

## Application Report

### Sensors for efficient intralogistics

**Swisslog equips Europe's most modern logistics system with Leuze electronic sensors**



**In Weilerswist near Cologne, one of the most modern logistics centers in Europe has been constructed. With an investment of more than 130 million euros, the drugstore chain dm-drogerie markt has expanded its capacity here to be able to supply more than 1200 dm stores in the future. Overall responsibility for the new distribution center was with Swisslog AG, of Buchs, Switzerland, which relied on proven, internationally active partners. The key supplier for the complex area of sensor systems was Leuze electronic.**

*"The flow of goods was redirected to the new pallet distribution center on schedule,"* explains Rolf Gutjahr from Swisslog AG. With that, the responsible project manager from the area of Warehouse & Distribution Solutions for Automation Process Planning at the company commented on an important milestone of this major project. The logistics center covers a total of 50,000 square meters – including the order picking warehouse for pallets and small parts and the high-bay warehouse.

18,000 pallet spaces, 5,000 order-picking spaces, 13 high-bay storage devices and some 3,500 m of pallet conveyor technology for a warehousing capacity of 390 pallets per hour – the key data for just this one massive part of the system. On top of this come 140,000 storage spaces in the small-parts area in which 52 high-bay storage devices are used to warehouse, supply items in the order-picking zones and retrieve the order containers used here. Small parts and boxed goods still on pallets can be temporarily stored in 30 m high, high-bay warehouses in 14,000 additional pallet storage places.

A key component of the facility is the CaddyPick<sup>®</sup> system from Swisslog, a semi-automatic order-picking solution with a total length of more than 2,000 m and a total of 163 controlled telfer-line vehicles. The Caddy moves automatically through the order-picking lanes and combines the man-to-goods principle with the zone-to-zone process. *"One feature of the system compared to standard order-picking solutions is that only as many vehicles are in use at a given time as are actually needed,"* explains Rolf Gutjahr, emphasizing the high standards of the operating company with regard to energy efficiency and environmental protection.

The complexity and high level of automation of the system give insight into the demands placed on the sensor systems. Here, it is necessary to direct flows of goods over extensively branched pallet and container handling technology, to position high-bay storage devices and telfer lines, to ensure the function of machines such as robots, stretchers, turners and similar, to transmit data and to provide protection in safety areas. *"Ultimately, the new combi-distribution center is to deliver approximately 1,800 pallets, properly packed with more than 15,000 different products, to the dm stores every day,"* says Rolf Gutjahr.

In addition to a wide range of sensor systems for switching and trigger functions, barcode readers and barcode positioning systems as well as optical data transmission systems are the key components in the distribution center. For the safeguarding of relevant system areas, the integrated muting function of the COMPACTplus Multiple Light Beam Safety Devices satisfies the high requirements with regard to efficient processes (figure 1).

### **Fast identification for directional decisions**

Alone in the area of container handling technology for the order picking of small parts, approximately 700 barcode readers, located at each branch of the extensive material flow system, perform reliable and fast product identification (figure 2). With the BCL 34 and BCL 504 device versions, high-speed scanners are in use in Weilerswist that were selected according to the necessary scanning distances and reading field sizes. Due to the small dimensions of the unit and short minimum

reading distances, the BCL 34 scanners may also be used flexibly in highly constrained spaces. The BCL 504 devices, with a reading field of 200 to 2400 mm, large depth of field and very compact construction, are likewise predestined for package and pallet transportation systems. High performance optics with an opening angle of  $\pm 30^\circ$  permit a wide opening of the reading field even across a short range.

The innovative code reconstruction technology (CRT) of the BCL 504 contributes to high reading reliability, even in fast processes. While simple reading systems completely capture barcodes using a continuous scan line, CRT technology enables codes to be read multiple times – each time with an offset – even when oriented at a large angle relative to the center axis. Using the overlapping elements, the individual fragments are merged together by the software to recreate a complete result. The advantages of this technology are obvious, in particular when dealing with twisted labels, small label heights, or fast movements. Even partly damaged or soiled codes can be decoded. This increases the reading rate and, thus, the system availability.

The BCL 34 and BCL 504 device versions are equipped with a Profibus interface, which facilitates extremely fast data communication with the primary control system. The maximum data transmission rate of 12 Mbit/s between barcode reader and Profibus master ensures that the extraordinarily high reading capacity of the scanner can be used to its full potential. This combines maximum reading capacity with delay-free data communication.

