

**Mechanical Engineering Department  
Carlos III University**



# **MATERIAL HANDLING**

**TRANSPORTATION**

Material Handling



## **DEFINITION OF HANDLING**

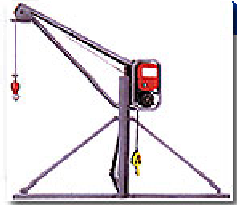
**Handling operations and stock of materials in a warehouse**

**Receiving materials, handling the materials inside the warehouse and stock of finished products**



## HANDLING SYSTEMS

### •Lift equipments



## HANDLING SYSTEMS

### •Passenger lift



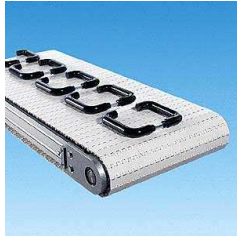
### •Cranes





## HANDLING SYSTEMS

- Continuous handling equipment (belts, rollers...)



- Air transport



## HANDLING SYSTEMS

- Powered industrial trucks.



- Air handling

- Moving ground ...





## HANDLING SYSTEMS

**Handling is related to product and material storage**



**New concept of storage**

**Using handling techniques for storage gave rise to different methods that allowed both actions at the same time: pallets and containers**



## PALLETS

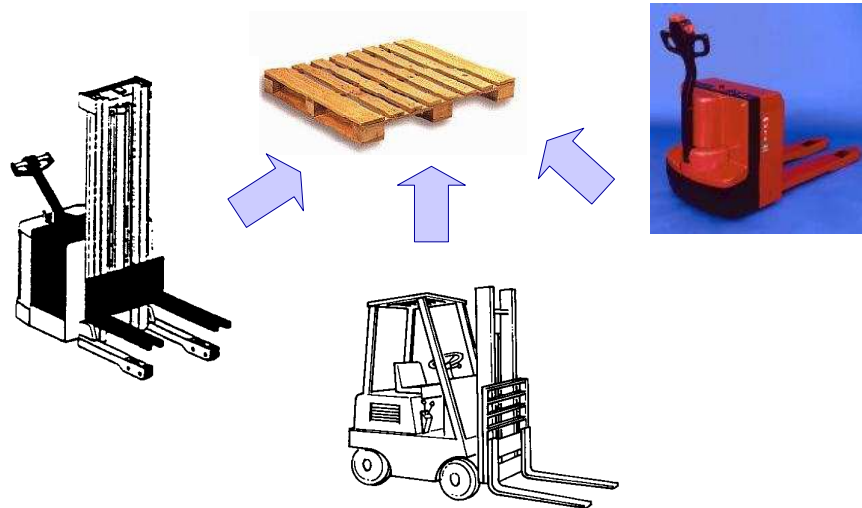
**Transport device that allows moving several products at the same time so that the product is treated as a load unit**

**The pallet has a certain height that allows the powered industrial truck to introduce the forks and lift it.**





## PALLETS



## PALLETS

### Materials:

#### Wood



- Cheap
- Easily wears out
- Flammable

#### Metal



#### Rubber



#### Plastic

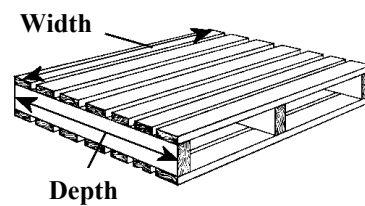




## PALLETS

### Size:

- Height 5 in. (127 mm) (not specified)
- Depth x width
  
- Most popular in EEUU: 48 x 40 in. (1220 x 1016 mm aprox)
- European standard (Euro-pallet): 1200 x 800 mm



## CONTAINERS

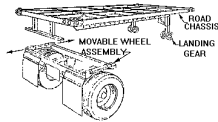
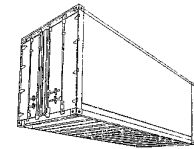
**Metallic vase of international standard dimensions with devices that provide an easy handling**

### Features:

- Long usage, resistant for several usage.
- Designed to provide transport of materials, without needing to separate the load, in one or several transport modes.
- Provided with devices that allow an easy handling of it, especially when changing from one mode to another.
- Easy to fill in and empty it.
- Volume not less than 1m<sup>3</sup>.



## CONTAINERS



## CONTAINERS

### Standard exterior dimensions:

- Length: 20 ft. or 40 ft.      6m or 12m aprox
- Width: 8 ft.                      2,4m aprox
- Height: 8,5 or 9,5 ft.        2,55m or 2,85m aprox

### Standard interior dimensions:

- Length: -8 in.                    -203mm aprox
- Width: -5 in.                    -127mm aprox
- Height: -9,5 in.                -241,3mm aprox



## HANDLING DURING MANUFACTURING

**Basic operations during manufacturing process:**

**Related with transport**

- ➔ •Input of material for the working place.
- ➔ •Machine loading.
- ➔ •Mechanical operation (mechanize, assemble, etc.).
- ➔ •Unloading of the machine.



