems** that require more space. Do not rule out very narrow aisles (VNA), space above dock doors or bridges over aisles.
- **Receiving and Shipping Areas** are the docks and working space to load and off-load trailers. Room may be needed for pallet drops, expandable conveyors, and power equipment.
- **Staging Area** is a zone for the temporary placement of goods awaiting movement to some other area in the warehouse. Expediting the movement of goods within the warehouse can minimize this space.
- **Picking Area** is space to move order-picking equipment and personnel. This includes room for pallet drops to enable order pickers to count/sort items.
- **Sortation Area** has conveyors, carousels as well as working space for manual operations.
- The **Assembly Area** is where repacking, kitting or assembly is accomplished. Other value-added services such as merchandise pricing or display building can be performed here.
- **Packaging Area** has space for pallets, dunnage, and stretch-wrap machines.
- **Area for Equipment** has parking spaces for power equipment, pallet jacks. This area may include a battery charging area and vehicle maintenance spaces.

In addition to the above areas, warehouse planners must consider safety and ergonomics.



Inventory

Inventory Management

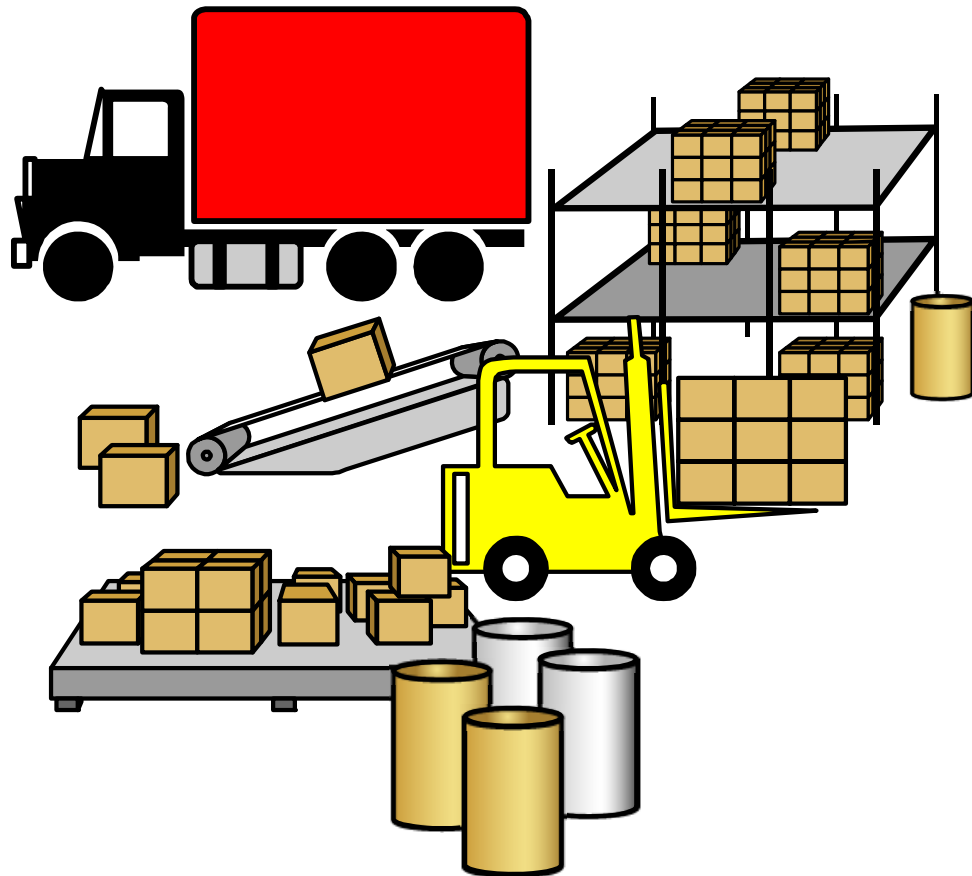
The reason a business must manage its inventory is to answer the question of how much inventory is needed to buffer against the fluctuations in forecast, customer demand and supplier deliveries. Having the correct answer to that question enables a company to meet its business objectives.

Four objectives of business are:

- Maximizing customer service.
- Maximizing the efficiency of purchasing and production.
- Minimizing inventory investment.
- Maximizing profits.

Inventory Control

Inventory control is largely information tracking. Think about your collection of CDs, books, magazines, or tools and how you know where everything is located. A warehouse has a similar task, multiplied many times by the number of items in the warehouse, the number of places the items are located, the number of destinations of the items, and the fact that much of it is moving at any given time.



Inventory



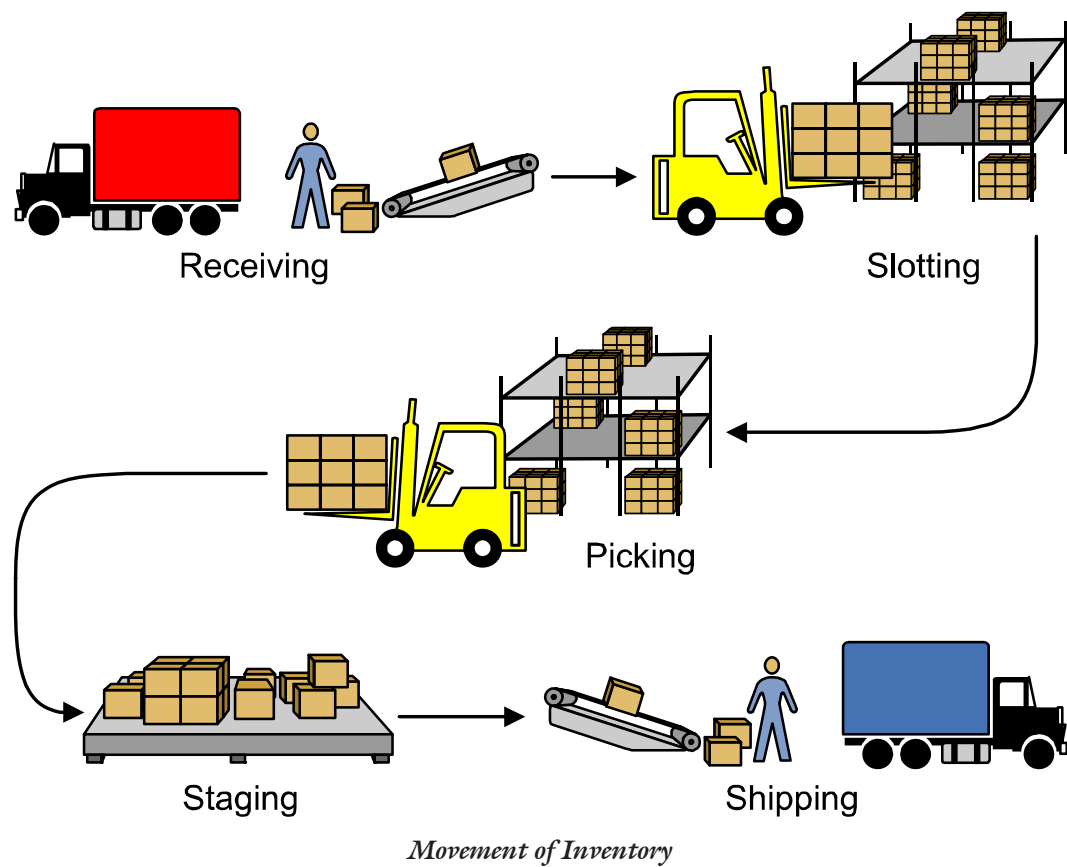
The function of any inventory control system is to track the inventory in the warehouse. It must log orders from customers, receive deliveries from suppliers, locate items received and find them when needed, and know exactly how much of any material is on hand. Often an inventory control system has forecasting and scheduling information. Information is input by computer keyboard, laser scanner, or biometric technology. Information is output by printers, computer screens, scanner screens, or biometric technology. A good Warehouse Management System (WMS) knows the location of every pallet, carton, or item in the warehouse.

There are two approaches to maintaining accurate inventory records: periodic physical inventory and cycle counting.

- **Periodic physical inventory** is when the warehouse is shut down completely for two or three days and everything is counted at one time.
- **Cycle counting** means that some product is counted every shift, so that all product is counted at least once or twice a year, and fast-moving product may be counted very two or three months. This has proven to be an effective alternative to the older periodic physical inventory. Cycle counting is more accurate and less disruptive: a few experienced associates are used to perform cycle counts, the operation does not have to be shut down, and errors can be investigated and corrected.

Movement of Inventory

Another important function of inventory control is loss prevention. Loss prevention covers physical loss of inventory (often called “shrinkage”), errors hidden in paperwork, and non-standard quality. Quality issues are often addressed by a quality control department, but not always. The more records are kept, and the more they are kept electronically, the more difficult it is for merchandise to disappear. If every movement of product must be accounted for, the incidents of pilfering drop dramatically.





A typical warehouse system will be at least partly electronic. It will create and track systems for purchasing, order entry, order fulfillment, accounting, returns, receiving, shipping, locating, cycle counting, expiration codes, lot codes, patterns of material movement, and many others. Accurate inventory and location data are critical to warehouse operations, as well as to order entry, accounts payable, customer service, sales, marketing, and almost every other function within the company. Sophisticated systems are now tied into suppliers' systems, so that the supplier knows when inventory must be replenished without needing an order. The inventory control system (or Warehouse Management System - WMS) ties it all together.

Like many material handlers, every time they input data - with a scanner, a portable data terminal, a computer, or on a log sheet - they are updating the inventory control system. They directly affect how accurately that system performs.

Inventory Documentation

As an Inventory Control Associate, you will receive the Advance Shipping Notice (ASN) at the same time that Receiving does. When Receiving makes the appointment for the truck to dock, it will show up on your screen. When Receiving accepts the ASN, you will know it. You will have access to, and the ability to make changes on, any of the screens that are used in warehouse operations.

SKU	P.O. Line Item	Vendor Item #	Description	U/M	Quantity Ordered	Quantity Shipped	Quantity Received	Overage/ Damaged	Comments
253-2546	1	44567	U.S. Songbirds CD	Ea	350	275			Breakout
347-6776	2	88657	Bird Calls CD	Ea	200	200			Putaway Location 01-15-D
667-9876	3	45564	Canadian Songbirds CD	Ea	100	100			Breakout
776-9090	4	77689	Top 40 Bird Songs CD	Ea	500	400			Breakout
Trailer # : _____									
Received by: _____ Supervisor: _____ Date Received: _____									

Advance Shipping Notice



Receiving logs in the shipment, noting any inaccuracies or mismatches. These, along with any other vendor violations, will either show up on your screens, or be put on your desk in paper form for you to enter into the system.

Vendor/Carrier Violations						
Vendor	Carrier	Purchase Order	ASN #	Scheduled Ship Date	Cancel Date	Received Date

A. Early or Late Shipments

___ 1) Shipped before the Scheduled Ship Date.
 ___ 2) Shipped after the Cancellation Date.

B. Damaged Merchandise
 (Complete Damaged Merchandise Report.)

___ 1) Damaged by Vendor
 ___ 2) Damaged by Carrier

C. Packing Violations

___ 1) No Packing Slip enclosed.
 ___ 2) Case pack quantities not as ordered.
 ___ 3) Multiple P.O.'s in one case.
 ___ 4) Multiple SKU's in one case.
 ___ 5) Cartons not marked with order data.
 ___ 6) Stores not listed on carton if required by P.O.
 ___ 7) Multiple stores packed in same carton.
 ___ 8) Missing items listed on Packing List.
 ___ 9) Additional items shipped.
 ___ 10) Packaging List does not match ASN.

D. Freight Violations

___ 1) Trailer seal not intact or seal number does not match Bill of Lading.
 ___ 2) Bill of Lading does not match Packing List.
 ___ 3) Shipped to wrong address.
 ___ 4) Missing items listed on Bill of Lading.

Comments: _____

Receiver: _____ Date: _____
 Supervisor: _____ Date: _____
 Approved: _____ Date: _____

Vendor Violations Form

The system you are using will tell you whether the shipment is to be located, cross-docked, broken out, or some combination of these. It may be your task to let Material Handlers know what to do with the newly received shipment, or your system may print out a document or set of labels that lets them know.

Inventory Control associates may receive customer orders, and be expected to generate the order filling documents. The inventory system you manage will be able to tell you if the merchandise the customer wants is in stock or is about to be received.

Inventory Control associates' screens will be updated as the merchandise makes its way through the warehouse and each operator inputs his or her own data. You may input data from paper documents such as packing lists from receiving and packing lists from shipping.

If the warehouse is a part of a manufacturing or assembly plant, you will have receiving and shipping documentation for raw materials arriving and finished goods departing. These will be intracompany orders or transactions. You may also be consolidating these finished goods – or other goods – with materials located in the warehouse, to be shipped to a customer. All must be documented, and all documentation goes through inventory control, whether paper or electronic.

When an order is shipped, the Inventory Control Associate may generate the documents (paper or electronic) that tell the accounting department which customer to bill, and for what.

The Inventory Control Associate may become an Expediter, tracking down missing documentation, missing merchandise, and inaccuracies. You may schedule and manage the cycle counting that verifies quantities on hand, and you may be responsible for reporting as “shrinkage” any items found missing. You may be the only one in the warehouse that can instantly find out where every item, pallet, and piece of equipment is located.



Categories of Inventory

There are several categories of inventory. Whether your warehouse is a distributor of merchandise produced by other companies or directly associated with a manufacturer, you will come in contact with one or more of these types of inventory.

Raw Material

Raw material includes all of the purchased parts that will go into a finished product. This may involve mechanical or electrical components, plastic resins, fabrics, fluids, packaging material, etc. This type of inventory will increase in value as it flows through the production process and becomes subassemblies, assemblies and, lastly, finished product.

Work-in-Process (WIP)

Work-in-Process inventory include partially completed assemblies, or materials that are not “raw” but are needed for assembly. Often the lack of material, machinery or personnel issues, design problems, or changes in priorities may cause production to be unable to complete the assembly of some items. In that case, they will need the warehouse to temporarily restock these semi-finished assemblies. Partially completed assemblies have increased value because of the labor that has been added to the raw material.

Finished Goods

Finished Goods are completed product that is ready to be shipped to distribution centers (DC's), retailers, wholesalers or directly to customers.

Distribution Inventory

Distribution Inventory is inventory that is ready for delivery to the customer and is held at a location as close to the customer as possible. Distribution centers may be owned by the manufacturer or may be independent. Some customers may purchase product from a manufacturer or distributor and ask that the product be held until needed. This customer-owned material is usually segregated from other material in the warehouse. Warehouse personnel must manage the inventory regardless of ownership.

