Types of Handling Equipment

1. Transport equipment

Transport equipment is used to move material from one location to another (e.g., between workplaces, between a loading dock and a storage area, etc.), while positioning equipment is used to manipulate material at a single location. The major subcategories of transport equipment are conveyors, cranes, and industrial trucks. Material can also be transported manually using no equipment.

- Conveyors

Conveyors are used when material is to be moved frequently between specific points over a fixed path and when there is a sufficient flow volume to justify the fixed conveyor investment. Different types of conveyors can be characterized by the type of product being handled: *unit load* or *bulk load*; the conveyor's location: *in-floor*, *on-floor*, or *overhead*, and whether or not loads can *accumulate* on the conveyor. Accumulation allows intermittent movement of each unit of material transported along the conveyor, while all units move simultaneously on conveyors without accumulation capability.

For example, while both the roller and flat-belt are unit-load on-floor conveyors, the roller provides accumulation capability while the flat-belt does not; similarly, both the power-and-free and trolley are unit-load overhead conveyors, with the power-and-free designed to include an extra track in order to provide the accumulation capability lacking in the trolley conveyor. Examples of bulk-handling conveyors include the magnetic-belt, troughed-belt, bucket, and screw conveyors.
A sortation conveyor system is used for merging, identifying, inducting, and separating products to be conveyed to specific destinations, and typically consists of flat-belt, roller, and chute conveyor segments together with various moveable arms and/or pop-up wheels and chains that deflect, push, or pull products to different destinations.

- Cranes

Cranes are used to transport loads over variable (horizontal and vertical) paths within a restricted area and when there is insufficient (or intermittent) flow volume such that the use of a conveyor cannot be justified. Cranes provide more flexibility in movement than conveyors because the loads handled can be more varied with respect to their shape and weight. Cranes provide less flexibility in movement than industrial trucks because they only can operate within a restricted area, though some can operate on a portable base. Most cranes utilize trolley-and-tracks for horizontal movement and hoists for vertical movement, although manipulators can be used if precise positioning of the load is required. The most common cranes include the jib, bridge, gantry, and stacker cranes.

- Industrial trucks

Industrial trucks are trucks that are not licensed to travel on public roads (*commercial trucks* are licensed to travel on public roads). Industrial trucks are used to move materials over variable paths and when there is insufficient (or intermittent) flow volume such that the use of a conveyor cannot be justified. They provide more flexibility in movement than conveyors and cranes because there are no restrictions on the area covered, and they provide vertical movement if the truck has lifting capabilities. Different types of industrial trucks can be characterized by whether or not they have forks for *handling pallets*, provide *powered* or require *manual* lifting and travel capabilities, allow the operator to *ride* on the truck or require that the operator *walk* with the truck during travel, provide load *stacking* capability, and whether or not they can operate in *narrow aisles*.

Hand trucks (including carts and dollies), the simplest type of industrial truck, cannot transport or stack pallets, is non-powered, and requires the operator to walk. A pallet jack, which cannot stack a pallet, uses front wheels mounted inside the end of forks that extend to the floor as the pallet is only lifted enough to clear the floor for subsequent travel. A counterbalanced lift truck (sometimes referred to as a forklift truck, but other attachments besides forks can be used) can transport and stack pallets and allows the operator to ride on the truck. The weight of the vehicle (and operator) behind the front wheels of truck counterbalances weight of the load (and weight of vehicle beyond front wheels); the front wheels act as

a fulcrum or pivot point. Narrow-aisle trucks usually require that the operator stand-up while riding in order to reduce the truck's turning radius. Reach mechanisms and outrigger arms that straddle and support a load can be used in addition to the just the counterbalance of the truck. On a turret truck, the forks rotate during stacking, eliminating the need for the truck itself to turn in narrow aisles. An order picker allows the operator to be lifted with the load to allow for less-than-pallet-load picking. Automated guided vehicles (AGVs) are industrial trucks that can transport loads without requiring a human operator.

An electric tug is a small battery powered and pedestrian operated machine capable of either *pushing* or *pulling* a significantly heavier load than itself.

- Manual Handling Equipment

Commonly used to assist in moving smaller loads where larger equipment would struggle, manual handling equipment such pallet trucks, trolleys and sack trucks can be an essential part of any material handling.