



NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY

Faculty of Management Sciences

# Unit 4: Warehousing Procedures

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## 1. Objectives of the Lesson

**By the end of this unit, students should be able to:**

- **Define a warehouse;**
- **Describe the warehouse process required for smooth operation;**
- **Explain the functions of the warehouses;**
- **Differentiate the different types of warehouses.**



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## Introduction

- A warehouse is a commercial building for storage of goods. Warehouses are used by manufacturers, exporters, wholesalers, retailers, transport businesses, customs (exporters, Importers), etc.
- They are usually large plain buildings, equipped with loading docks to load and unload consignment from trucks.
- Based upon the size of the goods and volume of operation they also often have cranes and forklifts for moving goods, which are usually placed on ISO standard pallets.
- In simple words, warehouse is a **facility** where the supply chain holds or stores goods, until they are needed by the customers. Warehouse can be owned by manufacturers, wholesalers, retailers to store the goods.
- A warehouse is typically viewed as a place to store inventory. However, in many logistical system designs, the role of the warehouse is more properly viewed as a **switching facility** as **contrasted** to a **storage facility**.
- The function of a warehouse is conceptually very simple: to receive goods into the facility, to store these goods and, when required to dispatch the goods.

## A Warehouse is:

- A place where *storage and materials handling* activities are performed
- The precise nature will vary depending on company, product and market circumstances
- Warehousing is closely related to inventory management



## Functions of the Warehouses

- **Receiving goods** – receive and accept responsibility by updating records
- **Identifying goods** – place label, colour code (Normal stocks, Promotional stocks, Special customer stocks, Price changed batch etc).
- **Sorting goods**- sort out the received goods based on identification for appropriate storage area. For example Special customer goods, revised price goods, Promotional goods should be sorted out separately.
- **Dispatching** put away the sorted goods to appropriate storage place- for temporary storage with easy accessibility
- **Holding goods**- security against pilferage and deterioration
- **Selecting**, retrieving, packing - items are retrieved and grouped according to customer order for dispatch
- **Marshalling goods**- check the items of a single order for completeness and order records are updated.
- **Dispatching goods**- consolidated order is packaged and directed to right transport
- **Preparing records** and advices- of stocks and replenishment requirements

Key Point:  
A Warehouse is:

There is an important

A planned space for the efficient & effective  
accommodation of goods and materials

"Trade-Off" between  
these two functions!  
Therefore it has two key features.

- Storage
- Handling

Efficiency v's Effectiveness?

# The Objectives of a Warehouse :

To attain the “best” combination of:

- the maximum of storage space in cubic terms
  - *“Efficiency”?*
- the minimum of handling operations
  - *“Effectiveness”?*

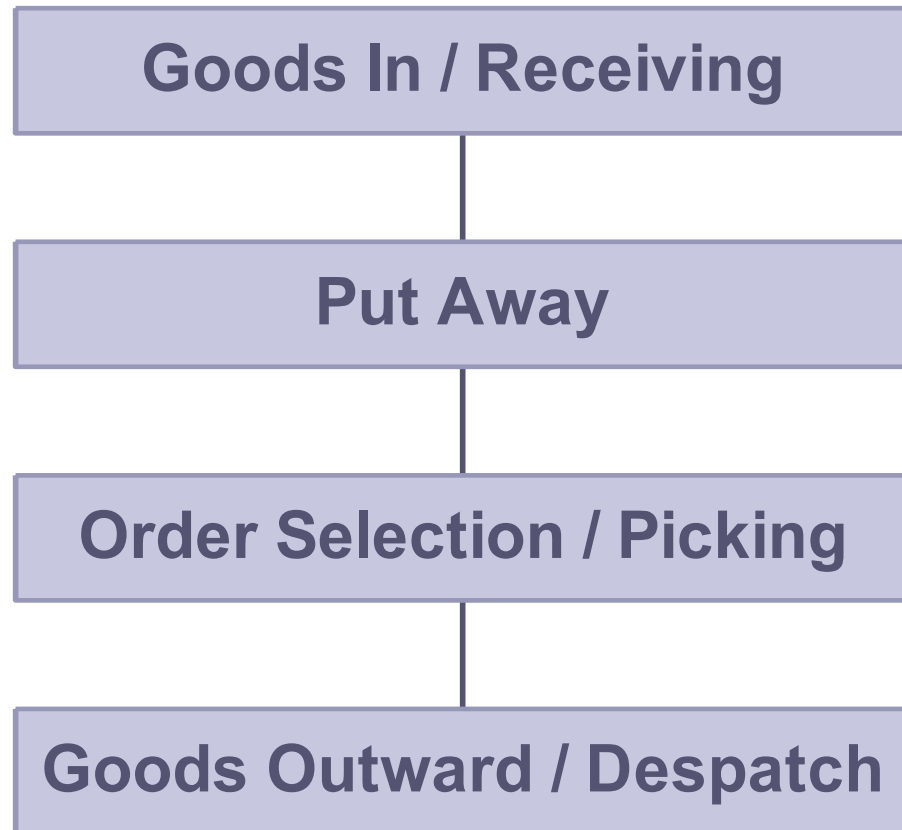


# Main “Jobs” in a Warehouse :

- Goods In
  - Receiving
  - Inspection
  - Put away
- Storage
  - Housekeeping
  - Picking
  - Replenishment
- Despatch
  - Order assembly
  - Packing
  - Checking
  - Marshalling