## HANDLING TYPES

**External handling:**

**Materials moving (raw materials, products nearly finished or finished) between production units or between these and the stores**

**Internal handling:**

**Moving materials that are being 'created' or that need to change position or to be moved to another work place**





## EXTERNAL HANDLING

**Easily applied to automatic devices**

**Types:**

- **Belt conveyors**
- **Cranes**
- **Powered industrial trucks**
- **Hand transport**



## EXTERNAL HANDLING

**Belt conveyor**

- **Material is transported between two specific points.**
- **Material is moved along a fixed path.**
- **High flux volume.**





## EXTERNAL HANDLING

### Cranes



- Material is transported (vertical and horizontal) along variable paths inside a restricted area.
- Have more flexibility than belt conveyors.
- Less flexibility than powered industrial trucks.
- Loads can vary in shape and load much more than loads handled by belt conveyors.



## EXTERNAL HANDLING

### Powered industrial trucks

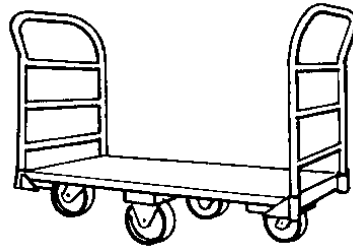
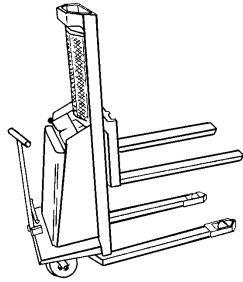
- Material is transported horizontally along variable paths without area restrictions.
- They allow vertical lifts of materials if provided with the needed devices.
- Variable flux of materials.
- More flexibility than belts or cranes.
- They are not allowed to ride on public roads.



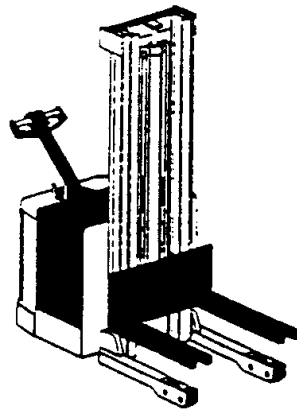
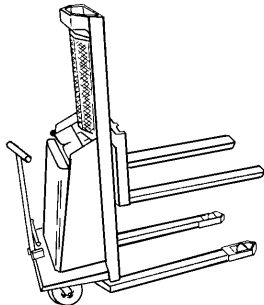


## EXTERNAL HANDLING

### Powered industrial trucks

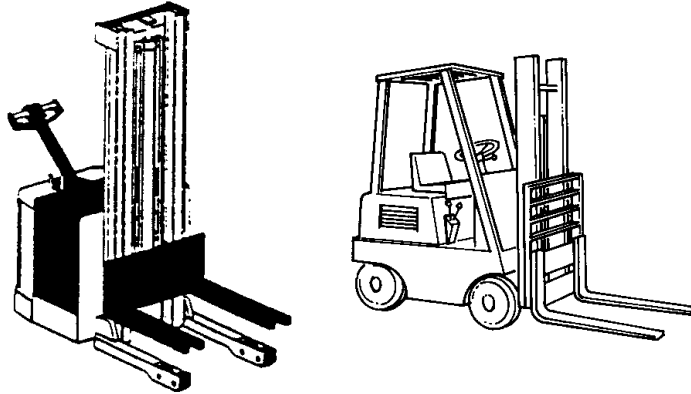


## EXTERNAL HANDLING





## EXTERNAL HANDLING



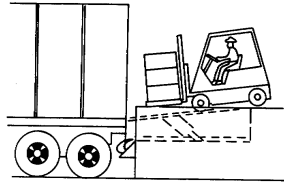
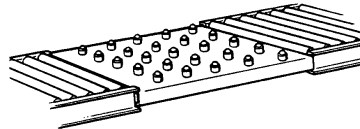
## EXTERNAL HANDLING

### **Powered industrial trucks: AGV's (Automatic Guided Vehicle)**

- **No operator is required**
- **Used when:**
  - Special conditions (paint)
  - Hazaroudous situations
  - High operation costs
- **Used in operations for handling materials with medium-low volume and medium-low**
- **Types:**
  - Fixed path
  - Variable path



### INTERNAL HANDLING



### INTERNAL HANDLING