Maintenance, Repair and Operating (MRO) Supplies

This category includes office supplies, operating supplies, machine repair parts or replacement parts, material handling equipment (lift trucks, pallets, wrapping machines, etc.). Almost all companies maintain this inventory. While usually low cost, some items may be quite expensive.



Components of Inventory

There are several different components of inventory.

- **Cycle Stock:** The active parts that are being used everyday. They are often referred to as the “high runners.”
- **Safety Stock:** This “buffer stock” is inventory that is used to guard against fluctuations in supply or demand. There are a couple of variations of safety stock.
- **Anticipation Stock:** includes finished goods, work-in-process and raw materials that are built up in anticipation of a scheduled event (i.e. seasonal demand, scheduled plant shutdown).
- **Hedging Stock:** Similar to anticipation stock. It is inventory that is built up in anticipation of an event that may or may not occur. Examples of such events are predicted price increases for material, possible labor strikes in the supply chain or political instability in foreign countries where suppliers are based.
- **Transportation Stock:** Inventory currently in the transportation pipeline. The time that this pipeline inventory spends in route to the warehouse impacts lead times and inventory levels.

Safety

Inventory Control Associates must follow all safety practices for their area.

Quality

Inventory Control Associates must:

- Be certain that all information is accurate.
- Know how to correct inaccuracies.
- Now how all the information in the inventory control system works together.

Progress Check #1

1. Match the warehouse area to its function:

- | | |
|----------------------------------|--|
| ___ Storage Area | a. Conveyors, carousels |
| ___ Receiving/
Shipping Areas | b. Repacking, kitting |
| ___ Staging Area | c. Pallets, stretch-wrap machines, dunnage |
| ___ Picking Area | d. Power equipment, pallet jacks |
| ___ Sortation Area | e. Racks, shelves, bins |
| ___ Assembly Area | f. Docks |
| ___ Packaging Area | g. Temporary placement of goods |
| ___ Equipment Area | h. Order-picking equipment |

2. Match the type of inventory to its description:

- | | |
|---|------------------------------------|
| ___ Raw Material | a. Office supplies |
| ___ Work-in-Process | b. Ready for delivery to customers |
| ___ Finished Goods | c. Ready to be shipped to DC's |
| ___ Distribution Inventory | d. Semi-finished assemblies |
| ___ Maintenance, Repair and
Operating Supplies | e. Parts for finished product |

3. What are the two components of any inventory?

- a. Cycle Stock and Safety Stock
- b. WIP and Finished Goods
- c. High Runners and Seasonal Stock
- d. High Cost and Low Runners



4. Material built up in anticipation of a scheduled event would be considered:
 - a. Hedging Stock
 - b. Cycle Stock
 - c. Anticipation Stock
 - d. Transportation Stock

4. Why do we sometimes need Decoupling Stock?

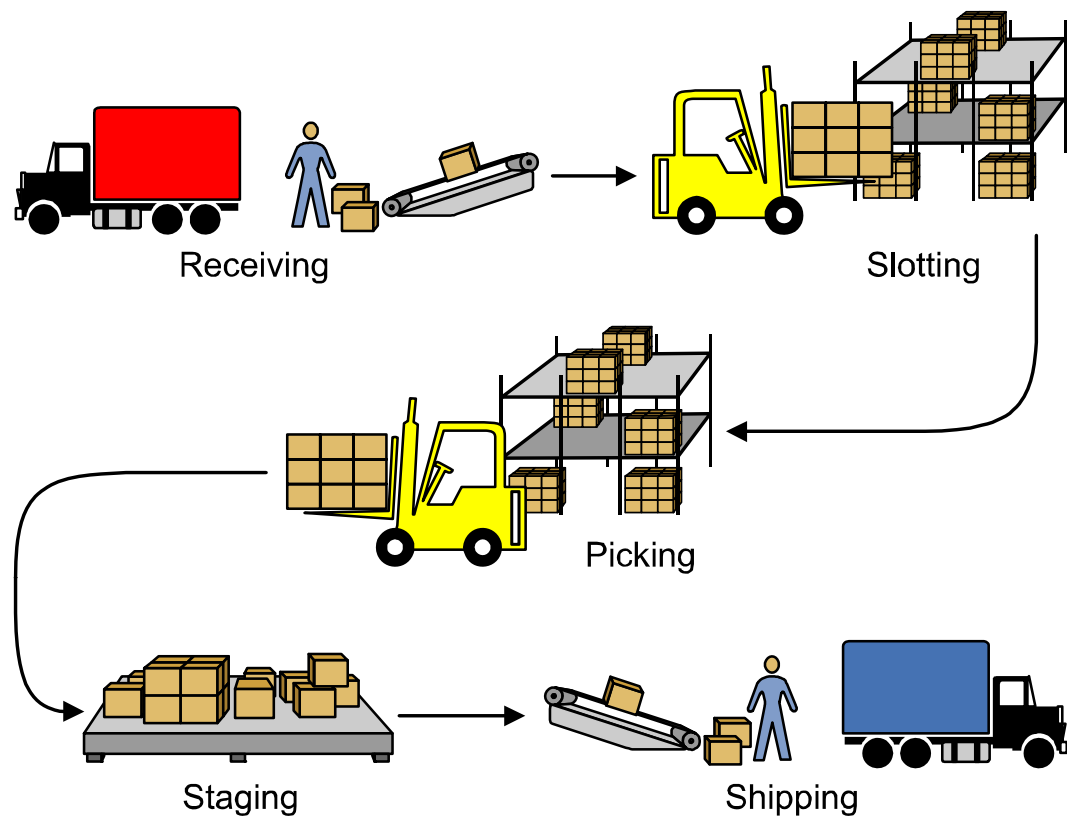
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Warehousing Job Functions

The remainder of the manual discusses the key warehouse job functions:

- Receiving
- Slotting
- Picking
- Staging
- Shipping



Warehousing Job Functions

Notes:



Receiving

Receiving Process

The receiving process is the key to timely and accurate induction of goods. It also tends to be the biggest bottleneck. Therefore, care must be taken when deciding what system will be used for receiving. In addition, attention must be focused on continually improving the receiving process.

The receiving process consists of:

- checking the receiving documentation
- verifying the goods
- unloading and inspecting the goods
- staging the goods.

Checking the Receiving Documentation

The first step in the process is to ensure that the receiving documentation is correct. The receiver inspects the seal on the trailer to verify that it is intact. The trucker's Bill of Lading is compared to the vendor's packing list. Care is taken to match the purchase order, vendor part numbers, descriptions and quantities. Those are, in turn, compared to the documentation (usually an Advanced Shipping Notice) supplied by the purchasing department.

Depending upon the industry, there may be additional certifications or paperwork requirements that must be reviewed. Any discrepancies are dealt with before any merchandise is removed from the trailer.

Verifying the Goods

Before the receiver begins to off-load the goods, the merchandise is matched against the packing list and purchasing documentation. Vendor part numbers, SKU numbers, descriptions and quantities are checked. Because some deliveries may include hundreds of cases, it is unfeasible to verify the contents of every case. In that situation, many companies require that the receiver open a percentage of the cases and verify the contents. If the sample is correct, it is assumed that the remaining cases are also correct.

Every company requires some sort of documentation trail to ensure the delivery information is correctly entered into its inventory system. This may be forms or reports that are matched to the delivery by the receiver who eventually certifies (by signing) that the delivery was correct. It may be a paperless system where the receiver certifies the delivery with a computer password. It may even be a scanning system that automatically registers each case as the receiver scans it into the system.

It is critical that the receiving data is correct. Incorrect information will result in overages and shortages that will disrupt later shipments to customers.



Unloading the Goods

When the receiver is satisfied that the documentation and goods are correct, the unloading process begins. Before any personnel enter the truck or trailer, wheels must be chocked to prevent injury as personnel and equipment move in and out.

Some docks have electromechanical systems that lock the vehicle to the dock. Most docks use dock levelers of some sort to ease movement into and out of the trailer.

Prior to unloading the goods, the truck should be inspected. This is especially important if the trailer is carrying perishables. The truck or trailer should be viewed from the outside and inspected for damage (holes, leakage, etc.) The inside should be viewed for general cleanliness. If perishables are involved, the receiver should be conscious of any foul odor. Trailer air conditioning or refrigeration units should be operating and the trailer temperature should be recorded.

In many cases goods will be manually carried from the delivery truck. In some cases, a conveyor or rollers may be moved into the trailer to expedite handling and minimize back strain. Often the receiver will need to use power-handling equipment (i.e., powered industrial trucks, walkie-riders) to move heavy merchandise out of the trailer. OSHA requires that personnel be certified before operating power-handling equipment.

Inspecting the Goods

During the verification and unloading process the receiver will be inspecting the merchandise for damage. Dented, ruptured or leaking containers are signs of damage. Damaged containers are segregated and documented.

In addition, vendors and carriers are often charged for violations of shipping procedures. Examples of vendor/carrier violations are:

- Early or late deliveries
- Over/under deliveries
- Duplicate deliveries
- Missing or incorrect documentation
- Goods not packaged as ordered
- Improper package labeling
- Damaged goods”

Care should be taken to understand the agreed-upon procedures and record any infractions.



Staging the Goods

As deliveries are being unloaded, the receiver must determine the next destination of the goods. The receiver makes this determination from the documentation or the labeling on the merchandise. Once this is decided, the goods are moved to a staging area, usually very close to the receiving dock, awaiting movement. While each warehouse is different, there are some general areas in the warehouse where goods may be moved:

- some goods may be cross-docked directly to the shipping dock for transport to the customer.
- some goods may need to be repackaged before shipment.
- some goods may need be consolidated with others before shipping.
- some goods may be Put-away, or temporarily stored in the warehouse.

Improving the Receiving Process

Few areas have as much impact on a warehouse's overall productivity as the receiving process. Many companies have implemented some time-tested steps that go a long way to increasing efficiency and accuracy:

- **Scheduling** is one of the best tools for enhancing productivity in the receiving process. Some vendors are linked electronically to the warehouse and can provide electronic notification (Advanced Shipping Notice - ASN) to the warehouse of what merchandise will be arriving. The warehouse and the carriers agree upon a time for each delivery. This enables the warehouse to balance labor and space so they are ready for the delivery. The carrier benefits by eliminating costly delays waiting to be unloaded.

Scheduling also helps to keep the variations to a minimum so that no day is heavier than another. It enables the warehouse to balance its volume to its capacity.

- **Technology** - There are many high-tech tools that can dramatically boost productivity. While larger companies have adopted these innovations, smaller companies are lagging behind. Some of these tools are:
- **Advanced Shipping Notice (ASN)** - Provides control over the receiving process.
- **Automatic Data Capture** - Bar coding, radio frequency and even voice recognition systems improve the accuracy and speed of the receiving effort. Unit-level bar code labels speed throughput of pallets. Carton-level bar coding can have a similar effect. Radio frequency data collection (RFDC), radio frequency identification (RFID) and voice recognition systems allow for hands-free mobility, improved accuracy and increased speed.



- **Automatic Unloading Equipment** - This not only speeds the unloading process along, it reduces the physical strain on the receivers. Equipment can range from simple conveyors to high-tech (and high-cost) systems that can unload entire trailers in less than five minutes.
- **Electronic Data Interchange (EDI)** - Connects customers and suppliers with the warehouse through a private-access computer link.
- **Enterprise Resource Planning (ERP)** - Extremely sophisticated software that ties all aspects of a business together. This gives all areas of responsibility better visibility to other areas for improved planning.
- **Internet** - Allows customers to access product information, order and track their shipment.
- **Warehouse Management System (WMS)** - Controls the warehouse inventory and can be used to designate slot locations for storage in advance. If cross-docking, the WMS can set up an area for those products.

Progress Check #2

1. What documentation is used during the receiving process?
2. What information on these documents should be matched to ensure accuracy?

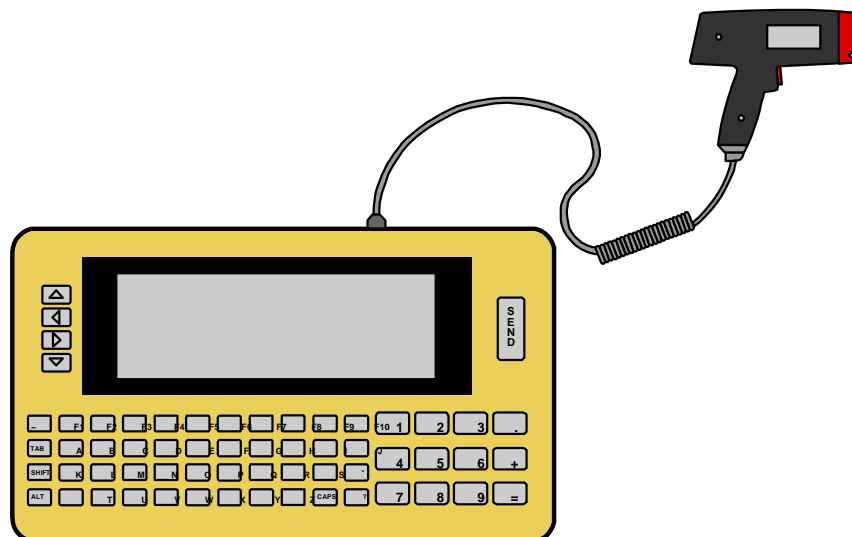


Material Handling

Moving merchandise through the warehouse can consume time and money and result in unnecessary delays. It also increases the opportunity for errors and damage. Over the past decade there have been tremendous improvements in material handling equipment.

Material Handlers, sometimes called Runners, are used in all areas of the warehouse. They carry boxes and materials in their arms or operate equipment ranging from manual pallet jacks to carousels and automated guidance vehicles. Material handling is part of every process from receiving through shipping. Sometimes the operator doing the process also does the material handling, and sometimes there is an operator who only moves material from one place to another.

Material Handlers who only run material from one place to another must plan their movements for greatest efficiency. Many lift-truck driving Material Handlers are tasked to never “run empty.” Usually, Material Handlers must keep up with paperwork, and keep inventory updated as they move their loads. Many lift trucks have RF units mounted on the truck.



Truck-Mounted RF Unit

Every time they input data - with a scanner, portable data terminal, computer, or a log sheet - they are updating the inventory control system. They directly affect how accurately that system performs.