# Warehouse process

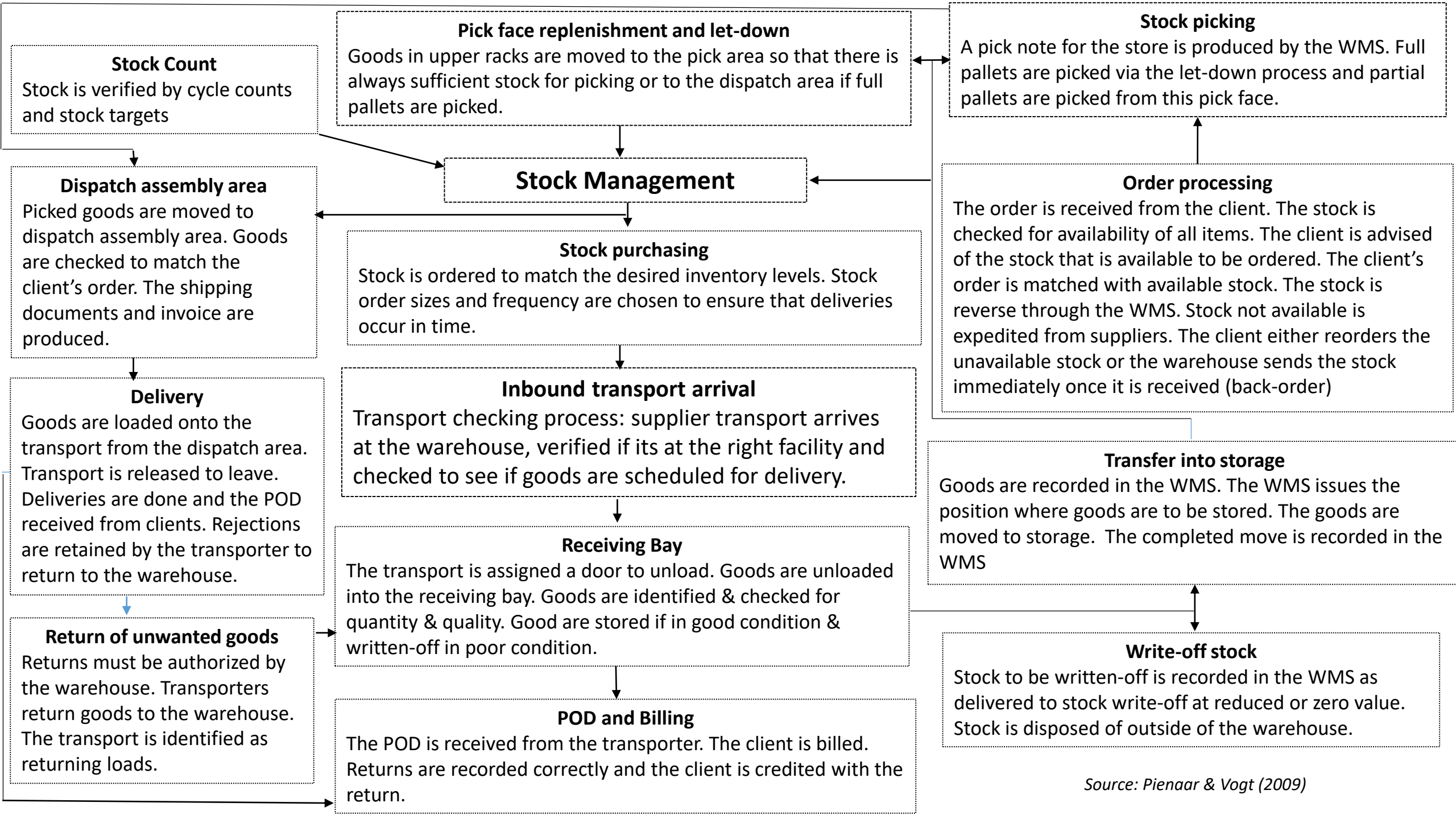
## Warehouse Processes



- This looks at the processes that support the activities of receiving, storing and dispatching.
- Each of these must be provided for and performed precisely.
- All the processes have a direct or indirect influence on the stock.
- The function of warehouse is getting focused from storage-dominance to transaction dominance.
- The warehousing functionality today is much more than the traditional function of storage.

# Warehouse process and operations.

- The design, good and time pressures vary from facility to facility.
- The following process are inherent in all facility:
  - Stock purchasing
  - In-bond transport arrival and identification of loads
  - Receiving Bay
  - Transfer of stock into storage
  - Pick face replenishment and let down of stock
  - Dispatch assembly area or assembly of the goods to create a transport load
  - Delivery of goods and obtaining proof of delivery (POD)
  - POD and billing
  - Return of unwanted goods
  - Stock write-off
  - Stock count





## Stock purchasing

- The facility must carry the correct stock to provide cost-effective and cost efficiency means to customers.
- This process is achieved through the replenishment of the inventory
- The aim is to alter the buying quantity or frequency so that there is a continuous flow of products is moved in the facility to match the uncertainty in inbound supply channel, while matching orders received from customers.
- Placing an order lead to the arrival of inbound transport to the facility, hence if the process is managed and coordinated well the transport will be efficient.



## Transport arrival and identification of loads

- Transport must be scheduled
- Arrival of transport must be planned so that the facility can provide staff to handle the unloading, the equipment to move the goods and capacity to handle any discrepancies between the stock ordered and delivered.
- The recommended steps to handle transport
  - The supplier books the transport load to be delivered to the facility
  - The load details are confirmed with the facility
  - Transport arrives at the facility within the scheduled arrival period and the check is merely a confirmation of the load.
  - The order number is checked.
  - The door where the truck should be discharged can now be allocated.
  - The truck waits for the door to become available; it is then discharged quickly and efficiently.



