

Zeeman distribution center with intelligent material flow system

Revolution in inventory management



→ Zeeman, based in Alphen on the river Rhine, is one of the largest textile retail chains in the Netherlands. Recently, a system for automatic palletizing of cartons comprising various carton and pallet conveyors and a precision carton measuring station was commissioned. Beckhoff control technology is used for controlling the robots and palletizers.



Zeeman has 830 textile outlets in the Netherlands, Germany, Belgium, France, Luxembourg and the Caribbean. The company head office and the distribution center are located in the Dutch town of Alphen, from where all branches are supplied several times each week. The product range of the retail group consists mainly of clothing and textiles, but also includes a variety of non-textile small articles such as toys.

In 2001, the company set itself the ambitious target of increasing the number of branches to 1000, with an associated increase in storage capacity. The Dutch engineering consultancy DENC was commissioned to optimize the existing distribution center based on a sophisticated material flow system. The palletizing system was developed by CSi Industries BV, a system integrator for intelligent material flow systems. IAL, the Beckhoff partner in the Netherlands, provided the support for control technology issues. CSi supplied an integrated solution comprising automatic carton conveyors, palletizers and a pallet handling system. During the second project phase, the automatic unloading system and the system for allocating individual cartons including a carton collection conveyor to form an integrated high-performance sorting system was realized.

The carton dimensions measured by the system are averaged and transferred to the palletizer. The palletizing software uses this information for generating the optimum stacking pattern in terms of pallet space utilization and load stability. This happens while the telescopic conveyor transports the cartons to the palletizer. Any adaptation that may be required is carried out automatically before the first carton reaches the feed conveyor of the palletizer.

Fully automatic from container to pallet

A sea container or trailer is unloaded manually and the contents placed on a telescopic belt conveyor. The conveyor can reach into the container, in order to reduce the distance between the product to be unloaded and the unloading station; remote storage areas in the container can be reached by lifting or lowering the device.

The measuring station accurately checks the outer contour of the first 10 cartons and calculates the average of all measurements. Based on this information, the stacking pattern is calculated and transferred to the palletizer. Any cartons that are not closed or whose dimensions deviate from the standard are separated out. The operator panel display provides feedback about this process.



Pallet sorting unit



Distribution station

Lorry loading station at the Zeeman distribution center in the Dutch town Alphen (left page)

Palletizing of the cartons



After the check-in procedure, each carton is allocated an individual barcode label and is then scanned and palletized, and the associated information is relayed to the WMS (warehouse management system). During the further handling steps, the information is used for identification, specification of the warehouse location, retrieval, sorting and picking. The palletizer generates the optimum stacking pattern automatically and without manual intervention. For automatic control, the palletizers are

equipped with servo drives. Once palletized, the cartons are transferred via chain and roller conveyors to one of the four transfer points and into the shelf store areas, where they are taken over by a fork-lift truck. The fork-lift truck drivers communicate with the WMS via an on-board mobile wireless terminal, which allocates each pallet to its correct storage area. Here, the pallets are stored until they are removed and transferred to the conveying system for automatic unloading and picking.

The control system of palletizing system

The system is controlled by a total of five Beckhoff Industrial PCs, 4 of which are equipped with a 12 inch Control Panel. The control system is based on the TwinCAT software PLC. Each of the two robots is controlled by a control cabinet PC C6150. The palletizers are controlled by two C6240 series IPCs. The two-channel FC3102 Profibus interface card provides master and slave functionality. The robots and palletizers are served via the master channel; the slave channel is used for coupling with a central C3620 series built-in PC, which is equipped with 4 Profibus master channels.

The C3620 Industrial PC controls the movement of the cartons to the palletizer and to the robot, i.e. it serves 10 servo drives and 190 frequency

controllers as well as several bar code and cargo scanners. Communication between the computers is established via real-time Ethernet through the TwinCAT ADS router. The C3620 also communicates with the ERP system. The palletizing system consists of a total of approximately 300 Profibus stations, 150 servo drives and 1200 I/Os, yet the C3620 processor utilization is only 10 to 15%.

→ Zeeman textielSupers www.zeeman.com

→ CSI Industries BV www.csiweb.nl

→ Industrial Automation Link www.ial.nl



All Zeeman branches are supplied
several times each week