Safety

Material Handlers must:

- Move materials without injury to themselves or others.
- Use good lifting techniques.
- Use weight belts or other protective gear issued to them.

Quality

Material Handlers must:

- Move materials without damaging the materials or equipment.
- Be accurate with paperwork.
- Be detailed-oriented: pick up the right material and take it to the right place.

Warehousing Strategies

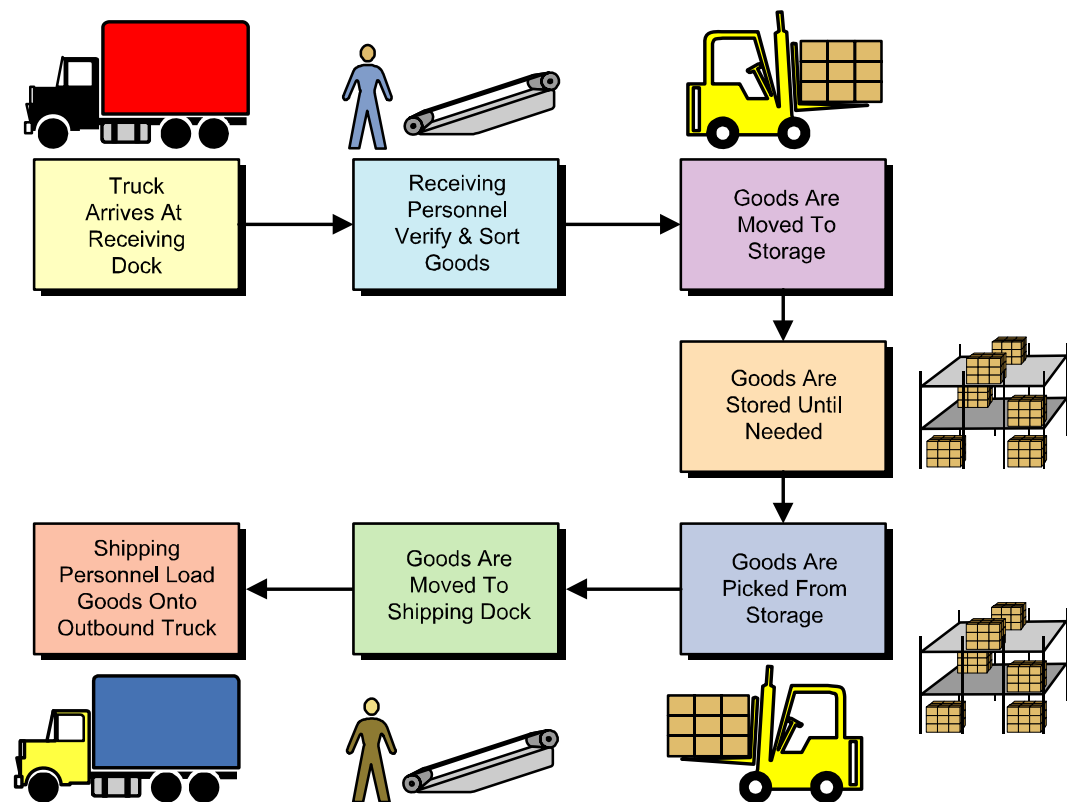
There are two modern forms of warehousing:

- cross-docking and
- flow-through warehousing.

These methods provide more efficient and effective ways for warehouses to manage inventory and achieve a competitive advantage. Both strategies can stand alone but the most efficient warehouses are taking advantage of both, marrying them with more traditional warehousing techniques.

Traditional Warehouses

In traditional warehouse settings, goods are delivered to the receiving dock and staged for movement to storage racks. The goods are later placed into reserve or pick slot storage. Upon receipt of an order for the material, the product is removed from its storage location and staged for loading onto outbound trailers. This process requires the least amount of technology or equipment but is very slow, prone to inaccuracies and requires expensive warehouse space. It may take days, even weeks, for product to move from inbound trailer to outbound trailer. This delay offers increased chances for damaging and stranding product.



Traditional Warehouse

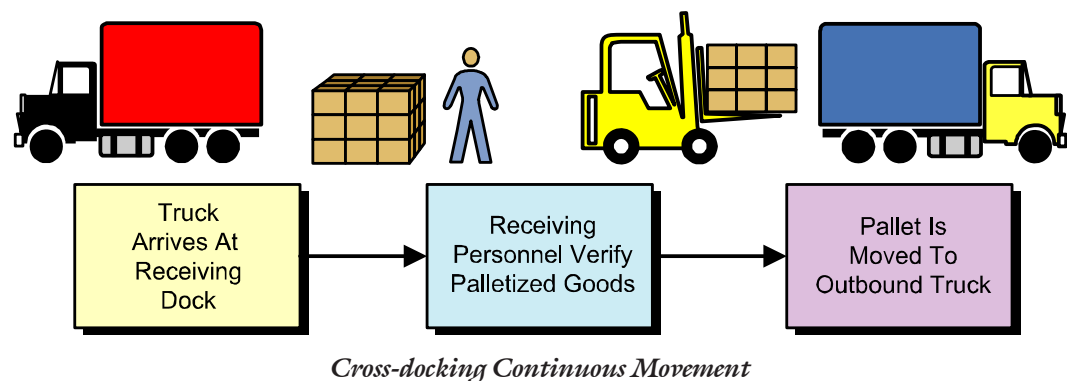
Cross-docking

In cross-docking is a strategy in which product is received from the supplier into a warehouse, moves across the dock directly to outbound loading for transportation to the customer or outlet. The product does not go into traditional reserve or pick slot storage. This movement usually occurs over one day. With the proper processes and equipment in place, movement from inbound trailer to outbound trailer can literally take minutes. Since the warehouse must know upon receipt where the product is going, cross-docking necessitates coordination with suppliers. It offers fewer chances for damage and less warehouse space.

The concept of cross-docking is rather simple but different industries and companies use the strategy in different ways. Cross-docking can be used in three ways: Continuous movement, distributed case movement and consolidated movement.

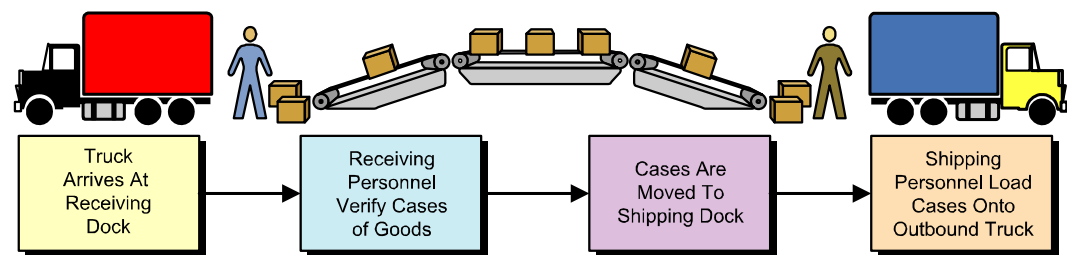
Cross-docking Continuous Movement

Continuous movement, also known as unitized continuous movement, is the most straightforward form in which a unit (typically a pallet) is picked off a truck and transported directly over to an outbound truck. The product literally never touches the floor. This works well for transportation operations where the carrier is using LTL (less than a truckload) consolidation to bring in multiple truckloads of palletized goods that need to go to various customers. Continuous movement is used where a retailer might demand one or more pallets of a single item or a “rainbow” pallet, or predetermined mix of items, for a store. Continuous movement allows the warehouse to cross-dock that special order directly from the delivery truck to the outbound truck with other inventory going to the same store.



Cross-docking Distributed Case Movement

Distributed case movement allows for goods to come into the warehouse, either on pallet or floor loaded, but the distribution of the product is done at the case level. With this technique, some sort of material handling system, such as a sorter or conveyor, supports the movement of large numbers of cartons. The goods are brought in, a bar code label is applied and then it is scanned and sorted down to the lane that is accumulating goods for an outbound customer. Many warehouses will have staging areas (or “hot” areas) on the dock that act as temporary picking locations for cross-dockable product. This way cross-dockable product does not need to be put in storage areas in order to be picked later.



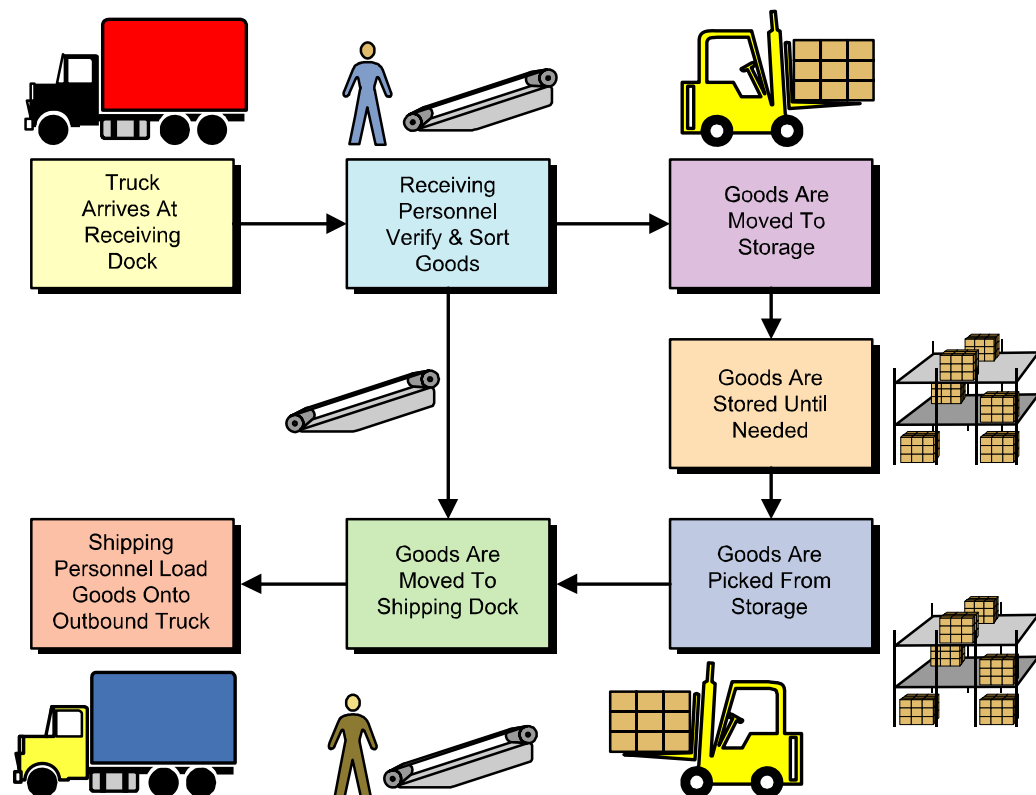
Cross-docking Distributed Case Movement

Cross-docking Consolidated Movement

Consolidated movement is considered a hybrid of the first two. Typically a pallet is brought in, a portion of which is needed immediately by the customer and a portion which is not. Here, warehouse associates remove those portions of the pallet to be put away. The rest is married up with other inventory to be shipped. This technique also requires staging and synchronization of the picking and receiving processes.

One of these ways is not typically the total answer. Many warehouses will use some sort of hybrid depending on the unit, supplier capabilities and demand.

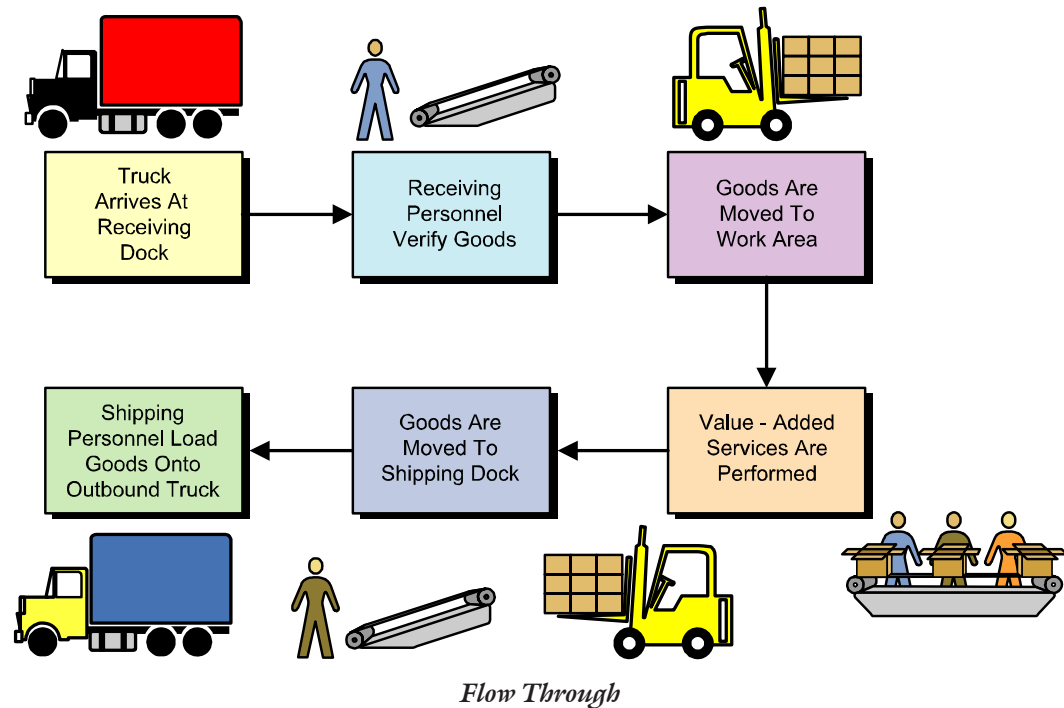
While there is nothing that says that cross-docking can not be done without the use of technology (e.g. WMS, conveyor systems), without it, a warehouse will probably not get all the benefits associated with the strategy.



Cross-docking Consolidated Movement

Flow Through

In flow-through warehousing, product also never enters into the traditional reserve or pick slot storage areas. It is an operation in which product is received from the supplier, but before leaving the warehouse, has value-added service, such as labeling or pricing, performed. In the additional time product takes to flow through the facility, a warehouse can perform generic operations that support a number of customers before the operators must know where it is going. This allows for more flexibility. Since additional handling is involved there are greater chances for damage or mistakes but, like cross-docking, less warehouse space is required.