## Receiving Bay

- Once the receipt of transport is arranged, orders can be unloaded.
- The facility must transfer the goods into storage
- The facility will incur the financial responsibility of for the purchased goods
- The receiving bay process involves checking the quantity and quality of the goods.
- The packaging must be in good condition and suitable for storage and sale.
- The unloading must be efficient and cost effective for all parties, yet allowing checking of quality and quantity.
- The best method:
  - Allocate the receiving Bay for the goods.
  - Choose a door that minimizes the distance the product has to travel to its storage location
  - Load the goods from the truck and place them on the floor, starting as far from the ruck as possible in the first of demarcated (marked) arrows.



## Transfer of stock into Storage

- Goods must be moved into a designated storage space
- The move must be confirmed with the warehouse management system (WMS), if not done the WMS will assume that the goods are still in transit between the receiving bay and stock location, there
- Clear marking of the storage location lead to accuracy.
  - Error of the product in the wrong location is a major problem because it means that the product is not available.
- The code number is allocated for each slot, which is used to confirm that the process has been completed correctly.
- Racks are often identified by designating three alphabetical characters to each space. E.g. A05E may refer to a location in the row of racks marked “A” the “05” column of spaces in the row (two characters are used in this group as the number of columns may exceed ten) and space marked “E”, which is the fifth space vertically in this column.





## Replenishment and let-down of stock to pick face

- Full pallets are stored in the upper levels so that the easily accessible levels are left for pick faces.
- The process of moving pallets from these upper storage levels –either to pick face or the dispatch area is called Let-down.
- **Pick face replenishment** – place where the selection, or pick of a product for dispatch occurs. It is usually near the floor or walkway level, where the goods can be accessed easily.
- As stock is picked from the a pick face it needs to be replenished.
- Pick-face replenishment must be done as highest priority activity in the pick cycle because if it is not done in time it may result into stock shortage at the pick face, delaying the pick process
- **Let-down for full pallet stock pick** – when an order of more goods is received than held on one pallet, it is better to allocate a full pallet first to replenish an order and remaining part of the order is then picked from the pick-face.



## Order Processing

- Once a customer submits an order, it must be processed to check if products requested fall within the supplier's range, availability and if it feasible to ship the products.
- The order is mailed to the warehouse where the products will be shipped, and the products are picked or selected for dispatch.
- Two ways of operation:
  - A customer is promised the delivery, e.g. internet-based selling organization, stock is reserved as a customer places an order. The reserved products is removed from the stock available to subsequent customers.
  - Multiple customers are belonging to a single organization, the customers may be treated equally as a block. If there is insufficient stock available, and the available product is allocated to the customers prorata to the original.



## Stock Picking or picking goods from storage

- Instruction to pick a certain quantity of particular product comes from the WMS in the form of a **pick note**.
- **A pick note** contains information regarding the order and the location of the pick face where the product is stored.
  - It also contains other information such as full description of the product, to assist the picker.
  - It is in a form of printed form or wireless terminal carried by the picker.
  - The recent method is a wireless voice-activated picking method (voice picking).
- It is difficult to detect errors in picks.
- The consequences of incorrect picks are physical stock and information records that do not match and customers who receive wrong goods or even no goods.
- The stock in the pick face must be reconciled with what has been picked to discover the extent of the errors.



## **Dispatch assembly area or assembly of goods to create a transport load**

- All goods from the sections or PPCs in the facility are accumulated into suitable loads for transport.
- It must be done very systematically as good should be loaded within a shortest possible time and in most effective way to minimize the transport costs.
- Goods should be recorded as received in this area so that outstanding goods are easy to identify.
- The best way to accumulate loads is to allocate a lane for each customer.
- Loading products into vehicles must be recorded to ensure that correct product is loaded.
- The driver of the transport must be held accountable for the product and loading process, as driver is responsible for the product once the vehicle leaves the loading dock.



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## **Delivery of goods and obtaining proof of delivery**

- The must be a positive means of confirming the transfer of goods to the customer.
- Ownership and risks pass to customer on handover of the goods and there should be no confusion over when this happen and how.
- Some firms use company stamps in addition to the signature of senior employee authorized to receive the goods.
- A POD document signed in accordance with agreed procedure, is a prerequisite for transferring goods to the customer.
- It records completion of the facility's task.
- Without the POD, the seller will not get paid and may be held liable for loss of the goods.



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## Proof of delivery and billing

- POD authorizes a facility to bill for the service it renders
- Customers are bound to query some of deliveries.
- POD can be imaged onto a computer system, sorted according to the reference number on the POD so that when a customer queries delivery, the POD image can be found very quickly and faxed to the customer for confirmation of delivery.
- The customer may also read the bar-code information of the goods in their system. The system will print a receipt and send the facility a copy of the information received from the scanned bar codes.



## Return of unwanted goods

- Goods must be returned to the facility because stock was delivered in error, over-ordered or damaged.
- Stock delivered in error – the stock was not delivered to the correct customer.
- Stock Damaged in transit should be returned to the facility and the customer is credited not having received the damages goods.
- Stock that the facility agrees to accept back from the customer should be recorded as returned stock.
- Goods returned to the facility must be credited to the appropriate customer at the charged by the facility.
- Damaged goods should be stored in the separate area.