### **Vehicles are positioned with barcode reader technology**

Barcode reader technology is also used for the positioning of high-bay storage devices and the CaddyPick<sup>®</sup> telfer-line vehicles. Here, the proven BPS 34 positioning systems are used. Each of these consist of two, easy-to-handle components: the read head and the barcode tape (figure 3 a/b).

With a high level of functional reliability and redundant data polling as well as minimal maintenance, these systems are predestined for use in the complex dm distribution center. The plastic code tape, on which the absolute distances are encoded, is a key contributing factor here. With the reader system, a laser scans the position information with a reproducibility of  $\pm 1$  mm. The calculated position values are passed on to the control in 2-ms intervals.

### **Additional optical data transmission**

In the vicinity of the high-bay storage devices, position data is transmitted to the control with DDLS 200 Data Transmission Light Beam Devices (figure 4). These devices permit contact- and wear-free optical communication without interference at a transmission rate of up to 2 Mbit/s over distances of up to 500 m.

The Data Transmission Light Beam Devices in the dm distribution center in Weilerswist are designed for lane lengths of 75 m. A data transmission path consists of two transmitter- and two receiver units which transmit and receive the data on different frequencies. For this purpose, a pulsed, invisible infrared laser beam is used whose frequency is exactly matched to that of the opposite receiver. This enables bidirectional communication and prevents mutual interference of the beams or reflections.

### **Safety has priority**

In addition to efficiency, the safety of workers in the highly automated dm distribution center has top priority. Making a large contribution to this are the *COMPACTplus* Multiple Light Beam Safety Devices. This is a type 4 electro-sensitive protective equipment acc. to IEC/EN 61496. With their integrated muting function, they provide permanent personnel protection at automated system parts without interfering with the flow of goods (figure 5 a/b).

Muting is understood to be a time-limited bridging of the safety function. For example, this allows a CaddyPick<sup>®</sup> telfer-line vehicle to pass through the protective field without interrupting the process. If, however, a person attempts to enter the safety area of the system, the *COMPACTplus* Multiple Light Beam Safety Device brings the dangerous movement to an immediate stop.

All sensors, control and display elements required for differentiating between people and materials can be connected directly on-site on the Multiple Light Beam Safety Device. A variety of available output assemblies, such as semiconductors, relays and integrated safety bus interfaces, facilitate optimum integration in every control concept.

### **All in all, a groundbreaking solution**

The sensors from Leuze electronic used in the new dm drugstore-chain distribution center are a key component of the state-of-the-art system technology – from the simple switching sensor to high-end solutions for barcode identification of pallets and boxes. By using scanners for the precise positioning of high-bay storage de-

vices and order-picking telfer lines, as well as systems for wireless data transmission, Swisslog has created a gigantic logistics solution for dm-drogerie market in Weilerswist which, with regard to efficiency, breaks new ground in Europe.

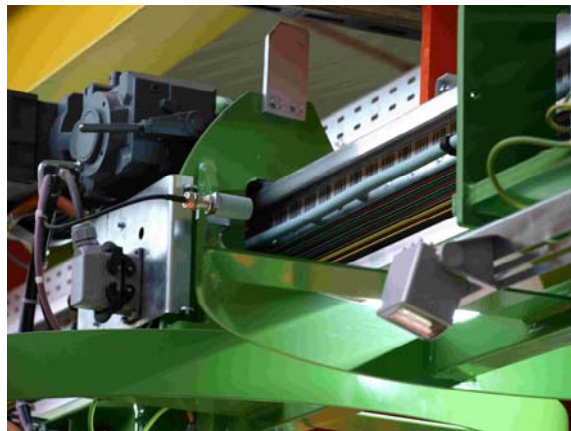
### **Figures and captions**



**Figure 1.** Roller conveyor safeguarding with muting with the COMPACT*plus* Multiple Light Beam Safety Devices.



**Figure 2.** Route choices in the extensively branched conveyor system are made by reading barcodes.



**Figure 3 a/b.** The CaddyPick® telpher-line vehicles are positioned using the barcode positioning system. The code tape in the guide rail is scanned by the reader in the suspended carriage.



**Figure 4.** The high-bay storage device is positioned using barcode technology; the position data is transmitted by means of Data Transmission Light Beam Devices.



**Figure 5 a/b.** The muting function of the COMPACT*plus* Multiple Light Beam Safety Devices ensures permanent personnel protection without interfering with the flow of goods.