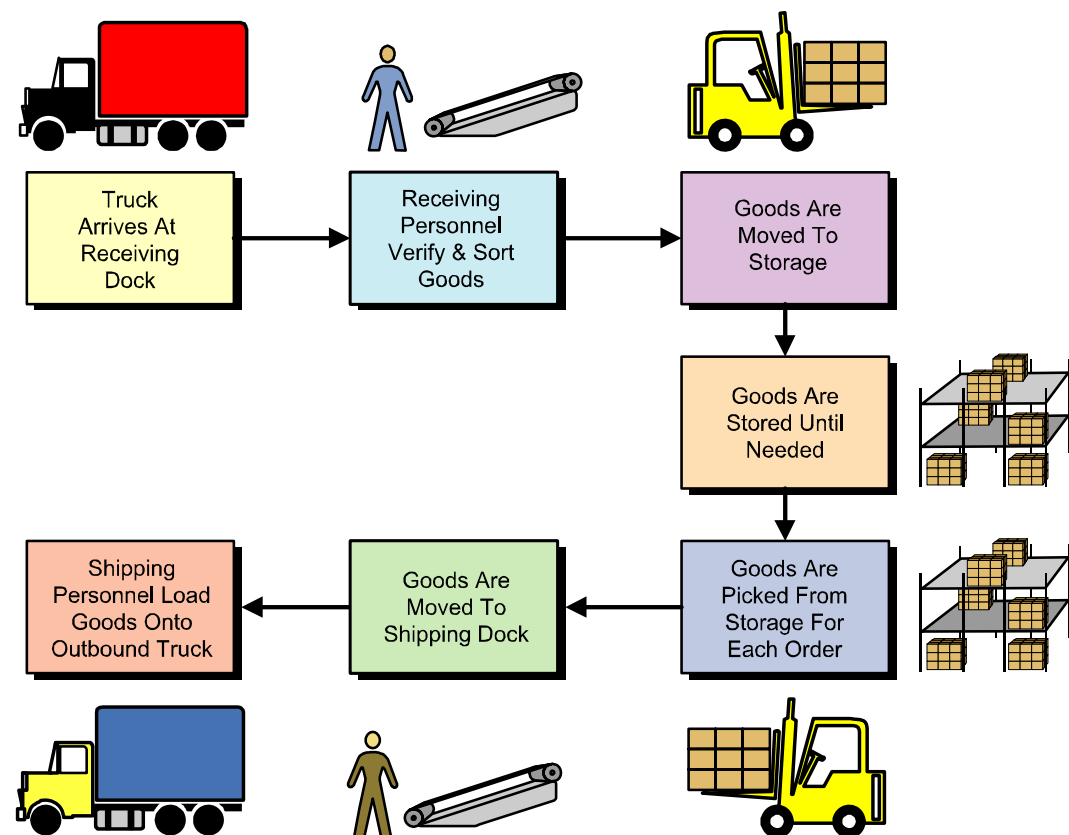


As with cross-docking, flow-through is focused on reducing holding costs for popular items that have predictable demand. Warehouses reduce handling labor in and out of storage using this technique. With this strategy, while product is constantly moving through the warehouse, there is time to add service to the process.

Retailers, for example, can benefit greatly from this strategy. For instance, if a retailer wants to form a kit that couples shoes, scarves and hats together for a display at the store level, the warehouse can consolidate all of these items as they move into the warehouse before moving them to the store.

Traditional Picking

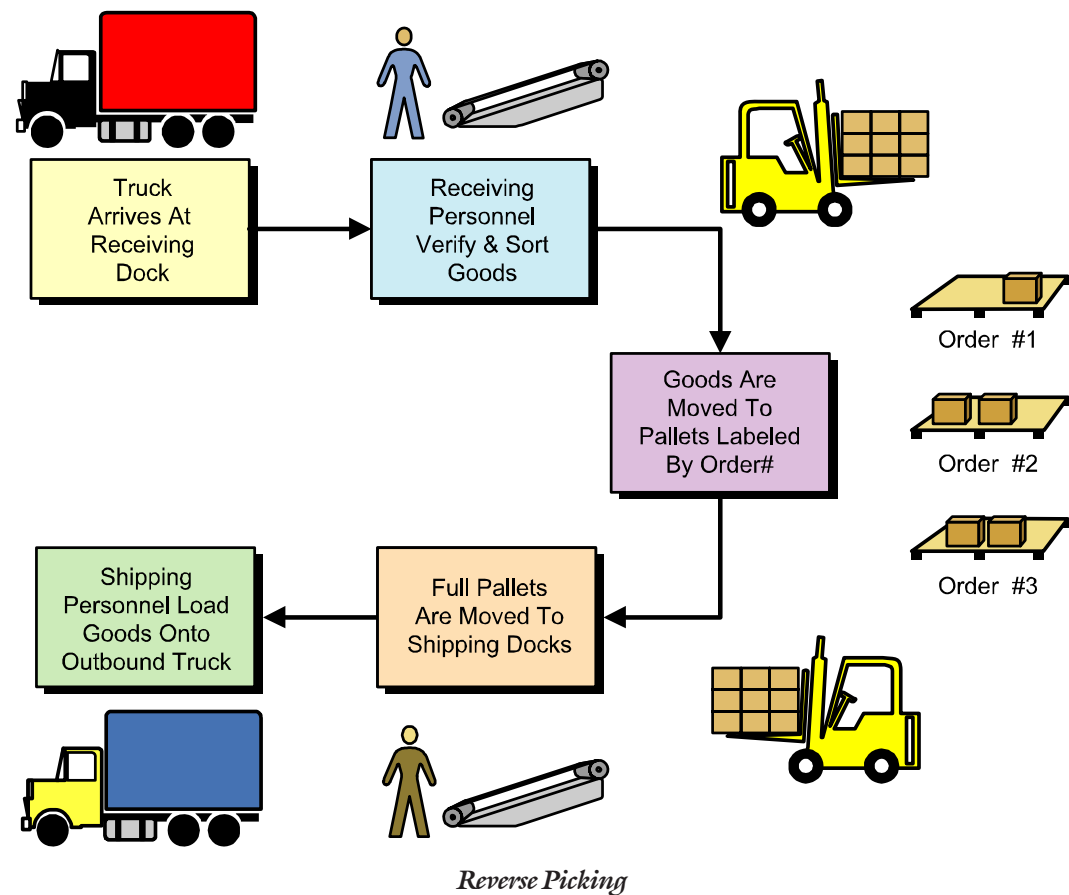
The traditional picking process moves store-specific pallets past the storage slot locations for picking.



Traditional Picking

Reverse Picking

Another form of flow through warehousing is the “reverse picking process” where the store pallets are in fixed locations. When product arrives, the incoming pallet is routed past the store pallet. Product is picked off the incoming pallet and placed on the store pallet. When the store pallet is filled, it is shipped out. This allows the warehouse to leave the store pallet in a fixed location until it is filled, and the warehouse does not have to put received product into storage unless it is not needed.





Power Handling Equipment

There are many types of power handling equipment that can be used in a warehouse. Each type has its own characteristics:

- **Manual pallet jacks** are an economical alternative to powered industrial trucks. They are easy to operate and require minimum training. The pallet jack does not allow the pallet to be raised more than a few inches off the floor.
- **Electric pallet jacks** (also known as pallet movers) eliminate the need for pulling. The operator walks with the electric pallet jack to guide it.
- **The Walkie-Rider** offers the operator the choice of walking with the pallet jack or stepping onto it and riding to the next location.
- **Pallet stackers** are used for feeding machines or lifting pallets to docks or mezzanines. They are not recommended for moving long distances.
- **Powered Industrial Trucks** offer increased capacity and speed. The operator stands or sits at the controls. Because of the inherent dangers in operating any powered equipment, OSHA requires that all operators be trained on the specific type of truck being used. There are many types of powered industrial trucks. Gas- and diesel-powered industrial trucks are for outside use. If emissions or noise are undesirable, propane (LP-gas) or electricity is used. Internal combustion engines offer increased power over electric trucks. The tires may be cushioned or pneumatic. Some trucks may be designed to maneuver in very narrow aisles (VNA). And, as mentioned earlier, the operator may stand or sit.

- **Reach Trucks** enable the operator to place pallets in deep lane racks.
- **Order pickers** (often called stock pickers or order selectors) elevate the operators to higher locations. This enables the operator to select the goods from the location.
- **Remote- or automatic-guided vehicles (RGV/AGV)** are used by more advanced companies to move goods through their facility. These may operate along a set path or may be sophisticated enough to determine their own route.
- **Conveyors** are used to move goods through the facility quickly. They are able to increase throughput and reduce handling damage. They are especially effective when cross-docking is the primary strategy. Conveyors are limited by weight and size restrictions that reduce their effectiveness. They are also expensive.
- **Automated storage and retrieval systems (AS/RS)** are used by some companies to put goods into the storage areas and to later pick the product. These reduce human error and speed the process dramatically but the up front costs may be prohibitive. AS/RS can be extremely expensive and require maintenance personnel for upkeep and repair.



Progress Check #3

1. What are the two modern forms of warehousing?
 - a. Cycle and Safety
 - b. OS&D's and DC's
 - c. Cross-docking and Flow-through
 - d. Strategic and Tactical

2. Match the three types of cross-docking to their description.

___ Continuous Movement	a. A portion of a pallet is stored and a portion shipped.
___ Distributed Case Movement	b. Pallet moved directly to outbound truck.
___ Consolidated Movement	c. Pallet is broken into cases which are then shipped.

3. Describe the Reverse-picking process.

4. Why would a warehouse choose crossdocking as a strategy?
 - a. Long replenishment lead times.
 - b. Light demand.
 - c. Unpredictable volume.
 - d. Short replenishment lead times.

Notes:



Slotting

Once goods have entered the warehouse, we must have a system for placing them in a location (slot) and knowing where they are so subsequent orders can be picked. The highly labor-intensive task of order picking can make up 50% of warehouse costs and account for the majority of warehouse mistakes. Developing a slotting system (also referred to as Put-away or Locating) that minimizes travel and eliminates searching will speed the picking process, improve quality and decrease costs.

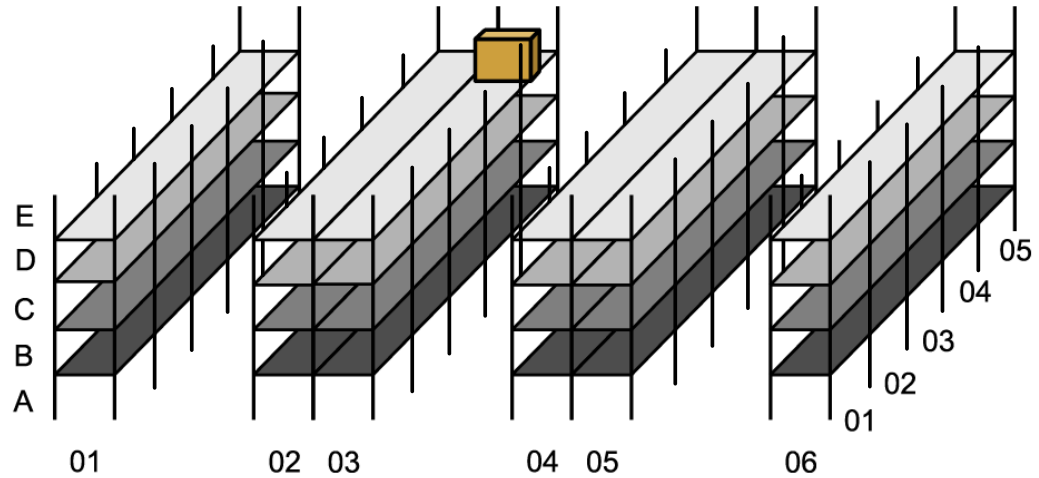
Locating Process and Documentation

After the merchandise has been staged by receiving, the Locator, picks up instructions for locating merchandise. The instructions may be on paper, on a computer screen, or given by a voice recognition RF system. The Locator will check instructions against the material to be located and make sure item numbers and quantities match the instructions. The merchandise is taken to the location and put it in its place. It may be a single item, a number of items, or a full pallet of items.

In some warehouses, the employee may make the decision about where to locate items although it will usually be predetermined. The best systems are designed to provide efficient movement of inventory while also utilizing space efficiently.

Usually a combination of letters and numbers pinpoint the slot. It is important that the locator system be easy to understand.

An item located on the racks in Row 03 – Section 05 – Level E may be referred to as being located in Slot 03-05-E.



Slot Location 03-05-E

The Locator will update Inventory Control by reporting the item located and its location address. This step is crucial. Locating is useless if the product can't be found when needed.



To update Inventory Control, the transaction may be logged or scanned into a Location Log. If using a voice recognition RF unit, the operator indicates that the locating has been accomplished. If using a scanner, the computer screen will show that the transaction has been completed.



Scanner

If two-part product labels are affixed, half of the label may need to be pulled off and turned in to Inventory Control. If a Locator Log is maintained, it will need to be given to Inventory Control.

Assigning Locations

Once a locating system is developed, it must be further refined by choosing one of two basic ways of assigning locations for items: **Fixed Location** or **Floating Location** system.

In a ***Fixed Location*** system, SKUs (stock keeping units) are assigned permanent locations. A fixed locating system is needed for those items (such as hazardous chemicals) that must always be in a certain physical location. Nothing else is stored in these locations. This makes it easy to remember in what general area items are located. As a result items can be found and picked faster. This system also requires less information processing. This system does not utilize space very well. There will be times that some slots are empty while other slots are overflowing with goods. The fixed location system is used when space is not an issue.

In a ***Floating Location*** system SKUs are stored in a random fashion based upon space availability. Using this system, the same SKU may be stored in several locations. A SKU may be stored in one location today and another location tomorrow. The floating location system relies on a computer system to keep track of the physical location of goods. Better space utilization and faster picking offsets the cost of the computer system.

Slotting Strategy

Item, unit cube, popularity, number of days picked, seasonality, the percent of orders that are filled with a particular item, velocity, turnover, and knowledge of what combinations of items are likely to move with other items comprise the information needed to make the right slotting decisions. Managers should also take into account the availability of slots, weight limitations of the slot, slot proximity to shipping dock and pick path.

Stored Product

Many variables must be considered when deciding where to put product: security, size, weight, whether the product is a hazardous or flammable chemical, temperature, or popularity. Availability of locations must be considered, as well as the weight limitations of the locations, and how close they are to the shipping dock and/or the picking path.



Stored Product

Flammable or otherwise dangerous chemicals will need to be stored separately, in a location that is completely secure for that product, and would pose no threat to the warehouse in case a product caught fire. The storage area for such products is often a warehouse within a warehouse. Some of these products are also affected by temperature.