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## Write-off of Stock

- Damages may occur during operation, transport and loading or unloading.
- Damaged stock has to be removed from the stockholding in the facility.
- Goods should be sent to a specified zone designated for goods that are sold at a reduced price (where the goods can still be sold) or Zero Value – where goods are scrapped.
- Once any valued received is recorded the stock should be removed from the facility and the stock value loss is recorded





## Stock Counting

- Stock counting is done to eliminate the errors causing mismatch between the WMS and the physical stock.
- Full stock count: conducted by two independent teams, which verify each other's results. This is often done to confirm stock for financial auditors. If the teams agree on the numbers, these are inserted into the WMS as correct stock quantities. If there is a discrepancy between the results of the two teams, a third team is introduced to recount the stock. The process is repeated until two of the teams agree. The agreed figure is inserted into the WMS.
- The process relies on the controlled counting of the stock and figures obtained from counting the physical goods override the WMS figures.
- Cycle Counts reconcile small sections of facility on a continuous basis. The pick faces are counted every morning when all picks are completed and recorded in the WMS.
  - The stock count and the WMS are reconciled immediately.
  - The storage areas are also checked continuously .
- The stock is categorized for the purposes of cycle counting
  - High-value stock – counted more frequently than medium value stock while Medium value stock – counted more often than slow-moving stock.



## Delivery Transport Operations

- Transport usually accounts for a substantial portion of the supply cost, when capital charges are correctly included, the transport must be used efficiently.
- Transport efficiency is achieved by packing full loads and utilizing the transport for as long as possible each day.
- The operation of transport must allow for trucks to be loaded to the maximum volume or mass, without compromising the standards of service required by the customers.
- The loads must be buildup from goods picked from the various sections of the facility
- Transport should be regarded as one fleet serving all customers.
- The loads must be accumulated in a dispatch assembly area in the facility
- Trucks can complete a limited number of deliveries in a trip, i.e. as they have to travel between stops, discharge the goods and then complete documentation before moving to the next stop.

# Economic benefits of Warehouses

- **Consolidation:** Reduction in transportation cost by consolidating movement. Several plants supply their products for the same customer through a warehouse and from this warehouse the products are sent in bulk shipment to the customer.
- **Break-bulk:** receiving bulk shipments through economical long distance transportation from plant and breaking of these into small shipments for local delivery to various customers.
- **Cross-dock:** This type of facility enables receipt of full shipments from a number of suppliers, generally manufacturers, and direct distribution to different customers without storage. As soon as the shipments are received, these are allocated to the respective customers and are moved across to the vehicle for the onwards shipments to the respective customers at these facilities.
- **Processing/Postponement:** This Functionality of warehousing enables postponement of commitment of products to customer until orders are received from them. This is utilized by manufacturers or distributors for storing products ready up to packaging stage. These products are packaged and labelled for the particular only on receipt of the order.
- **Stock piling (seasonal storage):** This function of warehousing is related to seasonal manufacturing or demand. A supply stored for future use, usually carefully maintained
- **Reverse logistics processing:** physical work related to reverse logistics is performed at warehouses. These activities include returns management, remanufacturing and repair, remarketing, recycling and disposal.



## Service benefits of warehouses

- 1. Spot stocking:** stocking of products in strategically located warehouses during **demand sensitive period** is called spot stocking. Agricultural implements are spot stocked during the growing season.
- 2. Safety Stocking :** In order to meet contingencies like stock outs, transportation delays, receipt of defective or damaged goods, and strikes, safety stocks have to be maintained. This ensures that, on the inbound side production stoppages do not occur, and, on the outbound side customers are fulfilled on time.



## Errors in Operation

- The purpose of any warehouse is to be able to manage the stock in storage, the stock received and stock dispatched in such a way that the warehouse can supply the right stock at the right time and place.
- If the wrong item is delivered, it implies that there is an operational error.
- The same applies for late delivery, delivery of damaged items or failure to deliver.
- Any error needs to be detected and corrected first, and then the correct procedure must be followed.
- Errors effectively quadruple the workload because, first, an incorrect process occurs; next, the second step is to identify the error; the third step is to rectify the error; and the last is to follow the correct process.
- Errors also place time constraints on operations.
- **Errors need to be monitored and minimized, as they result in stock losses or sale losses.**  
**AND** Accuracy is top priority since each activity has its own specialist considerations



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## **Efficiency in warehouse operation**

**Purpose of Efficient Warehouse is to achieve the following:**

- Professional attitude
- Customer awareness
- Establishing standard procedures
- Proactive operations
- Real-time, paperless control systems
- Flexible operations
- Automation
- Accurate inventory
- Priority to quality housekeeping
- Motivated workforce



## Principles of efficiency in a warehouse operation

- There are three principles which reflect the criteria against which all operations must be measured for efficiency of any facility.
- The operation encompasses not only the operation within the building, but also the interaction with the transport.

### **Efficiency Principle 1:**

- Goods at rest within the boundaries of a facility outside a designated storage area reflect an inefficient operation.
- There are only two desired areas of storage in a facility: the long-term storage areas (including the pick faces) and the dispatch assembly area, where goods are accumulated to build a load.

### **Efficiency Principle 2:**

- The location of goods within the boundaries of the facility must be known to ensure an efficient operation.
- The processes of the warehouse require that the whereabouts of goods must be known at all times.
- If not, the goods may NOT be available for efficient delivery.

### **Efficiency Principles 3:**

- People will perform their operations efficiently only if they are trained to do each job in the best way, and are given sufficient time to do the job without errors.
- Time and effort are required to rectify errors.
- Proper, formal training is the best way of preventing errors.



## Stock (inventory) Management

- Stock is the central point of all the processes in the warehouse.
- Every process affects the stock and every process is affected by the stock.
- For these reasons, having the wrong stock in the facility, or having stock that cannot be found immediately, is a big problem.
- **Stock is managed by three control processes:**
- Each pick and delivery of stock must be completed accurately and recorded accurately as completed.
- Each receipt of stock must be completed accurately and recorded accurately as completed.
- Stock must be audited continually.





