NOVEMBER 2008 Vol. 31, No. 11 www.oim-online.com

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Ontario's Business & Industrial Equipment Magazine

How Safe Are You?

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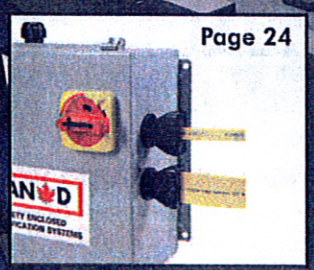

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Efficient DC Design

As the supply chain moves to a leaner, demand driven model, the trend is towards less inventory in the system, in general. This is a change from the traditional model which was essentially an inventory driven supply chain. With fewer inventories in the system, we see that product assortment and the need to handle individual products in the most efficient manner possible is driving DC design. That is, the slotting requirement is now as important as inventory storage and in many cases drives the DC sizing requirement.

When designing a warehouse facility for efficiency, several factors need to be considered. The goal should always be to minimize costs, both capital costs used to construct a new facility or expand an existing location, as well as ongoing operating costs associated with handling product and maintaining the physical structure.

Thus "Efficient DC Design" implies the design of a warehouse to minimize annual operating costs while maintaining desired service levels. Service levels are often affected by efficiency within a warehouse operation, and thereby impacted by the design of the layout.

Assuming a conventional, case pick operation there are 3 Main factors driving efficient design: Pick Slots, Net Working Capacity (Cubic Storage), and Dock Operations. Each is examined below in more detail.

Pick slots / Rack Bay requirements:

How many rack bays are needed to satisfy the types of slots required to efficiently select product for shipping?

Determining the pick slot requirements is an analytical process involving detailed data mining and evaluation. The correct application of slotting logic to the data results in an efficient DC design. The basic data needs include volume or sales history, physical product characteristics (including packaging types and case & pallet dimensions), and inventory requirements.

Assigning an efficient slot type to each unique item in the distribution center should be based on weekly shipping volumes and desired replenishment activity. The trade off in productivity is pick line length versus replenishment or restocking activity. In many distribution centers, picking productivity accounts for up to 60% of all direct labour and thus commands the greatest attention.

A pick slot can vary in size from a single carton location to a multiple pallet location, all accessible from floor level.

Once the number and type of pick slots is determined, this number is translated into the equivalent number of rack bays required. The height of the rack bays will depend greatly on the inventory levels to be held in the distribution center.

Cubic Inventory Storage:

How many rack bays are needed to satisfy the cubic (ft^3) inventory storage requirements, on average and at a peak?

What height of building is required to efficiently store the required inventory?

The necessary storage volume is often expressed in terms of cube (ft^3). The ability of a distribution center to efficiently store cube is defined as Net Working Capacity (NWC). Once pick slot requirements have been determined and converted into rack bays, the cubic inventory on hand will determine the required height of the bays, and thus the entire building size. The NWC is then calculated at varying building heights to ensure that inventory will fit overhead of the pick slots. In some designs, where inventory levels are very high, special dense storage sections may be added to the DC layout in order to minimize stacking height requirements.

It is always vital to hold inventory for a given item as close as possible to its designated pick location(s). This minimizes the amount of putaway and replenishment labour required to stock the pick slot.

The travel aisle spacing between rack bays is dictated by the mobile equipment meant to operate within a given aisle. Generally, fork lift equipment outrigger dimensions will vary with the required lift height at which product is placed in overhead reserve locations. The allowance for operators to pass easily in an aisle will determine the final aisle width. Passing is a requirement for efficiency as it prevents an operator being impeded by another from performing their function. A typical, conventional facility with a clear height range from 28' to 35' will have a minimum 10'6" aisle width for single-deep pallet racking.

Dock & Dock Door Requirements:

What size dock should I have? What is my optimal receiving dock depth and width? Of my shipping dock? Should the facility have separate receiving and shipping docks? How many dock doors?

Not to be underestimated is the amount of dock space required for efficient receiving, flow and shipping of product. The dock is the heart of any operation and ultimately creates needed efficiencies or, if inadequate, hazardous bottlenecks.

Again, the trade off is in building size vs. operating efficiency. The dock and dock door requirements are driven primarily by shipping or service levels, the hours of operation, and the number of days per week of operation. The more balanced the workload, the more efficient the design will be. Dock sizes can range from 50' to 120' in depth, depending on the amount of crossdock or product flow-through on a given operating shift, or for any required equipment such as pallet wrapping machines.

Other factors to consider in Efficient DC Design:

Location of auxillary functions such as location of building columns, battery charging, returns handling, clerical offices, etc. These items do not drive the design, but should be considered such that they integrate well and don't interfere with the main functions of the warehouse.

Last but not least, one must consider flexibility in DC design. Given the changing landscape of supply chain management, a flexible operation is a must. Therefore, thinking ahead to consider expansion planning and 'what if' scenarios will enhance your DC plan. Flexibility in the equipment chosen, sizing of dock and storage areas, will allow easier transition to new operating realities as required.

The factors outlined above address a conventional warehouse operation where orders are selected onto pallet jacks and putaway and replenishment functions are performed by fork lift trucks. The principles however, are similar in non-conventional solutions. Obtaining and evaluating the right data will allow one to follow the basic steps above, and gain an understanding of the footprint required for an efficient DC design.

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