Perishable Food Storage

Temperature is a crucial factor in food storage. Fresh foods of different kinds require different temperatures to stay fresh. Paper is also perishable and needs to be stored in a temperature-controlled environment.

Fast moving items will be stored where they can be accessed easily, and often by automated equipment. Slower moving items may be in less accessible areas, and reached by manually operated equipment.

Order Completion Zones

“Order Completion Zones” allow the grouping of items that, when placed together, will fill a large percentage of orders. Doing so can increase productivity, accuracy and response time.

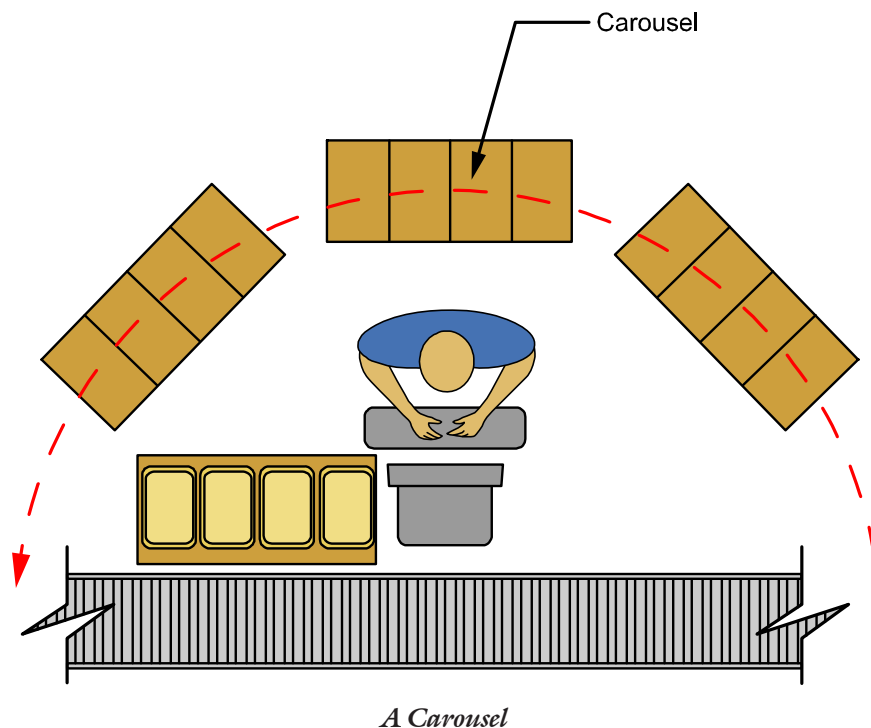
Golden Zoning

“Golden Zoning” is a practice of assigning the items with the highest pick volume to the most accessible locations. These “golden zones” or “sweet zones” (the region between a person’s shoulders and knees) will most likely be the center of the storage area so the locator and the picker do not have to walk far or stoop to reach product.

Basic Slotting Rules

The Basic Slotting Rules:

- Easily damaged or fragile items should be placed at top levels.
- Heavy and stackable items should be placed on bottom shelves and lighter items on higher racks.
- Non-conveyable items are often located near the dock or near pick lanes.
- Smaller items may be located in carousels, which bring the items to the picker and are usually combined with a sophisticated WMS (Warehouse Management System). Newer carousels can handle loads up to 150 pounds.
- Popular items should be stored closest to the pick lanes. This is the most efficient way of choosing where to store or slot items. Often 20% of the items account for 80% of the movement.
- Slow-moving items should be stored farther away.



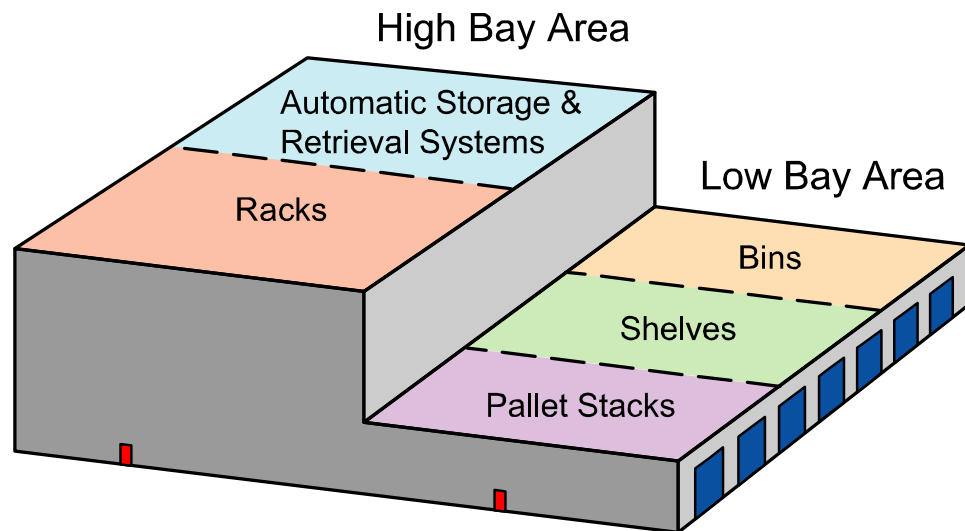
Types of Storage

There are five basic kinds of storage systems. Many can be adapted to specific needs by the original equipment manufacturer. Available space, type of goods being stored and cost, speed and accuracy must all be considered when deciding upon which system is needed.

1. **Bins** are used when order picking is characterized by picking individual small parts.
2. **Shelving** is better suited for picking part of a container's contents. They can be used with multi-tier applications with access stairways and catwalks. They may be constructed two or three levels high. Mezzanine or high-rise shelving is an excellent way to provide vertical space utilization and increased labor productivity.
3. **Stacking** can be used if the products are packed in a manner suitable for storage in stacks. They require no racks or shelves.
4. **Pallet racks** provide maximum space efficiency. They interface with all types of power lifting equipment from standard counterbalance and vary narrow aisle forklifts to straddle trucks. They work well with pick to belt systems and with other automation. These racks are sturdy, relatively inexpensive and easily adapted. They may be stacked as high as six levels. Racks used for carton storage can have hardwood or plywood decking while others can have decking of wire mesh. Companies specializing in full pallet storage can reduce cost by using the pallet as the deck.
5. **Automatic Storage and Retrieval Systems (AS/RS)** are best utilized when only full containers are stored and retrieved. If part of a container's contents is to be picked, one should consider a semi-automated storage and retrieval system. AS/RS are expensive but they reduce picking errors and speed the picking process.

Warehouse Bay Areas

The height of the warehouse bay area will determine which type of storage system can be used.



Warehouse Bay Areas

Types of Racks

There are many types of pallet racks. Each has its own advantages and disadvantages. Again, availability of space, type of goods being stored and cost must be considered when deciding upon which system is needed.

1. **Deep Lane Racks** may be two or more pallets deep thereby increasing storage capacity.
2. **Drive-in Racks** are used to store large quantities of similar loads by allowing the powered industrial truck driver to enter the rack system and place the load on structural rails. Drive-in racks only function as first-in/last-out (FILO) systems.
3. **Drive-through Racks** allow for first-in/first-out (FIFO) stock rotation systems.
4. **Pushback Racks** offer the same storage density as drive-in/drive-through racks but greater selectivity. All loads are stored and retrieved from the aisle. Loads in each lane rest on a cart on a rail that slopes gently toward the front. When a new load is deposited into the lane, it “pushes back” the one already at the face and all those behind. Then when the load is picked, the contents of the lane all move gently forward again. The result is to eliminate honeycombing or empty pick faces. Obviously, the ideal application for pushback is where all loads in a lane are identical and first-in/first-out stock rotation is not crucial.
5. **Flow Racks** are similar to pushback racks except the loads are generally deposited on one side and flow gently to the other. In many ways a flow rack is like a conveyor system within a rack system. Flow racks are used for both cartons and pallets. They may be many units deep. The most common applications are where the carton or pallet at the front is going to be picked and the ones behind are in reserve. Flow racks work well in a FIFO system. This high-density, dynamic system also helps keep people (i.e. pickers) at a safe distance from the powered industrial trucks that are replenishing the racks.
6. **Cantilever Racks** present no vertical obstruction so they are useful in storing long objects such as lumber, steel bars, tubing, pipes, etc.



Safety

Locators must:

- Operate the material handling equipment safely.
- Follow all rules for safe operation of a lift truck and other power equipment.
- Be properly trained and licensed for lift trucks and other power equipment.
- Use proper signals (horns, verbal messages) to let people know you are working in the area.
- Never look into hand-held laser scanners.
- Sheathe box-knives when not using them.

Quality

Locators must:

- Scan every item they move and every location they place merchandise.
- Follow all other procedures to update Inventory Control.

Progress Check # 4

1. What is the purpose of a Locating System?
 - a. To better utilize our equipment.
 - b. To identify where our parts are.
 - c. To increase the time searching for parts.
 - d. To enable management to monitor our progress.

2. What is the difference between a Fixed Location system and a Floating Location System?

3. What is a Golden Zone?
 - a. Where the high cost items are stored.
 - b. Where high volume items should be stored.
 - c. The highest tier/shelf.
 - d. The lowest tier/shelf.

4. What are the four basic slotting rules?



5. Circle the five basic forms of storage.

- | | |
|--------------|-----------|
| a. Shelves | e. Stacks |
| b. Poles | f. Manual |
| c. Bins | g. AS/RS |
| d. Mezzanine | h. Racks |

6. Match the type of rack to its description.

- | | |
|-------------------------|---|
| ___ Deep Lane Racks | a. Large quantities of similar loads. |
| ___ Drive-in Racks | b. Similar to Drive-in Racks but allow FIFO. |
| ___ Drive-through Racks | c. New pallet loaded in front; pushes the old pallet to rear. |
| ___ Pushback Racks | d. New pallet loaded on one side; flows gently to the other. |
| ___ Flow-through Racks | e. No vertical obstruction. |
| ___ Cantilever Racks | f. Two or more pallets deep. |

[illegible]



Picking

Picking, sometimes called order filling, means finding the product that the customer ordered, taking it out to its location, taking it to another location, and updating Inventory Control. The simplest order would be one pallet of product, taken directly to shipping and shipped to the customer. This is often done when large quantities of a single item are ordered.

Picking Operator will first receive instructions for picking the merchandise. The instructions may be on a paper pick list (also called pick sheet or pull sheet), on the computer screen, or given by a voice-recognition RF system. They will include what to pick, the quantity to pick, and where the merchandise is located.

The list can be all the items ordered by one customer, or all of one item ordered by a number of customers. When all of one class of merchandise is picked (one item for several customers, all items for one customer) before going on to the next class, it is called wave picking. Wave picking is efficient for large warehouses with many different items and/or many customers.

PICK LIST

Date: _____

Order Picker: _____

	Order #	SKU	Quantity	Location	Destination	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Pick List

In either case, make sure the items are not damaged, and put the items on a pallet, in a tote, or on a conveyor. As with locating, it is crucial to update inventory, by scanning each item, writing it in a log, checking them off on a list, or telling the RF voice recognition system that the item has been picked. It is also crucial to return the remaining items (if any) to the same location from which they were picked.



Picking Methods

There are four basic picking methods:

- **Discrete Picking:** One picker per order.
- **Batch Picking:** One picker per group of orders.
- **Zone Picking:** One picker per zone selecting one type of product who then passes the order onto someone in the next zone.
- **Wave Picking:** Grouping orders by characteristics (i.e. all orders being sent via UPS).

Picking Control System

There are three basic order-picking systems: Verbal, paper-based and paperless.

Verbal picking is the simplest. It works fairly well in low volume environments. The premise for the system is calling out to someone else to pick the product.

Paper-based is the standard warehouse control system of today. In this environment, a computer or a human compiles an order and creates paper pick tickets for order pickers to pull orders. The order picker must then read the item to be pulled and hope the inventory is located in the slot that the computer identified. The benefit of the paper-based systems is the relatively low purchase and implementation cost. In a well-maintained environment with experienced order pickers, a paper-based system can function effectively. However, there is a multitude of opportunities for data entry and order-pick errors that raise the cost of the order picking operation.

Paperless systems imply that all movement is tracked electronically rather than on paper via a paper trail. It eliminates the traditional errors associated with product recognition, location confirmation, data entry and pick accuracy. A paperless system increases tracking capabilities and reduces overall labor requirements and training. The paper pick lists are replaced with radio frequency or batch terminals, pick-to-light systems, warehouse management systems (WMS) and automated picking systems like automated storage and retrieval systems (AS/RS) and robotic extractors.

Picking Issues

STATE that Picking was once seen as a way to improve productivity in the warehouse but today it is viewed as a strategic advantage. Some of the order picking issues that companies face include:

- **48-hour Delivery Cycle:** Companies are implementing warehouse management systems (WMS), radio frequency and paperless picking to guarantee 24-hour shipment of goods in an effort to increase customer service levels.
- **100% Accuracy:** In today's order picking environment, picking accuracy rates nearing 99% are common. But the day of 100% pick accuracy in any environment involving human labor continues to be nearly impossible. Even in a fully automated system, 100% accuracy is not realistic.
- **Customized Packaging and Labeling:** Customers request that the warehouse apply a store label or create a specialty mix of products in customer packaging configurations, without adding lead time.
- **Shrinking Order and Unit Size:** Smaller order sizes translate directly into more customer orders, ordered more frequently, which directly increases the amount of labor required to pick the same quantity of items over time.
- **Order Tracking Requirements:** The location and status of orders throughout the distribution process must be tracked and updated in a real-time environment.



Improving Picking Efficiency

As warehouse managers look for ways to pick product more efficiently, they look at optional picking methods that include:

- **Pick-to-Pallet:** This is the simplest and most common way to accumulate cartons for a batch of customer orders. The investment in equipment is low; however, it is difficult to pick from any location except the floor level. In addition aisles must be wide enough to accommodate pickers passing one another.
- **Batch Pick 2 to 4 orders:** This permits several batches to be combined to reduce the number of times that a picker must travel the pick path. A special pick list that combines the batch requirements and indicates the allocation by batch must be prepared.
- **Order Picking Truck:** This requires a separate handling step to place the picked cases onto a sorter, and the order picker can access several levels in the pallet racks. It is especially suited for slow moving product.
- **Pick-to-Belt:** Cases are placed on a belt conveyor by the order picker along the pick face. Pickers walk from one pick to another to complete the requirements for a batch in their zone, then repeat the process for each batch.
- **Pick Car:** This is a special device that combines the feature of an order-picking truck and pick-to-belt. Because only one pick car can be placed in an aisle, the case-flow rate from that aisle is limited by the capacity of one picker.
- **Pallet-to-Picker:** When the number of cases of a single product required for a batch will consume a full pallet, the pallet may be brought directly from reserve storage to a special depalletization workstation where cases may be transferred from a conveyor to the sorter.
- **Robotic Picking:** Robots or other mechanical devices that transfer cases from a pallet to a conveyor are an extension of the pallet-to-picker method. AS/RS, Vertical Lift Modules (VLM) and carousels are examples of automated and semi-automated pick systems.