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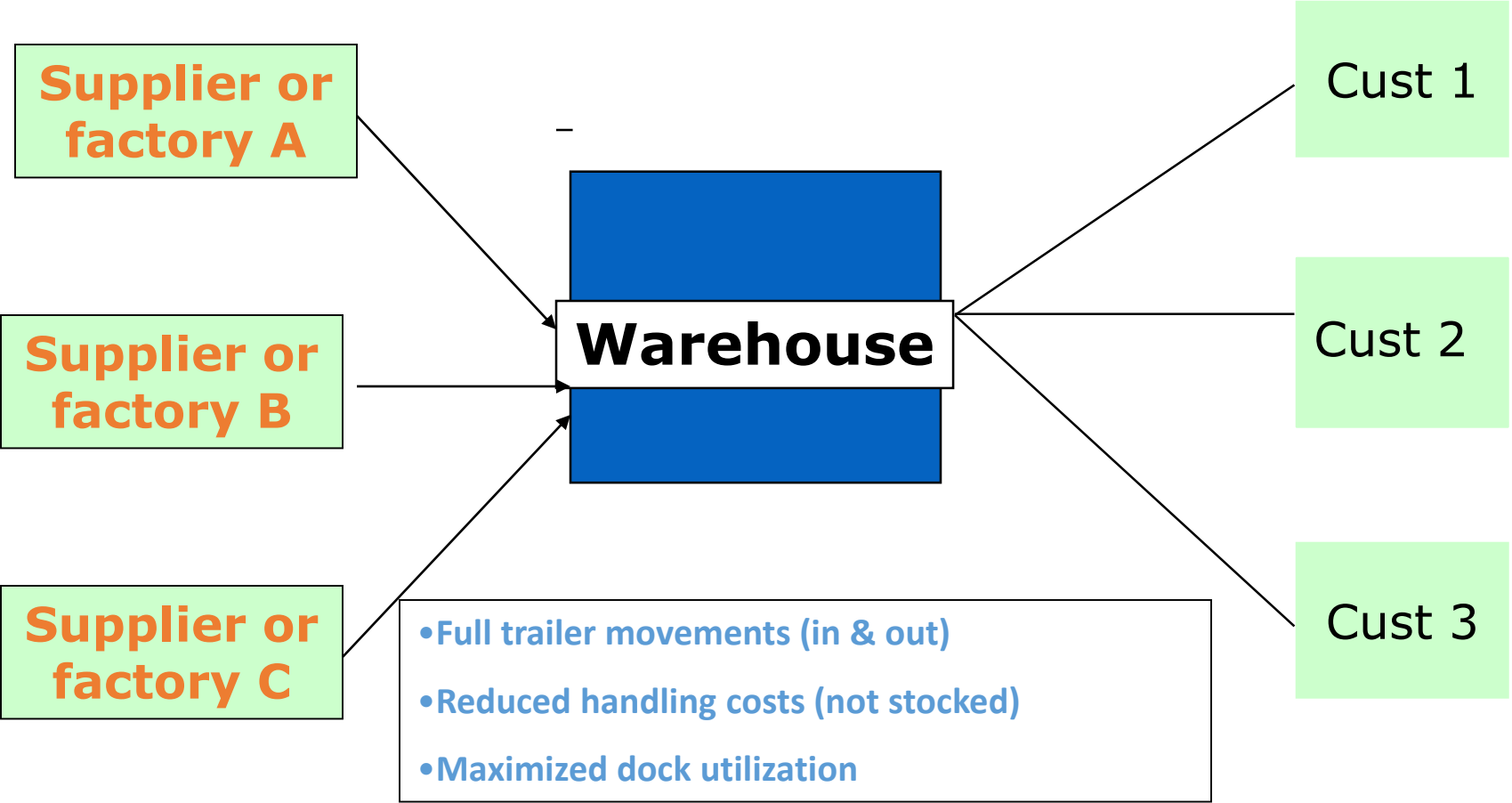
## **Types of Warehouses and facilities**

- There are many different types of facilities.
- These range from a terminal in a harbour that receives products from production facility inland and load them into a ship for export to a large Distribution Centre (DC).
- Some supply chains have a manufacturer's warehouse, a third-party or a common-user warehouse and a regional DC delivering to a retail store.
- All these operations have a receive and dispatch function and they all track stock and final deliveries.
- The only exception is a cross-dock facility, in which the storage function is absent, and the processes of storing and picking are combined into a sorting operation.
- A DC operation is very different from a manufacturing warehouse.  
Its aim (DC) is to be able to select stock and deliver it to customers in a short timescale.

# Cross-dock operations

- It is a particular type of facility in the supply chain where goods are received from suppliers, sorted without storage of the goods, and then efficiently moved on to downstream customers.
- Rather than a warehouse, a cross-dock is more like a continuous process of removing goods from one inbound transport and sorting them directly into an outbound transport.
- **The factors that determine whether utilization of a cross-dock is appropriate are as follow:**
- Products have a continuous flow to all the stores (downstream customers).
- The suppliers are highly reliable.
- There are no unpredictable fluctuations in the sales.
- The products have uniform handling methods.
- **To enable the supply chain to operate with a cross-dock, the supply chain needs to meet certain criteria; hence, it must have the following characteristics:**
- The supply chain must be integrated, including the systems.
- The vendors need to be reliable, accurate and offer high service levels.
- There must be frequent loads delivered.
- Multiple products must be married together.

