RFID in beverage logistics

Intelligent containers – RFID provides complete transparency in beverage logistics

For the transportation in the beverage industry of beverages like beer, soft drinks or mineral water, mainly reusable containers (bottles and kegs) are used. These containers offer a great potential for the usage of RFID to improve efficiency and quality in beverage logistics. The use of RFID to identify each single container allows transparency in the whole supply chain which allows making processes more efficient and reduces costs.

The transportation of goods has a high importance in all industries. On one hand, there are raw materials or semi-finished products which have to be transported inside of the company from inbound area to the warehouse or to processing. On the other hand, there are finished goods that have to be transported from the manufacturer to the customer. These transports are either done by the use of own employees or outsourced to an external service provider. In any case there are various stakeholders. The coordination and communication between all parties is a major task of logistics controlling. Another influencing factor is that the transportation is realized using auxiliary means like pallets, containers or specific load carriers which are either single-use or reusable. Knowledge about the status of a transport or the location of auxiliary means is essential for a well performing supply chain.

Containers in the beverage industry

Bottles and kegs are the most common auxiliary means of transport in the beverage industry. They are an important part of the value chain. Without them, products (e.g. a freshly brewed beer) cannot be filled into bottles or kegs and as a final result production may stop. These characteristics result in the following, typical questions:

- How many containers are in the inventory?
- How many containers are in use?
- How long does one circulation of containers take?
- Where are the containers?
- In what condition are the containers?
RFID for container management

To gather information about containers, RFID systems are used more often. The UHF-RFID system RF600 from Siemens has proven in various projects in container management, industry in general and especially in beverage logistics.

For a unique identification, each keg and crate (as carrier for bottles) gets a UHF-Transponder, which has a worldwide unique container number. Considering global supply chains, the GS1/EPC-Standard is the basis for this code. Data on the transponder are saved as GRAI-Code (Global Returnable Asset Identifier).

Different kinds of transponders are used depending on the application and requirements. For instance, in the beverage industry for stainless steel kegs are mostly used (Figure 3). Therefore suitable on-metal transponders are used. These transponders are robust and perform well, even in harsh environments, e.g. highly varying temperatures. A very high range ensures a reliable identification – also in multi-tag reading.

The proven and robust readers and antennas from the RF600 product family are used for the identification, hence reading the container number (Figure 1). The readers feature built-in tools for diagnosis and commissioning, which facilitate an easy installation. Integrated filter functions allow for a reliable single or multi-tag reading.

Identification enables transparency

An example for the material flow in a brewery is shown in (Figure 2). RFID reading points are defined in a process analysis. RFID reading points are installed in different places of the site to determine container inventory, circulation times and the quality of returned empty kegs. In the example, the containers are first identified when they are returned from the market and then again on neuralgic points like warehouse or production. This provides an overview of the internal processes. The time from the last reading point before shipping to the first reading when the containers are returned defines the circulation time in

Figure 2: Diagram of the different areas of a brewery. Typical operations and read points in the brewery logistics.
the market. The unique identification of each container ensures transparency so the owner is informed about the location and condition of his containers.

**An important advantage of the RFID technology is the automatic identification of the container number — no manual operations are required**

This performs well for single-tag reading (e.g. in the filling area) but also for so-called multi-tag reading for the more difficult identification of stainless steel kegs. For example, 48 kegs distributed equally on 8 pallets can be identified as an RFID gate is passed. There is another requirement for kegs; the keg-fitting (connection to the dispensing system) needs to be revised and maintained when necessary. Maintenance can be accomplished by randomly pulling out a keg from the conveyor line (e.g. every tenth keg) regardless of its real degree of usage and wear. The usage of RFID allows a usage oriented planning and execution of maintenance based on the actual amount of fillings. This saves time and reduces costs.

**Transparency boosts efficiency**

The existing multi-use containers, like keg for instance, can be used to make the whole supply chain transparent. The use of UHF-RFID technology is the basis for a unique labeling of all containers. The multi-tag feature and automatic identification in the flow of material make a RFID-based management economically reasonable in the beverage industry. This new transparency contributes to improving inventories and also improves the integration of existing inventory management systems allowing the reduction of costs in production and logistics. As a consequence, the productivity in the whole value chain can be improved.

**Transparent Processes
Simatic RF600 – Taking RFID to the Next Level**

With SIMATIC RF600 identification tasks in the UHF range (865 to 868 MHz, 902 to 928 MHz and 920 to 925 MHz) can be completed but they require a range of several meters. The system is suitable for the storage and identification of a unique identification number according to the EPCglobal-Standard (Electronic Product Code) attached to products, containers or auxiliary means. In addition to that, the storage of additional, freely definable user data is also possible.

There are various data mediums available — ranging from the cost-effective smart label to heat-resistant transponders usable for thousands of cycles.

SIMATIC RF600 can be used with SIMATIC PLCs and PC/IT-Systems.
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