Safety

Picking Operators must:

- Use caution when moving material, either with power equipment, or by hand.
- Use safe lifting techniques.
- Wear issued protective equipment, such as weight belts.

Quality

Picking Operators must:

- Be alert for damaged merchandise.
- Be careful not to cause damage when moving merchandise.
- Make sure that heavy items are not stacked on top of crushable items.



Progress Check # 5

1. Match the four basic picking methods to their description.

___ Discrete Picking	a. One picker per group of orders.
___ Batch Picking	b. One picker per order.
___ Zone Picking	c. Grouping orders by characteristics.
___ Wave Picking	d. One picker per zone.

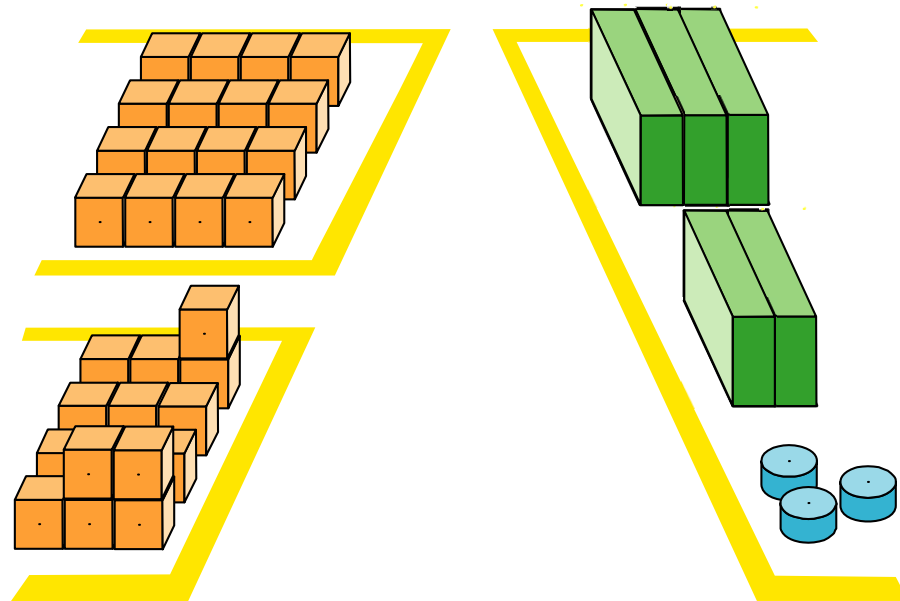
2. What are the three picking systems?

Notes:



Staging

After picking the product for an order, the picker or material handler brings it to the staging area.



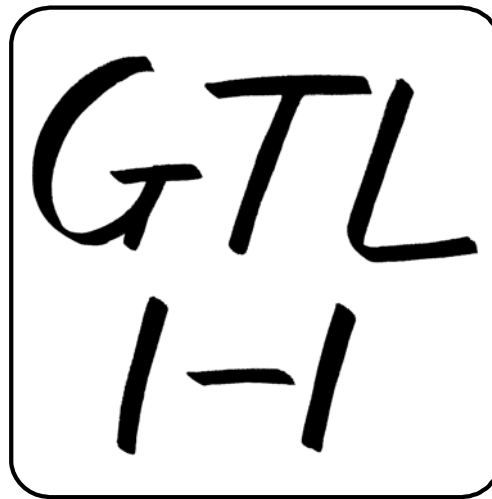
Staging

The Staging Operator, logs in, scans in, or uses a keyboard to input the order label. This updates inventory and prints the labels needed such as address labels, tracking labels, packing lists, and other labels required by the situation or by the company. Before attaching the labels, the packing, wrapping, or sealing is checked for security. The packing list is checked to verify the shipment.



Print Labels

The Staging Operator will attach the labels in the locations specified by the company. A full pallet of freight usually has at least two address labels, often four (one on each side). There may be a label for each piece in the shipment, and a “license plate” label that identifies the entire shipment. The company may also require the trucking company’s SCACTIL code written on a blank sticker and attached to the pallet, along with the pallet number. The SCACTIL label provides a method to help automatically identify a freight carrier’s trailer. The illustration below shows the SCACTIL code for Goggin Truck Line, pallet one-of-one pallets.



SCACTIL Code Label

If the pallet is full, the Federal Government allows the shipper to wrap the pallet without labeling each carton. In that case, attach a warning label telling the trucker “Do Not Break Wrap - Not All the Cartons Are Labeled.”

The Staging Operator will attach or insert a packing list. A second packing list is given to Inventory Control.



Staging

1 OLD DOMINION FREIGHT LINE INC. (ODFL) P.O. BOX 60908 - CHARLOTTE, N.C. 28260 (336) 889 5000																					
Destin Trs		Orig Trs		Shipper B/L Number		Purchase Ord No.		Type		Copy		4/27/00 RP									
FLO		MCN				4200000189						6813 651187 4/25/00 03100817513									
0 Car CD		0 Car Rev		ODFL Rev		0 Car W/B No		Bill to Cd		Tri No		W/B Date		Waybill Number							
CONSIGNEE		WACCAMAW DISTRIBUTION CENTER 550 GEORGE J BISHOP PARKWAY MYRLE BEACH SC 29578						Dest I/L Car		ANCHOR PLASTICS 350 HUTHINSON DRIVE MACON GA 30445						Page No					
																1 1					
																Sec 7 SHMT					
																P/C C/O/C					
0 Car Cd		0 Car Rev		ODFL Rev		Ack No		B I L L T O				WACCAHAW CORPORATION C/O DELTA AUDIT PO BOX 25964 CHARLOTTE NC 28229						B/C R/C			
																		AC DC			
Waybill Number		0/Agt		D/Agt		Master Bill No															
03100817513																					
Pieces	ret	Description						Weight	AS Weight	Rate	Prepaid	Collect									
40		HANDLING UNITS : 40 UNITS OF TYPE CTNS CTNS GLASSWARE						670				95.22									
40		3102243				8080		95.22	670			C.O.D.									
Ttl Pcs		Consignee Cd		Shipper		Tariff		Due ODFL	Ttl Weight	Ttl AS Wgt			95.22								
RECEIVED IN GOOD CONDITION EXCEPT AS NOTED										Exceptions :											
By :																					
Company :										Driver :											
Date :																					
Seal # (if Apple)																					
										Total Prepaid Total Collect CASH <input type="checkbox"/> CHK <input type="checkbox"/> CHG <input type="checkbox"/> Pcs. Del'd Date Del'd DELIVERY RECEIPT											

2 OLD DOMINION FREIGHT LINE INC. (ODFL) P.O. BOX 60908 - CHARLOTTE, N.C. 28260 (336) 889 5000																					
Destin Trs		Orig Trs		Shipper B/L Number		Purchase Ord No.		Type		Copy		4/27/00 RP									
FLO		MCN				4200000189						6813 651187 4/25/00 03100817513									
0 Car CD		0 Car Rev		ODFL Rev		0 Car W/B No		Bill to Cd		Tri No		W/B Date		Waybill Number							
CONSIGNEE		WACCAMAW DISTRIBUTION CENTER 550 GEORGE J BISHOP PARKWAY MYRLE BEACH SC 29578						Dest I/L Car		ANCHOR PLASTICS 350 HUTHINSON DRIVE MACON GA 30445						Page No					
																1 1					
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0 Car Cd		0 Car Rev		ODFL Rev		Ack No		B I L L T O				WACCAHAW CORPORATION C/O DELTA AUDIT PO BOX 25964 CHARLOTTE NC 28229						B/C R/C			
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Pieces	ret	Description						Weight	AS Weight	Rate	Prepaid	Collect									
40		HANDLING UNITS : 40 UNITS OF TYPE CTNS CTNS GLASSWARE						670				95.22									
40		3102243				8080		95.22	670			C.O.D.									
Ttl Pcs		Consignee Cd		Shipper		Tariff		Due ODFL	Ttl Weight	Ttl AS Wgt			95.22								
RECEIVED IN GOOD CONDITION EXCEPT AS NOTED										Exceptions :											
By :																					
Company :										Driver :											
Date :																					
Seal # (if Apple)																					
										Total Prepaid Total Collect CASH <input type="checkbox"/> CHK <input type="checkbox"/> CHG <input type="checkbox"/> Pcs. Del'd Date Del'd D EIPT											

Packing List

Depending on the warehouse and the size, number and weight of the items to be shipped, there may be as many as three types of shipping: UPS/RPS, freight and customer pickup.

UPS/RPS Orders

For UPS/RPS orders, the Staging Operator takes the picked order to a UPS/RPS area. The Operator ensures the products are all boxed and ready to ship. He/she prints address labels, packing lists, and tracking labels, and places them on the boxes. The boxes are then stacked for the UPS/RPS carriers to pick up for delivery. The Operator updates inventory by scanning labels, logging entries, or inputting data to a keyboard.

Freight Staging

For freight staging, the Staging Operator usually process the paperwork.

Orders for shipping are staged near the shipping dock doors until they are ready to be loaded onto the trucks. These orders may consist of individual cartons or full pallets. The Shipping Operator prints address labels, packing lists, attaches the labels and lists, and prints and attaches tracking labels.

Inventory is updated by scanning labels, logging entries, or inputting data to a keyboard. The scanning or data inputting process also prints the labels and packing lists. Often each part of the shipment gets a label, and a “license plate” is printed that identifies the entire shipment.

Warning labels, such as “Fragile” or “Flammable” are attached. The Staging Operator or Material Handler moves the material to the loading area.

Customer Pick-ups

Customer pick-ups are handled much like freight. When ready for shipping, the Staging Operator or Material Handler places customer pick-ups in the customer pick-up area.



Safety

Staging Operators must:

- Use safe lifting techniques.
- Use proper signals (horns, verbal messages) to let people know you are working in the area.
- Never look into hand-held laser scanners.
- Sheathe box-knives when not using them.

Quality

Staging Operators must:

- Wrap Pallets securely.
- Fasten containers securely.
- Attach labels securely.
- Use packing materials as needed.

Notes:



Shipping

If the order is to be palletized, the cartons must be properly stacked and weight distributed evenly. This will prevent tipping when it is lifted by the lift truck or traveling in the truck. Stretch wrapping the entire load (either by hand or by machine) will prevent the cartons from shifting on the pallet during shipping.

The carrier arrives at the dock that has been scheduled for him. As the loader or shipping operator, you plan how the orders should be loaded onto the truck. Take into account the weight of the orders, how fragile they are, if they can be stacked, and how the weight must be distributed on the truck. Also consider how to stack the load so it will not shift during transport.



Loading a Truck

When the orders reach you from staging, most of what has to be done, has already been done. (You may have done the staging work yourself). Scan in, log in, or enter on a keyboard each order number as you load it. You may need to consolidate (combine) some orders for the same customer. You may also load shipments that have just been received from an inbound truck (cross-docked material). As you enter or scan each order, you are updating inventory - just as crucial here as earlier in the process.

When the last order has been checked, scanned and loaded, make a final overall inspection. Make sure all people are cleared from the area. Then close the truck doors, remove the dock-locking equipment, attach a seal if required, and release the truck. Turn in your paperwork.

Shipping Methods

The following are methods of shipping:

- **Floor-loading** the semitrailer utilizes the space most efficiently but increases the loading and unloading times. It also increases the opportunity of damage if heavier cartons are inadvertently placed on lighter cartons.
- **Pallet loading** speeds the loading and unloading process but does not utilize all the available shipping space.
- **Dunnage**, or loose packing material, is used to fill the empty spaces between cartons to minimize any shifting that might take place during shipment.

In either case, evenly distributing the weight in the trailer is critical. An unbalanced trailer can cause the load to shift and damage the goods.



Safety

Loaders/Shipping Operators must:

- Use safe lifting techniques.
- Use proper signals (horns, verbal messages) to let people know you are working in the area.
- Never release a truck until all people are cleared from the area.

Quality

Loaders/Shipping Operators must:

- Make sure all shipments are undamaged.
- Make sure no damage occurs during loading.
- Load the truck to prevent shifting during transport.

Progress Check # 6

1. Why do we use filler in cartons?
 - a. To add weight.
 - b. To make the carton look full.
 - c. To protect the contents.
 - d. To prevent tipping.
2. How can we prevent a palletized load from tipping?
 - a. Use filler
 - b. Evenly distribute the weight on the pallet
 - c. Use corrugated boxes
 - d. Stretch-wrap the pallet
3. What are the advantages of Floor loading a trailer?
4. What are the disadvantages of floor loading a trailer?
5. What are the advantages of pallet loading a trailer?
6. What are the disadvantages of pallet loading a trailer?



Value-Added Services

Warehouses are expected to do more than just move goods into and out of the facility. Many distribution centers provide value-added services (VAS) that enable the company to decrease inventory and improve response time. Examples of value-added services include labeling, repackaging, kitting, postponement and vendor-managed inventory. These services are providing additional economic value to the supply chain.

Labeling

Many distribution centers affix identification labels to received goods to speed them through the warehouse. Product identification also helps to maintain accurate inventory. The labels usually contain product identification information such as SKU number, description, quantity, purchase order number, etc.

Some customers require additional information or markings on labels. Some require labels that have bar coded data to expedite electronic scanning. There are many types of bar coding available (1-D and 2-D are general categories of bar coding).

Other customers may require goods to be labeled for overseas shipment. The European Community (EC) has specific labeling requirements for products being shipped to Europe. Other countries have different labeling regulations. Often customers want pricing tickets or promotional stickers applied to the goods.

There are times when different retailers require their own logo on merchandise that was shipped in bulk to the warehouse.

If the supplier cannot (or does not) comply with these requirements, the task falls upon the distribution center.

Repackaging

Repackaging is required when the quantity of merchandise in the received package is greater than the quantity required to be shipped. Warehouse personnel will unpack the delivery and repackage it into smaller quantities. This task is often referred to as repack, breakpack, breakout, etc.

