

Tiefkühl-Center Birrfeld AG
monitors temperature via Ethernet



→ Swiss company Tiefkühl-Center Birrfeld AG has been operating a deep-freeze warehouse for storing convenience food products in Lupfig, Switzerland for 10 years. Storage and logistics for the perishable products require a reliable monitoring system that was achieved using Ethernet and web-based technologies.

Temperature under control

Tiefkühl-Center Birrfeld AG offers a unique combination of deep-freeze and logistics services for food industries in Europe. As ready-made "convenience food" pioneers, the company has experienced phenomenal growth since it was established.

Deep-frozen products are delivered to and from the warehouse via six vehicle ramps. The temperature in the handling zone is 0–5 °C (32–41 °F) and the temperature in the warehouse is -25 °C (-13 °F). In a deep-freeze buffer space (which avoids the need for night and weekend work), the products are supplied via an automatic pallet conveying system and subsequently positioned in the high-bay warehouse (which has a height of 15 m). Incoming orders are processed in the morning. The products are picked in the afternoon and collected in the late afternoon or evening. The boxes for individual orders are labeled in the high-bay warehouse, retrieved via a conveyor belt and checked. Every day, 50 employees handle up to 500 pallets or 12,000–18,000 boxes for up to 1,000 consignments. The warehouse has room for 5,000 pallets – this means that the warehouse stock is completely replaced about every two weeks.



Frosty work: Picking at -25 °C (-13 °F)

An icy challenge

The deep-freeze process must obviously rely on precise temperature control. This process is specifically defined in the quality assurance system and a verifiable three month history of temperatures must be kept. Compliance with these quality mandates is verified during annual audits. The requirements for verification and traceability of temperatures will become even more stringent in the future, largely a result of evolving European Union standards.

During the commissioning of the warehouse, a networked temperature control system with PC-based monitoring was installed, but the system did not meet the stringent quality requirements: It was prone to faulty alarms, and it was not possible to extend the monitoring system to several PCs. Building automation specialists, Bühler + Scherler from St. Gallen, Switzerland were chosen to develop an alternative solution, which was implemented using Beckhoff Ethernet I/O components and the CX1000 Embedded PC as the controller.

Smart implementation

I/O stations with the BK9000 Ethernet coupler are installed at the two collection points tracking five temperature values from the zone controls of the refrigeration plant, door monitoring system and from fault annunciators. A CX1000 is installed at the main collection point. A total of 80 data points communicate via Ethernet with a server that can be accessed by any PC using the correct username and password. The temperature readings are stored every second and averaged every 15 minutes. Traceability is now ensured for at least one year. All communication connections comply with the maximum safety requirements of the VPN (Virtual Private Network).

Software records the temperature curves and triggers an alarm in the event of a critical situation. Service staff can be notified via e-mail, pager, SMS, fax, or voice message.

This example demonstrates how Ethernet and web-based technology has increasingly replaced proprietary and traditional bus systems in building automation applications. The fact that the Ethernet technology provides data in a format that can be processed via PC and is automatically available worldwide via Internet is particularly convincing.