Material Handling Management

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Planning a Warehouse

Every warehouse has unique problems, but planning for a new one calls for basic decisions. Going through the planning process may help make better use of your existing space.

by Leslie Wood

Space Utilization

Before putting time and effort into planning a new building, take some basic steps to increase the space available in the current warehouse.

- Get rid of any junk equipment that has found a home there.
- Use JIT deliveries and shorter runs to reduce inventories.
- Use racks. There are many types of racks. Become familiar with them and their applications before making any decisions. They can increase storage capacity, but they are expensive and may not gain you as much space as expected. Analyze the potential space gained and the financial benefits.

The Layout: Inventory Analysis

Arrange the warehouse to fit the nature of the inventory. If it will store large quantities of few SKUs, many deep rows are needed. If the inventory will be small quantities of many SKUs, mostly shallow rows with many faces is more practical.

A simple spreadsheet analysis calculates how many rows of varying depths and how many racks are needed. From this it calculates the area needed for storage and aisles. Space for docks, offices and future expansion are not included.

The analysis is based on a "snapshot" of current inventories, modified to include future changes. Although individual SKUs may vary from week to week, the mix of deep and shallow rows is surprisingly stable and one period can be very representative. The height pallets can be stacked depends on the weight of the product, strength of the packaging, building height, etc.

Aisles

Aisle width depends on the type of lift trucks used. Aisles should be wide enough for trucks to make a single turn into the row. Making them too narrow will save space but slow down the store-and-retrieve operations and result in greater damage. Cross aisles can reduce travel times but take up valuable space. Balance the two.

Rows

Design rows wide enough to allow drivers to carry loads in and out without causing damage. Lift trucks fitted with side shifters allow drivers to move loads a few inches from side to side so they can work in narrower rows.

Docks

The number of shipping doors needed depends upon how long it takes to load and unload trailers, the number of trailers handled, and how many shifts are worked. The dock is the busiest and most dangerous part of the warehouse. Don't squeeze down the space.

INVENTORY ANALYSIS

	SKU	On Hand	Cases / Unit Load	Loads	Height	Stacks	Row Depth (No. of Stacks in Row) 16	12	9	7	4	3	2	1	Rack
5	7136	5368	108	50	3	16.67	1	0	0	0	0	0	0	1	0
6	9787	5130	90	57	3	19.00	1	0	0	0	0	1	0	0	0
7	41938	4492	90	50	3	16.67	1	0	0	0	0	0	0	1	0
	[illegible]	1709	72	24	3	8.00	0	0	0		0	0	0	1	
240	51[illegible]		96	43			0	1		0		0	1		1
241	60560	3412			3	14.[illegible]			0	0	0			0	1
242	77012	3557	72	50	3	16.67		0	0	0	0	0		1	0
243	80148	3348	90	38	3	12.67	0	1	0	0	0	0	0	1	0
244	96063	4095	48	86	4	21.50	1	0	0	0	1	0	0	2	0
245	96394	3086	12	258	4	64.50	4	0	0	0	0	0	0	1	0
246	Totals	131501		2985		880.28	14	8	8	7	37	24	34	158	84
247	Averages		44.05		3.39										
248	Utilization factor:						70%	70%	70%	70%	70%	70%	70%	70%	90%
249	Rows:						20.0	11.4	11.4	10.0	52.9	34.3	48.6	225.7	93.3
250	Sq. ft.:						5965	2686	2144	1560	5740	3181	3739	13809	1108

Total square feet needed: 39,935

Explanation of Terms

Column	
A	SKU
B	Number of cases of SKU on hand.
C	Number of cases of SKU per unit load
D	Number of loads = Cases on hand / Cases per unit load.
E	Number of unit loads in a stack.
F	Number of stacks = Number of loads / Height
G - N	Each cell calculates the number of storage rows, of each depth, needed to store the stacks for that SKU. Eg, to store 20 stacks requires 1
O	Any odd pallets not accommodated in the storage rows are placed in rack.

Row	
246	Total for each column.
248	Utilization Factor adjusts for the average amount that each row will be filled
249	Total rows divided by utilization factor
250	Square feet needed for rows and aisle.

Material Handling

Lift Trucks are the basic means of handling pallets. They come in many shapes and flavors. There are clamp trucks and fork trucks and push-pull trucks. There are counterbalanced trucks, stand-up trucks, straddle trucks, swing mast trucks, narrow aisle trucks, very narrow aisle trucks... The list goes on and on. Work with reputable dealers. Explain your situation and let them advise you.

When they recommend products (most often, their own), ask to visit sites with similar applications and request demonstrations in your own facility. If things become too confusing, hire an experienced, independent consultant to advise you.

Conveyors are a common means of delivering cases of product from manufacturing to the warehouse. They are expensive to install and maintain but can be less costly to operate than drivers on lift trucks. Whether or not a conveyor system is justifiable depends upon the amount of material, the composition of the inventory and the distance that the products have to be moved.

Automatic Guided Vehicles (AGV's) are an alternative to conveyors. They are most economical when hauling product over long distances.

Software

Over the last 10 years, there has been an explosion of software available for managing warehouses. Designers promise it will reduce inventories and labor costs while improving customer service, inventory accuracy and storage capacity. What they may not say is that it can take over your operation, tying up a quarter of your workforce to satisfy its demands for more and more information.

You do need a means of tracking your inventory and the software that fits your needs can bring most of the promised savings, but beware of bells and whistles that sound so good. They can become a cacophony when you try to implement them.

Picking

Orderpicking is the most labor-intensive operation in the warehouse. The objective is to get the correct product to the customer in the shortest time while maintaining high productivity.

Whether you are picking individual parts from within cases, picking cases from a pallet or picking full pallets, specialized equipment is available. Again, work with suppliers, study the options and ask to see demonstrations.

Whatever the type of picking, making the most frequently picked SKU's the most accessible will reduce picking times.

There are many more decisions that will confront you than we could cover in this article: - where is the best location; should you lease or buy; do you need a central distribution center; etc. Do not become overwhelmed. Take them one at a time and they will fall into place.

About the author

Leslie Wood is the founder of Les Wood Associates (www.lwassoc.com), a North Andover, MA-based consulting firm that has provided industrial engineering services to manufacturers and warehouses since 1989.

Previously, he was director of industrial engineering for Sweetheart Plastics. He has held similar positions in other industries including telecommunications, semiconductors, electronics, machine shops.

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