

Distribution Centre Design

As a business grows – be it organically or through acquisition – so does the need to increase the distribution footprint and capabilities. Building a new distribution centre is a complex process, involving many different considerations and extensive planning. This paper highlights some matters of facility design you should consider, whether it is a Greenfield project or existing premises your distribution centre will call home.

Facility design and selection revolves around three key factors; Historical Data Analysis, Anecdotal Evidence & Future Growth Aspirations. All play a key role and influence decision making, though several peripheral concerns exist which a business should weigh as well.

Location, Location, Location

Perhaps the most obvious criterion determining facility design is location. A new location will frequently be close to a company's existing premises, though exceptions do occur with third party providers, who in many cases have existing facilities established.

Staff retention also influences location decisions and can be crucial, depending on the complexity of the product being handled and the quality of the workforce. Ideally, the chosen location is well positioned to customers, suppliers and infrastructure; this will limit the time and cost associated with transport.

Sometimes multiple locations are required if the company is large and it makes sense for the markets it serves. Most companies establish sites that offer the best return on investment, meet customer service levels and deliver competitive advantage.

Building Orientation

Once size and location are established, the orientation of the building needs to be determined. This is done by accessing the land parcel and the roadways that will service it. In most cases, there is a stand out orientation for a building that provides the best traffic management, storage capacity and material flow. Land parcels should also offer extension options for future growth.

Dimensions and Height

Column grid patterns and building height also need to be considered. Column grids are usually determined on economic factors, while building height is governed by fire regulations and local authorities. Column grids should be designed to interact with storage equipment or manufacturing lines; however, this isn't always possible with an existing building.

Access Points

Access points for moving product in and out of a facility are also important. The number of doors needed will be determined by the size of the building and the volume of product being distributed and received. The type of doors selected will depend on how goods are received and dispatched. If shipping containers need to be unloaded or loaded, the docks may require levelers. Levelers are also required if goods can only be received by customers in the same manner. A shopping mall is one environment where goods are received in this way. In other applications, goods may be side loaded and unloaded at ground level. Incorrect type or wrong number of access points can result in productivity losses, congestion and safety issues.

Product Volume

Product volumes will also determine the required staging area needed for both the receiving and dispatching activities. The hours a distribution centre operates, and the frequency with which it delivers and receives products, will ultimately dictate space needs. Companies often receive large volumes at a particular time or day; therefore, receiving peaks should also be entered into the calculation. Likewise, outbound orders may need to be picked in advance and staged to meet customer expectations; this is common during product launch periods, as well as promotions.

Facility Lighting

Lighting is important for the safe operation of a distribution centre; this lighting also needs to be flexible. High bay lighting is a good choice for forklift aisles and should be located within the aisles to maximize effectiveness and to prevent intrusion into storage space. Skylights can also be used to provide natural lighting and minimize energy usage. If high bay lighting is used, it should be easily adjustable to deal with layout changes that may occur over a facility's lifecycle. External lighting should be provided for staff car parking, security, etc., especially if the facility is a 24-hour-a-day operation.

Loading Points



Floor and point loadings are extremely important for racking and materials handling equipment and should be considered along with facility design. This is because slabs can be designed to suit the unique needs of an operation. For example, floor loadings are difficult to obtain for older buildings, but are vital to know prior to selecting or leasing a property. In automated applications, floors need to be very level and built to a high quality.

Communications

Last but not least, communication requirements need to be determined to accommodate computers, telephones, data interchange and radio frequency networks. The modern distribution centre has a growing need for communication and contingencies should be built into any system to anticipate upgrades and future technology changes.

Design Checklist

There are many other important considerations such as hazardous and dangerous goods segmentation, office areas, training/meeting rooms, car parking and security. The below checklist identifies key tasks to be considered for both new and existing facilities.

Facility Design Checklist					
Task	Check		Task	Check	
Facility Location/s, proximity to suppliers customers and relevant infrastructure	<input type="checkbox"/>		Land parcel, growth options	<input type="checkbox"/>	
Facility size/s	<input type="checkbox"/>		Building orientation	<input type="checkbox"/>	
Building height	<input type="checkbox"/>		Fire protection needs & legislative requirements	<input type="checkbox"/>	
Column grid layout	<input type="checkbox"/>		Access points into building & types	<input type="checkbox"/>	
Lighting natural and artificial	<input type="checkbox"/>		Staging area allocation, receiving & dispatch	<input type="checkbox"/>	
Slab design, likely point loads to be Imposed, general weight of equipment	<input type="checkbox"/>		Communication requirements, voice, data, radio frequency	<input type="checkbox"/>	
Product classification/s dangerous goods classes	<input type="checkbox"/>		Return on investment, competitive Advantage delivered over competitors	<input type="checkbox"/>	
Materials handling solution/s	<input type="checkbox"/>		Material flow/s	<input type="checkbox"/>	
Office areas	<input type="checkbox"/>		Meeting & training rooms	<input type="checkbox"/>	
Staff amenities	<input type="checkbox"/>		Security requirements	<input type="checkbox"/>	
Yard design	<input type="checkbox"/>		Storage layout & mediums	<input type="checkbox"/>	