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Wednesday 18. Feb 2009

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MATERIALS HANDLING

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By Sangeeta Anand

Experts say that good infrastructure designs should include provisions for materials, equipment, transport and people to enable the processing of goods in the minimum possible time. This is not possible without flexible designs.

Warehouse designs should allow for improvements and enhancements such as flexibility for delivering power, voice and data, and should consider locations of warehouses, says supply chain expert Nigel Oliver. "Close proximity to market, transportation networks, main highways, rail networks, airports and ports is essential."

This is true; transportation costs money. As such, the shortest distance to market will save costs. "In addition, customer expectations should be met," he adds. "For example, if the customer expectation is delivery within the same day, then to support that, several stocking points should be developed. If the expectation is the next day, a single stocking point may be sufficient."

Mr Oliver also recommends that designers should consider future expansions for automation when designing layouts to avoid the need to move major equipment in the future.

Infrastructure designs that save money

It is believed that good infrastructure designs should comply with safety, fire protection, health and carbon-free environment norms. However, there is also an expectation that they should include a reduction in operational costs and create increased savings.

For example, solutions such as passive solar designs (use of the sun's energy for heating and cooling), onsite renewable energy technologies (such as photovoltaic and solar thermal systems and wind turbines), and HVAC (heating, ventilation and air-conditioning) systems that consume less energy, are ideal. Floor types are also an important consideration – hardeners and dust-proofers should be used to protect concrete.

Particular attention should be paid to the warehouse floor. "Designers should ensure the floor is built to a high specification with regards to flatness, especially if building high-rise racking," says Mr Oliver. "They must consider building up before building out; utilise natural lighting as much as possible (for products that are not sensitive to light) and use light sensors to turn lights on and off."

Designers must make sure that transport in and out of the facility has sufficient turning space. Warehouse walls should be designed in a way to prevent water from collecting in the interiors. Designs should also incorporate signage or warning signs

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for hazards to prevent mishaps.

Careful consideration of the environment

Going up instead of out explains why Coca-Cola Amatil NZ (CCANZ) uses their distribution centre to store the majority of their beverages. The automated facility uses specialised crane technology to store and retrieve products. The centre, which has a total floor space of 28,000 m² and rises to a staggering height of 25 m, is one of its kind in New Zealand.

The designers carefully considered all environmental factors, resulting in special cladding on the outside to minimise the visual impact of the building, planting on the external perimeter to improve aesthetics, noise restrictions to minimise the impact on neighbours, and the use of constructions, such as high concrete walls, to dampen vehicle noise.

“Our \$83 million investment in the Auckland distribution centre has resulted in a 30 percent decrease in vehicle movements due to all products now being able to be stored on one site,” says George Adams, managing director of CCANZ.

Maximum efficiency

Aero Fulfillment Services is a third party fulfilment (3PF) and logistics (3PL) leader in the US, and its Ohio warehouse is an example of the new ‘maximum efficiency’ warehouses now being built. The 145,000 square feet (~13,500 m²) of floor space is expandable to 415,000 square feet (~38,500 m²) and features 32 feet (9.75 m) high ceilings.

The new warehouse system is significantly more efficient than standard warehouse configurations because it uses higher than standard racking (which maximises the vertical space) and a very narrow aisle racking system (which maximises the horizontal space). Specialised turret forklift trucks that are designed for narrow aisle configurations allow Aero to provide the best levels of efficiency possible.

New Zealand supply chain industry relies on features such as sophisticated materials handling equipment and higher bays that enable the designers to take advantage of height allowances in the space, Mr Oliver says. Wireless technology is also being used to create paperless warehouses.

Another organisation that has adopted ideal infrastructure for their warehouse is Jeans West, Australia. They have implemented a simple technology that will increase their stores’ productivity and maintain efficiency. They have opted for radio frequency (RF) communications to manage large volumes of data in real time.

In New Zealand, the priority is slightly different. Severe competition is encouraging distributors to look for smarter ways to move their products to consumers. For this reason, ‘clustering distribution’ – fewer but larger regional facilities – is likely to be seen in the future. Scarce labour and technology advances are also factors driving many companies to consolidate their distribution systems.

Into the future

The future holds a number of possibilities with regards to infrastructure. CCANZ’s George Adams says automated storage and retrieval systems will shape warehouse designs: “Automation provides improved inventory management, storage

capability and reduces product damage.”

Future warehouses will be designed for maximum storage and minimum staff on site. The operational temperature limits of such warehouses will be low, with minimal light and heat requirements.

The economy and cost of assets and overheads required to hold inventory are pushing a number of small to medium-sized companies to move towards third party warehousing. Third party warehousing has grown considerably in the last few years, with companies such as Toll, Mainfreight, Linfox and Contract Logistics all offering services.

Whilst technology offers a number of options such as RFID (radio frequency identification) and 4GL systems, there is still some distance to go. Walmart for example is yet to receive any return on investment for the RFID systems it is exploring with suppliers. The mega-retailer has recently diverted its efforts of implementing RFID in its distribution centres to getting RFID into its stores.

RFID offers a number of advantages in the future over bar coding as the product does not need to be visually seen. Imagine receiving a pallet full of goods that will be automatically receipted into stock once the pallet is moved through an RFID receiving bay. The RFID tag cannot only identify the product but also the order number.

A greener future

Moving forward, a clean green look will be imperative for most businesses as some form of tax measures will be introduced. Designs will therefore need to cater to a better and improved environment.

Warehouses will need to adopt methods to capture rainwater for truck washing and deployment of electric and gas forklifts to reduce emissions. They will need to focus on landscaping of the distribution centre perimeters to blend with the local area. They will also have to address truck noise issues in the local community.

Other considerations will be recycling of water specifically in truck wash areas, recycling of plastic and paper from packaging, light sensors to control lighting (both internal and external), and reverse logistics to pick up packaging and used product (computer ink cartridges are a good example).

More efficient solutions will include reducing operation times to eliminate noise at undesirable times, close control of hazardous chemicals to ensure that there are no spills and that the chemicals cannot enter into any stormwater systems, and finally, use of biofuels for transport.

There is also likely to be a shift towards 'flex' warehouses – those located in industrial parks that are suitable for smaller businesses.

With the future moving towards sustainability and care for the environment, warehouse operators in New Zealand will need to rethink their strategies for design.

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