This task is very labor intensive and error-prone. Warehousing personnel should work closely with suppliers to minimize the need for repackaging.

Gift Wrapping

Some companies offer gift wrapping services to their customers. Again, this is a very labor-intensive task and dramatically slows movement of an order through the warehouse.

Kitting

Kitting (or assembly) is the process of consolidating goods into one saleable unit. It may include combining merchandise from multiple suppliers into one product.

Kitting may be done for a number of reasons. It may be a marketing tactic of combining merchandise to increase sales.”

Assembly often involves finalizing product for shipment. It might include customizing merchandise or it may be part of a postponement process.



Postponement

Postponement is a practice of manufacturing generic products and then adding last-minute customized details in the warehouse. This practice is becoming more and more popular with the retailing industries.

Case Study

An appliance manufacturer produces all the parts required for its entire line of refrigerators but does not complete the final assembly steps. The refrigerator parts are stored in the warehouse until orders are received from the customers. The customers may choose a door that opens to the left, an icemaker and/or special shelving. Upon receiving the specific customer orders, specially trained warehouse personnel finalize the assembly. The customized refrigerators are shipped within 24 hours.

In the above case study, the manufacturer is able to provide specialized services to the customer while maintaining low inventories. The manufacturer is also able to adapt quickly to unforeseen changes in customer preferences. Any additional costs for this service are offset by the reduced cost of storing stranded merchandise. It also gives the manufacturer a leg up on its competition. The customers are satisfied because they do not have to pay for unwanted options. In addition, they have a product that has been personalized to their specific needs.

Postponement is very labor intensive and can be costly if done incorrectly. It requires additional space and training. Companies must be careful to choose which products they are going to customize.

Vendor-Managed Inventory (VMI)

Vendor-managed inventory is a process by which the supplier controls the flow of inventory into a customer's distribution network based on inventory, demand and other relevant product movement data provided by the customer to the supplier.

Case Study

The Customer Service Center of a large computer manufacturer was responsible for servicing and repairing returned product. During the repair process miscellaneous hardware (screws, nuts, clips, etc.) were removed. Upon completion of the service new hardware was installed.

Although one person was assigned the responsibility of maintaining the inventory, it was difficult to know the precise mix of product that would be returned to the service center. To make matters worse, this individual had other responsibilities that absorbed his time. To make up for this, there was a tendency to order larger-than-necessary quantities, causing delays from the various suppliers. Often the service center would run out of specific pieces of hardware. This delayed the repair process and angered customers.

It was decided to outsource the management of the hardware. One supplier was tasked with maintaining the inventory. Twice a week, the supplier visited the service center, inventoried the hardware, replaced used hardware on the spot and later invoiced the service center for the parts.

The supplier did not charge any additional fee for this service. As a sole-source supplier of the hardware, he was assured of a steady customer with constant usage.



Practice Exercises

The objective is to give you practice in the operation of a simple warehouse with a few products. All practice exercises are built around “CatsAlone,” a fictional company specializing in pet supplies for cats. The company orders its supplies from various vendors, and fulfills the orders of its eight stores from a small distribution center (40,000 sq-ft)

For the purpose of this practice, we will focus on a narrow range of products: two brands of dry food (KittyQueen and CataTonic), two brands of canned food (CatScience and CataTonic), one brand of litter (KleenKat), litter pans in two sizes from TidyTom, and a variety of cat toys and grooming items from CatAComb. Food and litter is received on pallets, and must be broken out to make up orders for the stores. Litter pans and cat toys are received in cartons of quantities small enough to be consolidated and crossdocked to the stores.

The key functions are as in the text: Receiving, Putaway, Picking, Material Handling, Staging, Shipping, and Inventory Control. The key jobs for these practice exercises are Receiver, Locator/Picker, Stager/Shipper, and Runner/Loader. The paperwork follows Job Descriptions; your instructor will have extra copies.

Job Descriptions

Receiver

1. Compare ASN/Packing List, Bill of Lading (BOL) and merchandise as the orders are processed.
2. Check the ticketing code on the ASN and make sure the merchandise is correctly ticketed.
3. Physically check the case pack of each SKU; make corrections to the ASN if necessary, and order new labels if necessary.
4. Determine which items are to be crossdocked.
5. Fill out the Crossdock Log and attach labels to crossdock merchandise.
6. Check the merchandise as it is unloaded, and notify the supervisor of any problems (damaged merchandise, incorrect quantities, paperwork issues).
7. Complete the Vendor/Carrier Violations form.
8. Return opened or damaged cartons, and damaged goods, to the vendor.
9. Double-check ASN's and turn in paperwork immediately after the delivery is off the truck and verified.
10. Designate where merchandise is to be moved: location, breakout, shipping (for cross-docked items), or damaged merchandise area.
11. Complete a Locate Log to include the SKU, PO, ASN #, quantity, location, and date that the merchandise will be put away in the warehouse.



Locator/Picker

1. Get the Locate Log for items to be located.
2. Record every location used on the Locate Log.
3. Physically move the merchandise into the location.
4. Scan the location bar code and item bar code to update inventory.
5. Read the Pick List for the SKU, location, and quantities needed.
6. Scan location and label for each item picked.
7. Check off each item picked on the pick list; make comments where necessary.
8. Notify inventory control if an item on the Pick List is out of stock.
9. Safely operate a lift truck to transport merchandise.

Stager/Shipper

1. Get the Shipping List to find out what must be shipped and to whom.
2. Break out and repack pallets as required; use appropriate packing materials.
3. Consolidate pallets and cartons as required.
4. Wrap or band loose cartons and pallets into an order.
5. Label wrapped pallets with license plate barcode that designates each item in the order.
6. Scan in the license plate to update inventory.
7. Label each order with address labels.
8. Print and attach Packing List to each order.
9. Double-check SKU's, quantities, PO #, customer name and address.
10. Check off each item on the Shipping List.
11. Safely operate a lift truck to transport merchandise.

Runner/Loader

1. Move merchandise within the warehouse, as needed.
2. Plan how the truck should be loaded.
3. Load truck as full and square as possible.
4. Make sure the heavier merchandise is on the bottom.
5. Take any necessary precautions to prevent damage to merchandise during shipment.
6. Scan each order as it is loaded to update inventory.
7. Safely operate a lift truck to transport merchandise.



Practice Documentation

The practice documents are located in the Appendix. The documents are blank; participants should fill in ASNs, Packing Lists, Pick Lists, etc. with the required merchandise as well as the other information needed. Make copies and distribute to participants.

Guidelines

1. You will work in teams.
2. Each team receives the same situation and works independently in a different area or separate room.
3. Teams work through the situations in the time allowed by the instructor. During your team meeting you should:
 - Discuss the case,
 - Decide what needs to be done,
 - Using the job descriptions, determine the individual responsibilities,
 - Identify and complete the paperwork required by the situation,
 - Using the diagram of the warehouse, demonstrate the complete path followed by the merchandise.
4. Give the work sheet and all completed forms to the instructor.
5. The instructor reviews the paperwork, discusses each team's response and clarifies any confusion.

You may use your workbooks and any notes.

Exercise #1

A delivery of KittyQueen dry food has just arrived. The delivery is one pallet containing 30 ten-pound sacks. Ten of these must be shipped to Store #6 immediately, and Store #4 has ordered five. The rest can be located. Store #6 also wants 5 cases of CatScience canned food and 25 14-pound boxes of KleenKat litter. Store #4 wants a carton of assorted cat toys and grooming items. These items are in the warehouse.

Each member of the team should assume responsibility for one of the four jobs: Receiver, Locator/Picker, Stager/Shipper, Runner/Loader. Write down what you need to do for this order, and what paperwork you need. Find and fill out the paperwork and attach it to this sheet. Assume there is no ASN, only a Packing List.

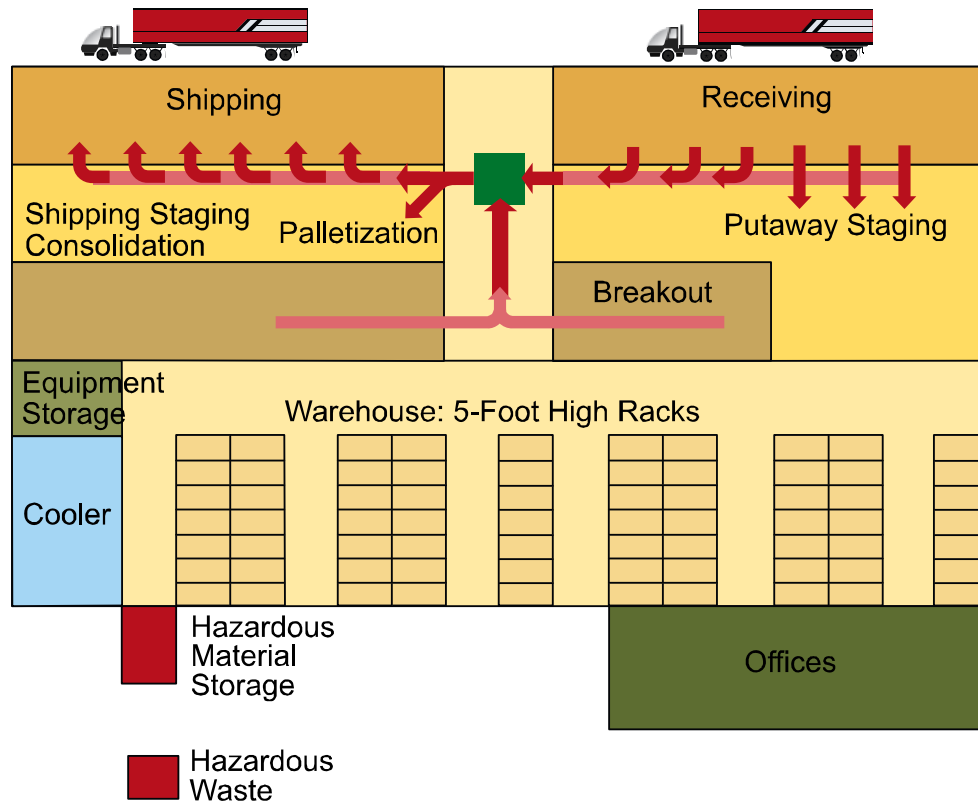
1. List the responsibilities of the Receiver, Locator/Picker, Stager/Shipper, Runner/Loader in the spaces provided in the chart below.

[illegible]

2. In the chart below, list all the paperwork that must be completed for this situation. Select and complete all required forms, using the information provided in this situation. Attach the forms to this sheet.

Form(s)

3. On the diagram of the warehouse, draw lines to trace the movement of the material through the warehouse.



Exercise #2

Store #1 has ordered 15 ten-pound sacks of KittyQueen, 10 cases of CataTonic canned food, 10 fourteen-pound boxes of KleenKat litter, and 1 box of toys and grooming items. Store #3 has ordered 5 cases of CatScience canned food, 1 carton of TidyTom litter boxes (large), 1 carton of TidyTom litter boxes (medium), and 1 box of toys and grooming items. All items are in the warehouse except the CatAComb toys and grooming items.

Each member of the team should assume responsibility for one of the four jobs: Receiver, Locator/Picker, Stager/Shipper, Runner/Loader. Write down what you need to do for this order, and what paperwork you need. Find and complete the paperwork and attach it to this sheet.

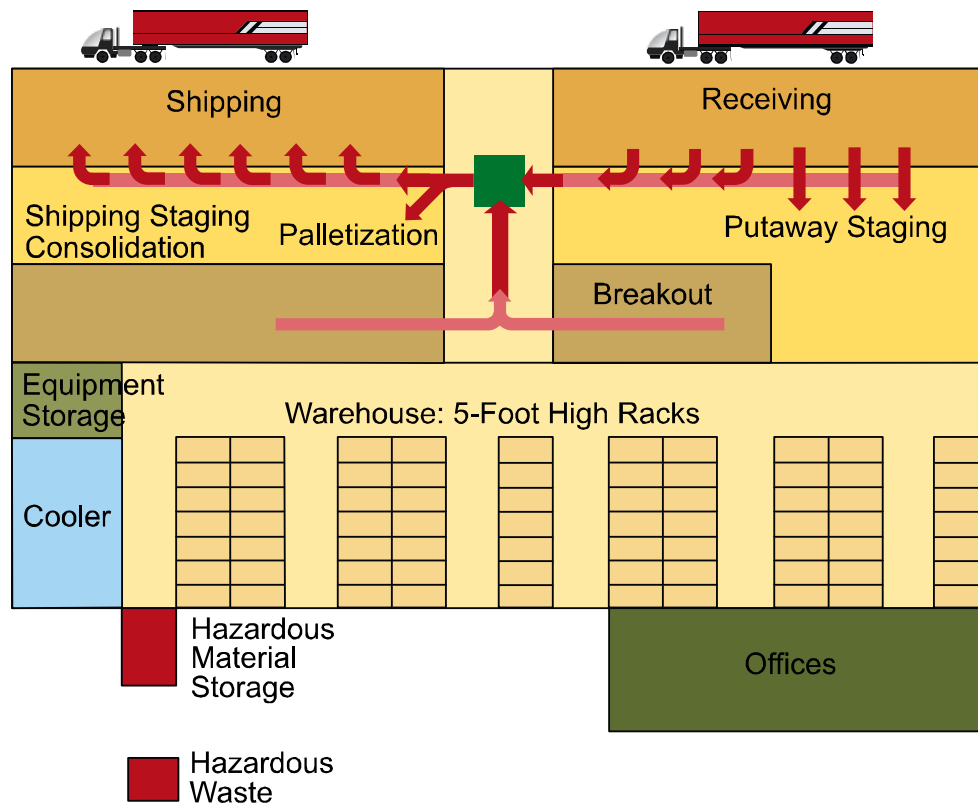


- [illegible]

2. In the chart below, list all the paperwork that must be completed for this situation. Select and complete all required forms, using the information provided in this situation. Attach the forms to this sheet.