# Cross-Dock Operations





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## Types of cross-dock

- Three considerations in defining the different types
  - Where in the supply chain the identification of the specific items for customers is performed.
  - Where the sorting of goods is done for the items to be sent to one customer.
  - Whether the supplier provide one product or multiple products to the sort.
- Types
  - Cross-dock-managed load (CML) – identification and the sort of the items done within the DC. Supplier will provide the goods, which the DC must check against the delivery note, identifying each item and then sort these items to the appropriate downstream customers.
  - Joint-managed load (JML) – supplier labels the individual items and delivers them to the cross-dock, where the individual items are then sorted to build a load.
  - Supplier-managed load (SML) – the supplier identifies and labels the items and sorts them into downstream customer groups. Items for downstream customer are consolidated into a unit load on a pallet. The sort of pallets from inbound to outbound transport is done in the cross-dock



## **Public Warehouses can be classified into number of groups:**

- Commodity warehouses: limit their services to storing and handling certain commodities such as lumber, cotton, tobacco, grain and other products that easily spoil.
- Bulk Storage warehouses: offers storage and handling of products in bulk such as liquid chemicals, oil, highway salts and syrups
- Temperature-controlled warehouses: control storage environment; both temperature and humidity may be regulated. Perishables such as fruits, vegetables and frozen foods as well as chemicals and drugs.
- Household good warehouses: storage and handling of household items and furniture are the specialty of these warehouses.
- General merchandise warehouses: handle broad range of merchandise. Merchandise usually does not require the special facilities or the special handling.
- Mini-warehouses: small warehouses, having unit space from 20 to 200 square feet and are often grouped in clusters. They are intended as extra space and few services provided.



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**Public warehouses (rented warehouses) has the following advantages:**

- *No fixed investment*: the use of public warehouse requires no investment for the firm renting space. All costs of the warehouse to the using firm are variable or direct proportion to the warehouse service used.
- *Lower costs*: offers lower costs than private or leased warehousing when the utilization of private space would be low as when seasonal inventories must be stored.
- *Location flexibility*: it is easy and inexpensive to change warehouse locations as markets shift because arrangements with public warehouses are usually on a short-term basis. This lack of a long-term commitment offers important flexibility necessary to maintain an optimal logistics network.



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### **Space ownership (warehouses):**

The organization would invest a huge capital in the space and in the equipment for handling the materials in the facility.

Number of advantages on space ownership include:

- Less expensive warehousing that is possible with renting or leasing, especially if there is high utilization of the facility most of the time.
- A higher degree of control over warehousing operations, which helps to ensure efficient warehousing and high level of service.
- Private ownership may be the only practical alternative when the product requires specialized personnel and equipment, such as pharmaceuticals and certain chemicals.
- The benefits that accrue from real estate ownership.
- The space may be converted to other uses at a future time, such as to a manufacturing facility.
- The space may serve as a base for a sales office, private truck fleet, traffic department or purchasing department.

# Bar-coding and Scanning

- Scanning and bar codes reduces the delays associated with data capturing, increase the accuracy of data capturing and provide more detailed information of where goods are in the process than manual data capturing.
- Scanning allows the operator to record the action into the terminal, and the terminal automatically updates the WMS.
- The scanning system speeds up data collection and reduces the need for written records
- Communication between the scanner and WMS can be via:
  - A hand scanner connecting directly to the computer terminal
  - A portable scanner that stores data to a terminal when placed in a docking station
  - A portable scanner communicating with a wireless system to the WMS.
- Wireless communication allows instructions & information to be downloaded from WMS and displayed on the scanners or terminals in vehicles.
- Bar codes can be introduced to identify products
- Bar codes reflects a number to a product and a pack size, known as universal product code (UPC).
- A single scan will identify the product and pack size.



## Characteristics of Bar- codes

- Read through a scanner, projecting light on the bar code
- The patterns are processed and decoded by the scanner
- The scanners light source is absorbed by the dark bars and reflected by the light spaces
- The patterns are processed and decoded by the scanner
- Can be alphabetical/numerical or both
- Does not store information, but acts as a reference point of information.

## Bar coding can be used for...

- Tracking assets in a building
- Tracking mail from the time it arrives in the mail room to the time it is delivered to each desk/ location within the office
- security measures
- Securing , locking, unlocking entrances/ exits
- Managing and tracking your vehicle fleet and driver





## RFID Technology

- RFID is in two parts
  - 1<sup>st</sup> part is a transmitter or tag, that transmits an embedded code.
  - 2<sup>nd</sup> part is a receiver, which performs two functions of asking for the code, and then deciphering the code to sensible data.
  - Transmitter can be either passive or active
    - An active transmitter has a power source and can transmit longer distances.
    - Passive transmitter, the receiver provides power via radio waves and the distance of transmission is short.
- Advantage of RFID is that the receiver and transmitter do not have to be in the line of sight of one another.
- It allows for rapid checking of the tags in an area and can read all items with 100 percent accuracy.

# RFID Applications

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## ✦ Supply Chain Management

- ◆ Shipping, receiving, inventory

## ✦ Asset Management

- ◆ Monitoring and tracking position or location of assets
- ◆ Electronic Article Surveillance (EAS)
- ◆ Theft Prevention

## ✦ Logistics

- ◆ Where is all the stuff ?

