

Architectural design considerations of a light warehouse

[Design](#)



Warehousing - warehousing is the receiving, storage, and delivery of goods.

Receiving - receiving is the acceptance of goods with a degree of accountability therefore. Storage - storage is the safekeeping of goods in a warehouse or other depository. Delivery - delivery is the transfer of goods to the transportation carrier or customer.

Distribution - distribution is a function of warehousing which includes the preparation and delivery of goods according to plan or special order. Supply chain efficiencies depend upon the efficiency of logistics including transportation and warehousing operations. Warehouse efficiencies depend upon a combination of warehouse design, layout, infrastructure, systems, process and people. Warehouse Design element aims to maximize the utility of space, equipment and efficiency of operations. We will briefly cover the various elements of a warehouse design and understand their importance.

In basic functional aspects, a warehouse function consists of- Material receipts including unloading, unpacking and inspection, put away and Storage of materials in various categories of storage locations, systems updating, pull materials for dispatch and delivery of materials after processing. Warehouse Location, Layout and Building The location of a warehouse should ideally be situated in a flat ground. The location should be easily approachable and in an area suited for this nature of business.

Locations closer to markets or to national highways would be ideal.

Public transportation and communication infrastructure should also be available. The layout of the building should be designed to accommodate fleet parking, and enable trailers to drive in and drive out easily. Any

time two containers should be able to pass through on the path without any interruption. There should be enough free space for vehicles to maneuver. The layout should also provide for other utility, safety and security operations. Building is normally constructed using galvanized metallic weight bearing capacity as per requirement of the load to be calculated in each case.

The ground should be flat, even and smooth surface to facilitate MME movements and dust free. The roof height would be a major consideration to be able to install multi vertical storage racking installation. The walls and roof should be designed with suitable lighting panels and ventilators for air exchange fitted with bird cages. The number of loading and unloading docks and placement of these docks play an important role in the design of operations and efficiency of operation. All weather docks and the facility should enable 24 hours operations. Dock Levels.

The docks should be equipped with dock levers and all these have to be installed during construction phase itself. Ramps have to be provided to facilitate movement of forklift etc. Lighting design will depend upon the layout and the racking design. Internal Layout Internal layout design will be built taking into account the operational process, nature of goods, volumes of transactions both inbound and outbound, storage types, in house operations involving put away and pull sequences and process requirements including packing, kitting etc and the availability of floor space coupled with building layout design of inbound and outbound docks.

The design aims to maximize space utilization, minimize MME movement and Manpower movement. Types of Storage Types of storage are determined by the nature of cargo. Depending upon the cargo whether finished goods, raw material parts etc, the types of storage can vary from bulk stock, block stock, racking, pallet racking, shelf racking, binning, unit pick or loose pick face, carton pick etc. The storage types vary with nature of materials with different types of storage designs for drums, pallets, tires, cartons, tube and rods etc.

Racking Designs & Material Handling Equipment Racking Design takes into account the storage type, storage unit, volume and weight coupled with the available floor space and roof height to design system which maximizes the storage capacity. Put away and picking process and transactional volumes are also taken into consideration. The inventory profile study would include detailing of number of SKU in each category of fast moving, slow moving or other criteria as per the nature of business and the storage type would be designed as per the inventory profile and the process.

Racking designs are very many and varies with the type of industries and nature of inventory. Normal racking designs include pallet racking on multiple levels. You can have shelving, binning or combination of bulk stock and forward pick face racking designs. Block stack racking and other types of high density racking can be found in FIG warehouses. Mezzanine store binning and shelving rack designs are normally designed for spare parts and small parts. Highly automated racking designs can have automatic retrieval systems and conveyors in the warehouse.

Material Handling Equipments are specified based on rack design coupled with pallet design, nature of cargo, weight and the warehouse layout etc.

Forklifts, reach trucks, hand pallet Jacks, trolleys are normal Material handling Warehouse Layout Design - Sizing the Space Requirements

Warehouse layout & sizing is a critical aspect of planning a new facility or re-designing an existing building. Many times organizations start from a fixed view of what size the facility will be, and most times the square footage is based on affordability.

The problem with this, is that the building may end up be to big, and therefore more expensive or to small and put operational constraints into the facility before the design even gets off the ground. Warehouse Layout and Sizing: The correct way to size the facility is from the inside, that way the actual size required will fit the operational requirements, and will ensure that all available space is used and you are not paying for unused space.

Estimating Space Requirements: Short and long term, based upon forecasts, historical usage patterns, and projected changes.

Developing new layouts to maximize usage of space. Short- and long-range sizing of individual areas: racks, shelving, automated systems, docks, staging, offices, and support. The final sizing needs to come from the operational requirements of the building, this can only come from modeling the design. Key Factors to Consider during Warehouse Sizing Order Picking: Methods for Piece Pick, Case Pick, and Pallet Pick Operations. Deciding on the amount of space you will need is not just about how much product you

wish to store. The type of picking you intend carrying out is a fundamental part of the decision process.

The methods for order picking vary greatly and the level of difficulty in choosing the best method for your operation will depend on the type of operation you have. The characteristics of the product being handled, total number of transactions, total number of orders, picks per order, quantity per pick, picks per SW, total number of SSW, value-added processing such as private labeling, and whether you are handling piece pick, case pick, or full-pallet loads are all factors that will affect the decision on how much space will be required.

Therefore when you have:- Full pallet picking you will need more racking space than open floor space. Lots of case picking you will need more ground floor pick faces, than you will need for full pallet picking and you may also need a case to pallet consolidation floor area. Lots of small quantity piece picking you will need packing & pallet consolidation areas on the floor. Holding requirements include defining the physical size of the inventory on hand. Unless the on-hand total is fairly stable across the year, it is usually preferable to plan for a high but not peak inventory level.

To fully utilize the space, it is important to determine how product needs to be stored (e. G. , floor stacked, pallet rack, shelving, case flow) and how much of each fixture type will be required. Cube data (length x width x height) for each product is a very useful kind of information for many aspects of capacity planning. Workflow requirements encompass everything from how product arrives to how it leaves the facility and everything in between.

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The objectives s possible, and to minimize the resource requirements (labor, packaging, transportation) to move the product to the customer.

Among the factors to consider are the following: (1) Link the way product arrives with where it is to be stored (location capacity). If possible, store all of a product in one location and pick from that location as well. This does not work if stock rotation matters (expiration dates, serial number, or lot control issues). (2) Locate the highest-volume products (greatest number of orders, not physical size) closest to the outbound shipping area to minimize the travel required to pick and ship orders for them. 3) Because vertical travel is always slower, locate as many products as possible on or close to the floor. 4) Allow for staging space to handle product that is in transit, such as items waiting to be put away.