Form(s)

3. On the diagram of the warehouse, draw lines to trace the movement of the material through the warehouse.



Exercise #3

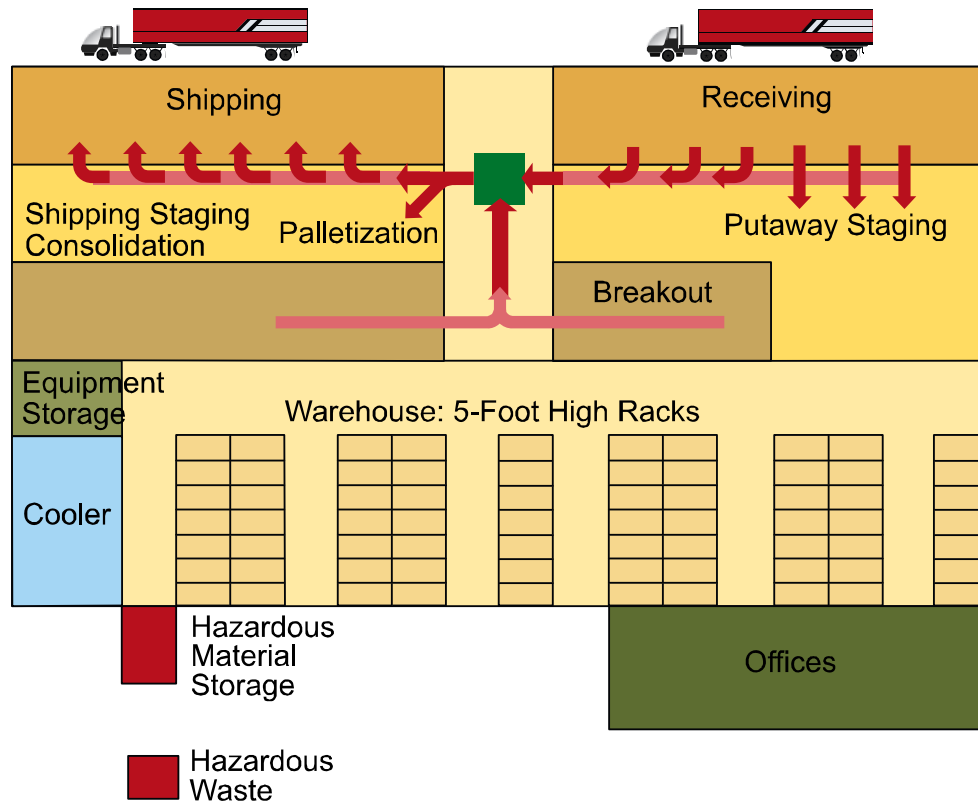
To replenish the warehouse stock, these items have been ordered from RegalCat Supplies: 20 cartons of CatAComb assorted cat toys and grooming items; 40 cases of CatScience canned food; 40 cases of CataTonic canned food; one pallet of 30 fourteen-pound boxes of KleenKat litter; and 4 cartons of (6 each) medium TidyTom litter boxes. The shipment has arrived. As you check in the merchandise, you notice that two cases of CataTonic canned food appear to have been dropped; the cases are damaged and you can see dented cans inside.

Each member of the team should assume responsibility for one of the four jobs: Receiver, Locator/Picker, Stager/Shipper, Runner/Loader. Write down what you need to do for this order, and what paperwork you need. Find and complete the paperwork and attach it to this sheet. Assume there is no ASN, only a Packing List.

2. In the chart below, list all the paperwork that must be completed for this situation. Select and complete all required forms, using the information provided in this situation. Attach the forms to this sheet.

Form(s)

3. On the diagram of the warehouse, draw lines to trace the movement of the material through the warehouse.



Exercise #4

At the same time that the shipment in Exercise #3 is being received, the following orders arrive from your stores. Assume that any items not on the just-received order are located in the warehouse.

Store #5 orders 2 cases of CatScience canned food, 2 cases of CataTonic canned food, 10 ten-pound sacks of KittyQueen dry food. Store #8 orders 10 fourteen-pound boxes of KleenKat litter and 1 carton of TidyTom litter boxes (medium).

Each member of the team should assume responsibility for one of the four jobs: Receiver, Locator/Picker, Stager/Shipper, Runner/Loader. Write down what you need to do for this order, and what paperwork you need. Find and complete the paperwork and attach it to this sheet. Assume there is no ASN, only a Packing List.

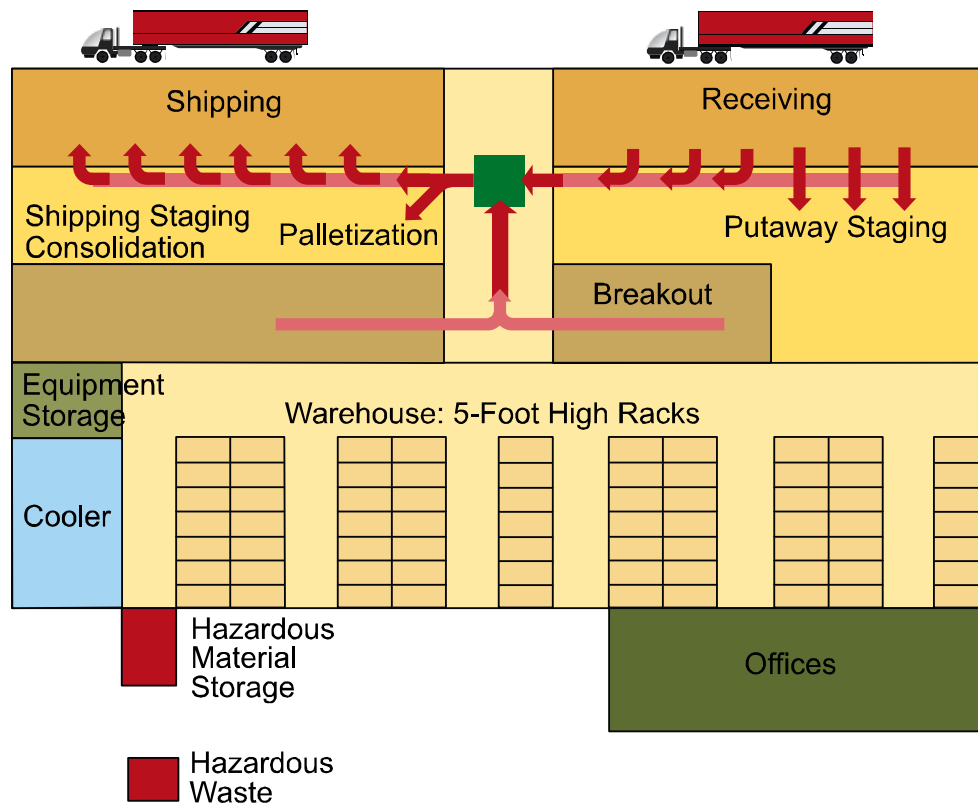


- [illegible]

2. In the chart below, list all the paperwork that must be completed for this situation. Select and complete all required forms, using the information provided in this situation. Attach the forms to this sheet.

Form(s)

3. On the diagram of the warehouse, draw lines to trace the movement of the material through the warehouse.



[illegible]



Glossary

Advanced Shipping Notice	Notification of product due prior to receipt.
AGV	Automatically Guided Vehicle.
Anticipation Stock	Inventory that is built up in anticipation of a scheduled event.
ASN	Advanced Shipping Notice.
AS/RS	Automatic Storage and Retrieval System.
Automatic Storage and Retrieval Systems	A computerized system that physically places goods in warehouse locations and later retrieves those items to fill customer orders.
Bar-code	A series of thick and thin lines that translate into an identifying number.
Batch Picking	One picker per group of orders.
Bill of Lading	A legal document generated by a shipper to consign a load to a carrier. It includes such information as number of cartons, weight, carrier, etc.
Bins	A box or place for storing small items.
Cantilever Racks	A racking system used in storing long objects such as lumber, steel bars, tubing, pipes, etc.

Carousel	An semi-automated system consisting of bins that rotate (either vertically or horizontally) into place to allow the operator to manually pick items for a customer order.
Carrier	A company that transports goods for profit. Also referred to as freight company, trucking company.
Consolidated Movement	A crossdocking strategy where a pallet is brought in, a portion of which is needed immediately by the customer and a portion of which is not.
Continuous Movement	A crossdocking strategy where a unit (typically a pallet) is picked off a truck and transported directly over to an outbound truck.
Conveyors	Moving belts that transport goods, materials, boxes, etc.
Crossdock	A strategy in which product is received from the supplier into a warehouse, moves across the dock directly to outbound loading for transportation to the customer or outlet.
Cycle Stock	Active parts that are being used everyday.
D.C.	Distribution Center.
Decoupling Stock	Inventory maintained between machines to enable them to continue running.
Deep Lane Racks	Racking system that is two or more pallets deep.



Discrete Picking	One picker per order.
Distributed Case Movement	A crossdocking strategy where the distribution of the product is done at the case level.
Distribution Center	Located as close to the customers as possible, these warehouses are operated by suppliers, wholesalers, and retailers or may be public warehouses.
Distribution Inventory	Inventory that is ready for delivery to the customer and is held at a location as close to the customer as possible.
Drive-in Racks	A racking system that allows the forklift driver to enter the rack system and place the load on structural rails.
Drive-through Racks	A racking system similar to drive-in racks that allow for first-in/first-out stock rotation systems.
Dunnage	Loose material laid beneath or wedged among objects carried by rail or truck to prevent damage from movement.
EDI	Electronic Data Interchange.
Efficiency	The ratio of work accomplished to the effort (or time) supplied. Usually expressed as a percentage.
Electronic Data Interchange	The computer to computer transmission of business information using a public standard format.

Ergonomics	The science that coordinates the design of devices, systems and physical working conditions with the capacities and requirements of the worker.
ERP	Enterprise Resource Planning.
Field Warehouse	See Distribution Center.
Finished Goods	Completed product that is ready to be shipped to distribution centers.
Fixed Location System	SKUs are assigned permanent locations.
Floating Location System	SKUs are stored in a random fashion based upon space availability.
Flow Racks	A racking system where the loads are deposited on one side and flow gently to the other.
Flow-through	An operation in which product is received from the supplier, but before leaving the warehouse, has value-added service, such as labeling or pricing, performed.
Hedging Stock	Inventory that is built up in anticipation of an event that may or may not occur.
High Bay	An area of a building where the ceiling is exceptionally high above the floor.
Inventory	All items in the warehouse.



Kitting	The process of consolidating goods into one saleable unit.
Labor Rate	The total hourly cost to a business for employing one person.
Lead Time	The cycle time needed for raw-material-to-market cycle.
Locating System	A system developed to quickly identify where items are located in the warehouse.
Low Bay	An area of a building where the ceiling is not exceptionally high above the floor.
MRO	Maintenance, Repair and Operating supplies.
OEM	Original Equipment Manufacturer.
Order Completion	Areas where items are grouped so that, when Zones placed together, will fill a large percentage of orders.
Order Picker	Sometimes called stock pickers or order selectors. These lifts elevate the operators to higher locations.
Order Picking	See Picking.
OS&Ds	Overages, Shortages and Damages.
OSHA	Occupational and Safety Health Administration.
Packing List	An itemized list of merchandise in a shipment created by a vendor.

Pallet-to-picker	A picking method used when the number of cases of a single product required for a batch will consume a full pallet.
Perishables	Goods that are subject to decay or spoilage.
Picking	Taking requested items out of their location.
Pick-to-Belt	A picking method used where along the pick face, cases are placed on a belt conveyor by the order picker.
Pick-to-Light	A system in which lights and LED displays show operators where to pick product.
Pick-to-Pallet	The simplest pick method. It is most common way to accumulate cartons for a batch of customer orders.
Postponement	A practice of manufacturing generic products and then adding last-minute customized details in the warehouse.
Pricing	Applying the price ticket to an item.
Pushback Racks	A racking system where a new load is deposited into the lane, it “pushes back” the one already at the face and all those behind.
Putaway	Placing an item in a specific location, from which it can later be retrieved.
Raw Material	All of the purchased parts that will go into a finished product.



Reach Truck	A forklift that enables the operator to place pallets in deep lane racks.
Receiving	The process of unloading a shipment, making sure the items are correct and undamaged and that all the paperwork is correct, and logging the shipments into the inventory control system; the area where these activities take place.
Repacking	A process required when the quantity of merchandise in the received package is greater than the quantity required to be shipped.
Return on Assets	The amount of profit computed by dividing the income by the cost of assets. Usually expressed as a percentage.
Return on Investment	The amount of profit computed by dividing the income by the amount invested. Usually expressed as a percentage.
Reverse Picking	A picking process where the store pallets are in fixed locations. When product arrives, the incoming pallet is routed past the store pallet. Product is picked off the incoming pallet and placed on the store pallet.
RGV	Remotely Guided Vehicle.
ROA	Return on Assets.
ROI	Return on Investment.
Safety Stock	Inventory that is used to guard against fluctuations in supply or demand.

Scanners	Devices that use a laser to read identifying bar codes.
Shipping	The process of packing, loading, and transporting a shipment of goods to meet customer requirements; the area where the staging and loading take place.
SKU	Stock Keeping Unit.
Slot	A warehouse location.
Slotting	Placing goods in a warehouse location.
Sortation/Sorting	The process of moving items into different areas according to what they are or where they are going; sortation often uses conveyors and high-speed scanning devices.
Staging	A zone for the temporary placement of goods awaiting movement to some other area in the warehouse.
Supplier	See Vendor.
Supply Chain	The complete path an item takes from a vendor's raw material through the assembly and distribution process to the final point of sale.
Transportation Stock	Inventory currently in the transportation pipeline.
Utilization	The ratio of the amount of time an item is used to the amount of time available. Usually expressed in a percentage.



Value-Added Services	Services provided by a warehouse that enable the company to decrease inventory and improve response time. Examples of value-added services are labeling, repackaging, kitting, postponement and vendor-managed inventory.
VAS	Value-Added Services.
Vendor	Any individual, firm or corporation from whom purchases are made.
Vendor Managed Inventory	A process by which the supplier controls the flow of inventory into a customer's distribution network based on inventory, demand and other relevant product movement data provided by the customer to the supplier.
Vertical Lift Module	A carousel that rotates vertically.
VLM	Vertical Lift Module.
VMI	Vendor Managed Inventory.
VNA	Very Narrow Aisles.
Walkie-rider	An electric pallet jack that offers the operator the choice of walking with the pallet jack or stepping onto it and riding to the next location.
Warehouse	Usually refers to areas or buildings where goods will be stored for a period of time, until they are needed.
Warehouse Management System	A manual or computerized system that enables a warehouse to track all items in the facility.

Wave Picking	A picking method that groups orders by characteristics (i.e. all orders being sent via UPS).
WIP	Work in Process.
WMS	Warehouse Management System.
Work in Process	Semi-finished assemblies.
Zone Picking	One picker per zone selecting one type of product who then passes the order onto someone in the next zone.