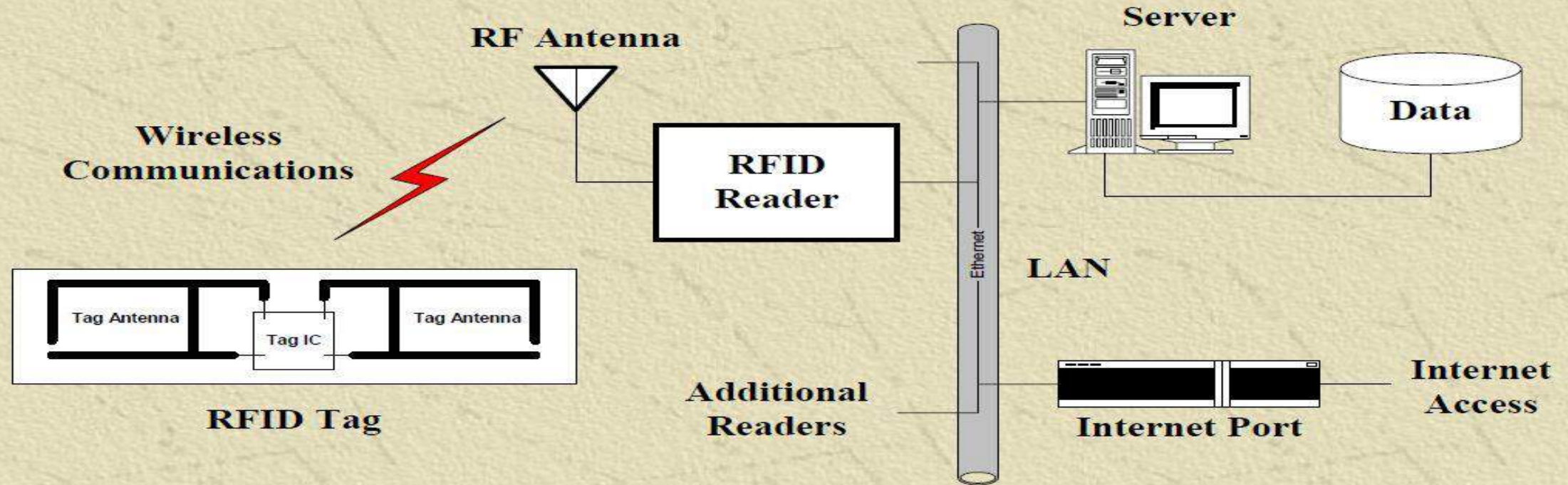
## ✦ Access Control

- ◆ Personal Security
- ◆ Fast Pass toll lanes, parking garages

## ✦ Manufacturing and Process Management

- ◆ Quality Control

# RFID System



- ✦ Low cost RFID tags on products, flats, pallets, etc.
- ✦ RFID antennas and readers installed at tracking portals
- ✦ Database Server for collecting, processing and providing ID information
- ✦ Network/Internet access for tagged item information

# RFID- how it works



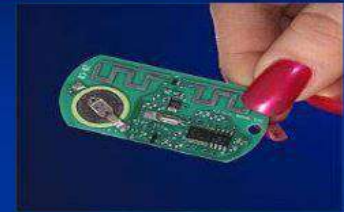
- There is a transmitter and receiver
- Tags have an integrated circuit for storing and processing information
- There is an antenna to send and receive information
- A transponder - the RFID tag - that has been programmed with information

# RFID types

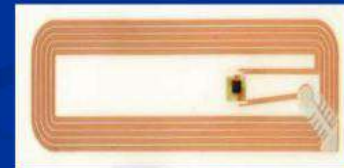
- ▶ **Passive Tags**
  - No battery
  - Low cost
- ▶ **Active Tags**
  - Battery – must be replaced
  - Longer range
  - High cost
- ▶ **Semi- Passive tags-use** batteries to transmit, but need to be signalled to send data.

## Types of RFID Tags

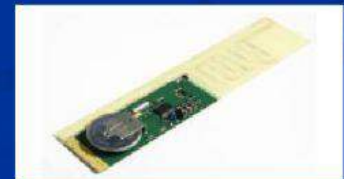
- Active RFID Tag
  - with a battery



- Passive RFID Tag
  - without a battery

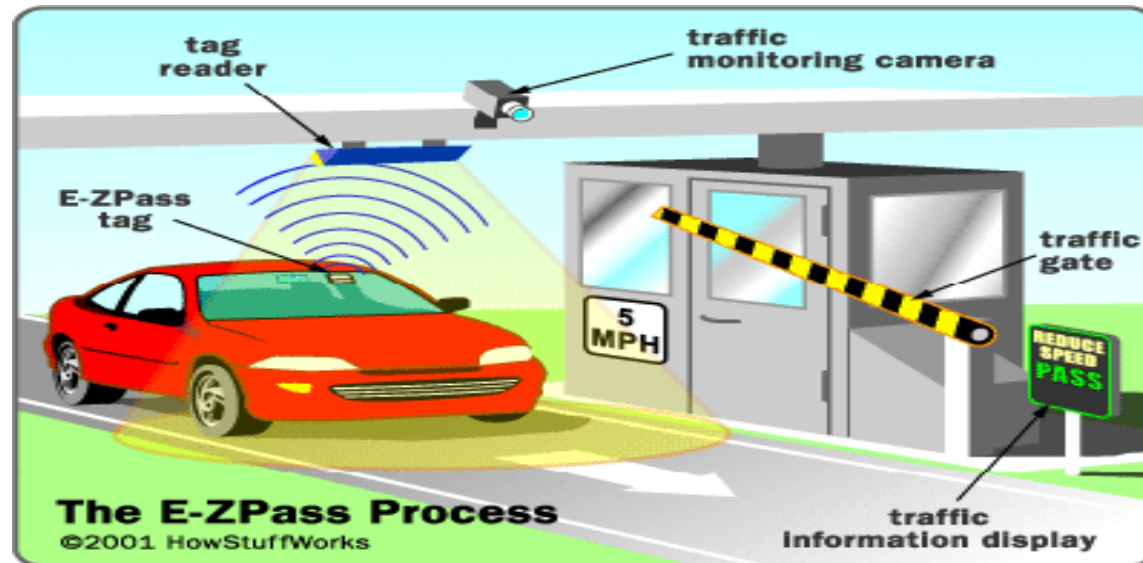


- Semi-Active/Semi-Passive
  - with a battery
  - but working conditionally



# RFID can be applied

- Used in supermarkets smart shelves with electronic product code(EPC)
- Active tags- used to track containers over the world
- Transportation systems also use RFID systems





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## RFID Versus Bar-coding

- ▶ RFID Does not require human to manually pass item over scanner.
- ▶ RFID has More accurate inventory count.
- ▶ RFID Can be incorporated into product, person, animal, unlike the barcode.
- ▶ RFID tags are more expensive than barcodes
- ▶ Bar codes have no read/ write capabilities- you cannot add information written on a printed barcode. RFID, however have read/ write devices & the RFID can communicate with the tag and alter as much information as the tag design will allow.





