

warehousing

Achieving high-bay efficiency

The latest technology in aisle-changing automated storage and retrieval cranes provide significant advantages compared to using dedicated-aisle cranes in high-bay warehouses. **Patrick Roberts*** writes.

TO REMAIN competitive in the modern warehousing environment, distribution centres require systems that offer the flexibility to adjust quickly and accurately to market conditions, such as meeting shortened lead times.

The most streamlined warehouses today are highly automated facilities, with maximised high-bay, high-density storage that utilises automated storage and retrieval systems (ASRS). Central to the ASRS is its stacker cranes which permit full-pallet load and layered-pallet inventory to be moved quickly, safely and precisely within a high-bay warehouse environment.

Efficient, flexible design

Modern cranes operate within a set of top and bottom rails, eliminating the need for any flat-floor requirements. Since the crane is stabilised by the rail connections, greater load capacities are available, as well as higher rack heights, when compared to free roaming lift trucks. ASRS cranes have a high efficiency of cycle time, a calculation of the movement of product within a DC's storage system.

Many manual operations in a warehouse transport product in only one direction, then return with an empty load. Stacker cranes place a load into a rack position, and then retrieve a load from storage on their way back out, optimising the crane's movements. This helps to reduce operating and distribution costs in the warehouse, including the number of people required to operate the warehouse, thus allowing DC's to operate at a more cost-efficient level.

The latest generation of cranes incorporate a unique flexibility,



The crane smoothly rotates around the end of the aisle on a curved track.

allowing single-deep, double-deep, triple-deep and up to 20-deep pallet stacking utilising telescopic forks and shuttle cars, with the flexibility to handle one load at a time or multiple loads.

High-speed PLCs with integrated controls architecture monitor the movements of the cranes. Receiving directions from the distribution center's warehouse management system (WMS) and warehouse control system (WCS) via Ethernet, the cranes utilise barcode technology to direct their movement in the high-bay and the crane's movement of pallets. The most efficient stacker cranes that provide the lowest operating cost per hour are now fully A/C powered. This eliminates the costs associated with DC batteries, charging, and associated maintenance. Such cranes have also eliminated hydraulics, which greatly reduces maintenance costs.

Although aisle-changing capability in stacker cranes has been around in some form since the early

1990's, the speed and efficiency with which these new cranes can now execute aisle changes makes them a serious option for use in any DC interested in reducing operational costs while improving throughput.

Reducing costs

Most high-rise warehouses use ASRS cranes that are only capable of travelling in a straight line, in one aisle. The limitation of such a dedicated-aisle crane is that one crane is required to service each storage aisle in a warehouse.

As cranes are a major part of the cost of high-bay warehouse solutions, by reducing the numbers of cranes significant savings can be realised. The number of stacker cranes can be matched to the warehouse throughput instead of the number of aisles, therefore reducing the capital investment.

Unlike earlier models of aisle-changing cranes which had limitations in their aisle-changing flexibility, some of the latest stacker cranes

have been designed with efficient aisle-changing capabilities. For example, warehousing stacker crane manufacturer LTW Intralogistics has produced a crane that travels to the end of an aisle, then travels perpendicular to the aisle and enters another aisle to continue storing and retrieving pallets.

The company has designed a specialised track to facilitate the move, which requires no transfer mechanisms, supervision equipment or costly and time-consuming maintenance, problems that have plagued earlier aisle-changing cranes.

The track enables the crane to smoothly rotate around the end of the aisle on a curved track, without leaving the track. It makes for an easy and fast transition between aisles. The ability to switch aisles increases redundancy, in the event that a crane would go out of service. Each pallet position then becomes 100 percent accessible. This also allows cranes to be easily moved off line when service is required into an off-line maintenance area.

If an ASRS solution in place in a distribution facility has ten aisles and is employing ten stacker cranes each operating in its respective aisle, if a stacker crane breaks down there is no way to get products out of that aisle. With aisle-changing cranes operating in a situation like this, the DC operator could easily move the disabled crane to the maintenance area and the remaining cranes could complete the tasks required in that aisle. The redundancy system would assure that the pallets are retrieved. This is very important to maintaining a high level of delivery assurance.

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LTW Intralogistics, www.ltw.at