

# Transparent Loop – Management of Pallets optimized with RFID Technology

## Sachsenmilch AG

In order to optimize logistics processes as well as the handling of pallets and products, the Sachsenmilch AG has outfitted the powder bagging area with RFID pallets and UHF readers.

The result: Increased flexibility, elimination of read errors and complete batch tracking & tracing.

The Sachsenmilch AG is based in Leppersdorf, Saxony (Germany). It is part of the internationally operating Müller Group. With about 1600 employees and a capacity of 1.5 billion kilograms of milk annually, the Sachsenmilch AG is considered one of the most modern dairy-processing operations in Europe. In the five production areas of the Leppersdorf site, milk is processed into basic and fresh products, cheese and powder.

Tailored to customer requirements, the Sachsenmilch AG offers powder products in different containers. Besides bags from 20 to 25 kg, there are “Big Bags” holding 750 to 900 kg. Alternatively, the goods are loaded loosely into silo vehicles with capacities up to 25,000 kg.

The latest processing methods supported by state-of-the-art technology ensure that food producers get products of the highest quality, for example, high-quality sweet and acid whey accumulated during the milk processing. By means of highly advanced membrane technology, whey is fractionated into various components – thereby creating whey derivatives, such as WPC, lactose and milk calcium. Different grain sizes assure optimal application in, for example, the confectionary, baking or beverage industry.

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The compact design of the UHF reader SIMATIC RF620R enabled an easily accessible installation for cleaning and maintenance despite the restricted space conditions.



Andreas Ulbricht, project engineer for process technology and instrumentation and control engineering at the Sachsenmilch AG, checks the order data on a SIMATIC Touch Panel

The initial situation for the RFID project looked as follows: On three palletizing systems and one manual bagging system, wooden pallets – as is customary in conventional systems – were used. “In the area of the powder bagging, we are working with nine different pallet types,” explains Andreas Ulbricht, project engineer for process technology and instrumentation and control engineering at the Sachsenmilch AG. “In addition to Euro pallets, there are customer-specific models as well as various one-way and container pallets for specific market segments.” When inserted into the palletizing systems, production employees attached labels with EAN codes to the pallet feet, which were scanned and associated with the product data. The loaded pallets were then placed in the central warehouse according to their data records.

## Limited Space, compact Design

About a year ago, the project team began with the conversion of the powder bagging area to conform to new hygiene guidelines. Prior to that, the project team analyzed the operational suitability of various identification and logistics solutions. In the end, the RFID plastic pallets of the Craemer GmbH were chosen. The model CR3 comes standard with two transponders for use in the ultrahigh frequency range (UHF), which are embedded into the pallet feet for protection against external influences. The mobile data media send and receive information on a frequency of 868 MHz and conform to the global Gen2 standard for data storage structures and RFID transmission protocols (UHF EPC Gen2) by EPCglobal.

“Several proposals were also considered with regard to the read/write devices,” emphasizes Andreas Ulbricht. “We decided on the Siemens offer, since it best matched our requirements.” Due to restricted space conditions between the process equipment and the reading stations, it was necessary to employ a compact UHF reader with integrated antenna. For cleaning and maintenance, it also had to be easily accessible. In this case, the advantages of the compact UHF reader SIMATIC RF620R came into play: The antennas are space-savily integrated into the enclosure. In addition, the devices

needed to be resistant to external influences – criteria that the IP65 version fully met. “Furthermore, it offered the greatest potential for the future expansion of our installation,” adds Ulbricht.

## Installation and Connection carried out in-house

The planning and live operation of the new RFID solution was implemented in combination with a new pallet changer. A total of five RF620R were installed in the powder bagging area, of which two each are connected to a communication module ASM 456. The installation and connection of the hardware was undertaken in-house by the project team. Project engineer Ulbricht, who also originated the concept of the RFID scenario, describes further: “The programming of the new application was assigned to a local system integrator, who also assumed support duties.”

The uniform plastic pallets ensure that the RFID tags are always oriented in the same way. The reader with its integrated antenna reads the tag information and forwards it via the communication module ASM 456 to the SIMATIC controllers (S7 315-2DP), which control the subsequent processes. To lighten the load on the S7 CPU, the communication processor CP 343-1 for Industrial Ethernet is available. The ASM modules are also connected to a diagnostic repeater, which – as customary in the other PROFIBUS networks of the Sachsenmilch AG – monitors the bus cables and, in case of a malfunction, sends detailed information on the type and location of the error.

During commissioning, the project members discovered that overshooting occurred despite reducing the transmitting power at the read/write devices. Individual pallets were thus simultaneously captured by multiple read/write devices. After an in-depth examination, it was found out that machines and conveyors as well as their safety guards acted as “antennas” and transmitted radio signals through the metal structures. Here, the flexibility of the SIMATIC readers demonstrate their advantage when it comes to modifying the sending and receiving behavior: They allow a fine adjustment of the response

characteristics to the data medium used. "Ever since we varied the read frequencies, the RFID solution has been running faultlessly," judges Ulbricht.

### Trouble-free Transmitting

After the drying, the powder reaches the bagging systems, which measure out the corresponding quantities. For the powder bagging, the Sachsenmilch AG utilizes paper bags as well as Big Bags, whose handling is comparable. After the filling, the bags are sealed, labeled and transported to the palletizer on conveyor belts. Each bag is arranged according to a specific packing pattern and the loaded pallet is supplied to the pallet changer via a transport system.

Prior to handing over the plastic pallets to the pallet changer, the data of the RFID tags is acquired for the last time and the shipping pallet is readied at the changer. Roller conveyors move the arranged bags and Big Bags from the RFID pallet onto the tilting element of the pallet changer. The machine tilts the goods so that the pallet is freely accessible. The pallet changer then exchanges the RFID pallet with the shipping pallet, tilts back to the original position and transports the containers to the wrapping machine. For protection against dirt, moisture or other transport stress, PE film is wrapped around the containers. Until the final shipping, the goods are placed in the high-bay warehouse. The RFID pallets are returned to the palletizer.

The powder bagging area currently operates with a pool of RFID pallets that are solely intended for the internal logistics in a closed loop; from the pallet changer they go back into the magazine of the palletizer for another pass. As a general rule, the data is deleted directly after the pallet change, at the latest when new data records are read in at the palletizer. For the identification of the pallets, the Sachsenmilch AG only utilizes the electronic product code (EPC), which is stored in the control system.



As soon as an RFID pallet passes the sensor, a time slot for the read operation is opened in the UHF reader, which is mounted below the roller conveyor.

In combination with the RFID technology, the EPC standard enables the tracking & tracing of pallets without visual and tactile contact.

### Seamless Integration into the SCADA System

The SIMATIC PLC queries the EPC number in the SCADA system SIMATIC WinCC and expects a pallet number. Only after it has been input is the empty pallet released for entry into the palletizer. The palletizer transmits the reading gate to the head controller, which in turn releases the antenna for reading. As soon as a pallet passes the sensor, a time slot for the read operation is opened in the reader. The reader acquires the EPC number of the RFID tag and transmits it to the head controller. The radio link is only activated for this short time period.

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