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## RFID Versus Bar-coding

- Multiple items can be read with a single scan
- Each tag can carry a lot of data (read/write)
- Individual items identified and not just the category
- Passive tags have a virtually unlimited lifetime
- Active tags can be read from great distances
- Bar codes are much smaller and lighter than RFID tags and therefore easier to use.
- Bar codes are less expensive than RFID tags; as barcodes are directly printed onto plastic or paper materials and therefore the only cost involved is the ink; a tiny overall cost.
- Barcodes work with the same accuracy on

# Analysis of RFID

## Strengths

- Advanced technology
- Easy to use
- High memory capacity
- Small size

## Weaknesses

- Lack of industry and application standards
- High cost per unit and high RFID system integration costs
- Weak market understanding of the benefits of RFID technology

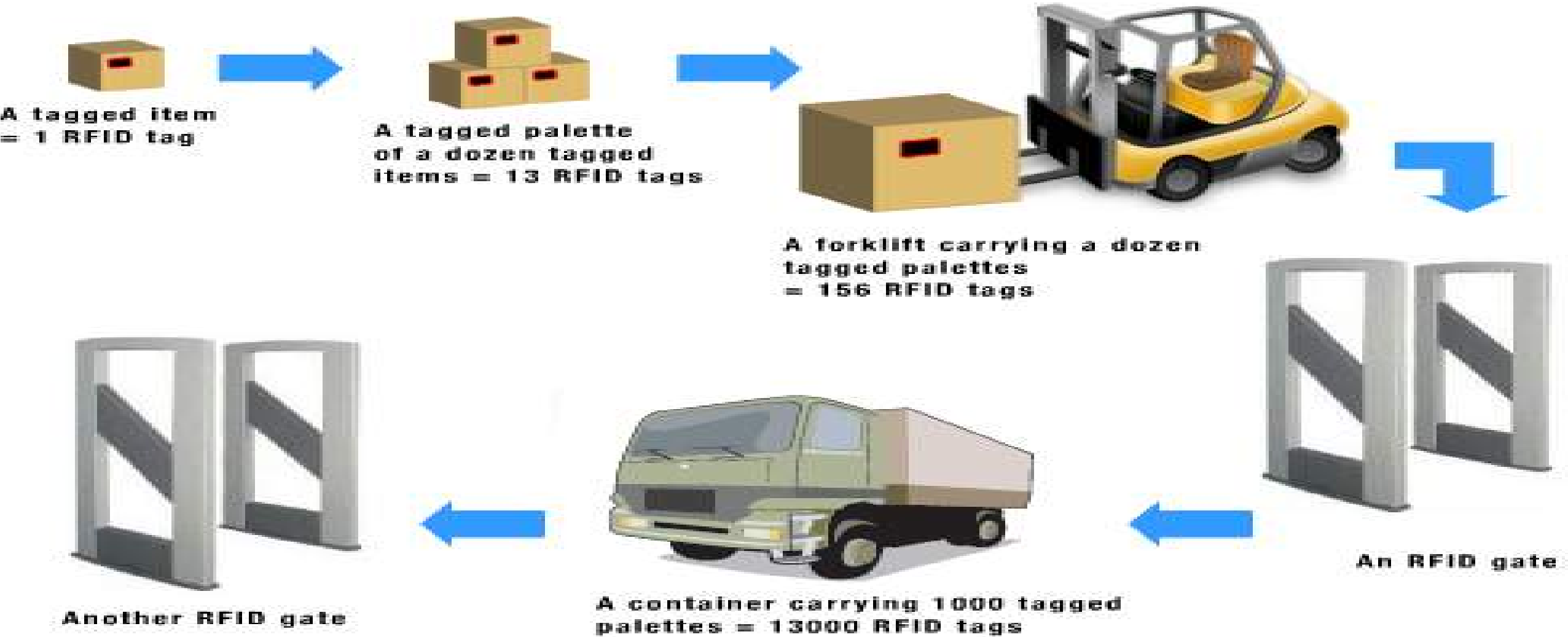
## Opportunities

- Could replace the bar code
- End-user demand for RFID systems is increasing
- Huge market potential in many businesses

## Threats

- Ethical threats concerning privacy life
- Highly fragmented competitive environment

# RFID in a ware house -0example



# CONCERN

## **Improve customer services**

- **Materials more readily available**
- **Less time wasted in line to check out/ check in**
- **Fewer items remain charged to accounts**
- **Improved privacy since staff never sees what's being checked out**

## **Increase productivity**

- **More accurate shelving**
- **Time saving, speedy**
- **Provide security and material controls**
- **More opportunity for enhanced services**
- **Durability, longevity and Insurance**

## **Maintain current staff level**

- **Repetitive Stress**
- **Reduce handling of item with RFID**



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Next Chapter is  
*Customer Service*

**Thank you!**