



APPLICATION REPORT Food & Beverage

Equipping a cheese dairy with flow, level and analysis instruments

- Automation of a production site for premium cheese
- Providing information on various plant operations – from raw milk reception to cheese preparation to sterilisation and wastewater management
- Cross-company and cross-country project management to fulfil customer requirements on time



1. Background

Royal-Aware, a family-owned Dutch business, specialises in the maturation, cutting, wrapping, storage, transportation, and sale of cheese and other food products. With the ambition to become the best value supply chain partner in the food and agricultural business in Europe, the company also started their own cheese production in 2015. Their state-of-the-art cheese factory in Heerenveen, The Netherlands, allows Royal-Aware to develop up to 80 specific recipes and provide customers with tailor-made cheese products. The cheese dairy has a production capacity of up to 100,000 t/year.

2. Measurement requirements

The complete project management and engineering was done by Royal-Aware themselves, starting construction in 2013. Process technology and components were supplied by several suppliers according to the companies' specifications.

With regard to process measuring technology, only a partner with ample experience in cross-company and cross-country cooperation would have been able to meet the demands on time. Various measurement tasks in different plant areas had to be mastered:

- Fluid handling at raw milk reception and during cheese milk preparation
- Monitoring CIP processes
- Controlling wastewater discharge

Among others, it was specified that the process instrumentation be manufactured using EC 1935/2004 regulation-compliant material as well as industry-specific hygienic connections. For digital communication with the PLC, it was mandatory that most of the instrumentation have PROFIBUS® DP capability.



3. KROHNE solution

KROHNE was selected as the main instrument vendor to equip various production and auxiliary processes with flowmeters, level transmitters and analytical sensors.

The well thought-out project concept from consultation, to instrumentation, to integration, service and on-site support tipped the scales in KROHNE's favour.

The following key applications were the focus of attention:

3.1 Raw milk reception

In order to determine the amount of raw milk delivered by road tankers, the raw milk reception docks were equipped with OPTIFLUX 6300 electromagnetic flow meters (EMF). Given the outdoor environment, the devices were completely fitted with insulation to guarantee a stable milk temperature at the measuring point.



Flow measurement at the raw milk reception with the OPTIFLUX 6300

3.2 Cheese milk preparation

Before the raw milk can be fed into the production line, it has to be prepared accordingly. This includes separation, standardisation and pasteurisation.

Separation:

In a first step, the delivered raw milk is separated into skimmed milk and fat. In order to accurately monitor the flows, OPTIMASS 7300 C Coriolis mass flowmeters were installed after the separators.

Standardisation:

Subsequently, the cheese milk is produced, i.e. the skimmed milk is standardised to the desired fat content according to the selected cheese recipe. This involves accurate dosing of large quantities of skimmed and full cream milk.

- KROHNE supplied two OPTIMASS 2300 for the dosing system. The twin straight tube Coriolis mass flowmeters in stainless steel were installed with aseptic flange connections (DIN 11864-2) into the vertical dosing lines before the tanks.
- An OPTIFLUX 6300 EMF was mounted after the dosing system to control the cheese milk transported to the milk pasteuriser.

Pasteurisation:

In the flash pasteuriser the cheese milk is gently treated to extend its shelf life. During this process, hot water is circulated at a regulated temperature using a system of plate heat exchangers and steam, while maintaining a constant temperature. In the heating section the cheese milk is heated in a counterflow and brought to pasteurisation temperature:

- The pasteuriser is equipped with OPTIFLUX 6300 to control the amount of cheese milk flowing through the system.
- In order to keep the ionic concentration in the condensate below a certain limit, the conductivity in the supply circuits is measured by OPTISENS COND 1200 conductive conductivity sensors. The sensors were installed into the condensate reflux and supplied with a MAC 100 signal converter.



Milk standardisation with the OPTIMASS 2300 C



Milk pasteurisation with the OPTIFLUX 6300 C



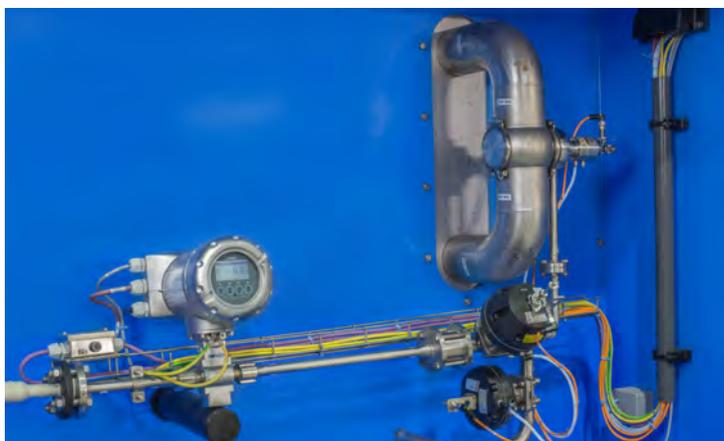
Conductivity measurement with the OPTISENS COND 1200 and MAC100 signal converter

3.3 CIP systems

To ensure plant and product safety and to comply with regulations, the dairy operates a comprehensive cleaning system of storage tanks, dosing stations and CIP lines. Each area requires consistent monitoring.

Among others, KROHNE

- equipped the tanks storing the concentrated agents with OPTIFLEX 2200 C level transmitters to ensure a reliable stock management
- supplied very small OPTIFLUX 6300 units enabling precise dosing of the caustic cleaning agents into the CIP circuits
- provided numerous EMF OPTIFLUX 6300 units for the CIP lines to allow for reliable monitoring and control of the CIP processes.



Process instrumentation for the CIP (Clean in Place) system: Stock management with the OPTIFLEX 2200 level transmitter (top and centre left). Dosing of CIP agents (bottom) and flow measurement of the CIP lines (top/centre right).

3.4 Wastewater management

In cooperation with an adjacent milk processing company, Royal-Aware operates a facility to treat dairy wastewater from cheese production. Before the effluent is discharged into the treatment facility, it has to be continuously monitored in terms of quality and quantity. KROHNE supplied the corresponding flowmeters as well as analytical instruments:



Flow measurement of dairy wastewater with the OPTIFLUX 2100 F



pH measurement of effluent with the SMARTPAT pH 8150

- In order to control the pH value in the effluent, the pH sensor SMARTPAT pH 8150 is used. The sensor was installed into the vertical effluent pipe. Due to its integrated transmitter, there was no need for an external transmitter as the sensor is directly connected to the control room.
- The volume flow of dairy wastewater is monitored by the electromagnetic flowmeter OPTIFLUX 2100 W. With its rugged, chemically resistant liner, the meter is particularly suitable for this application.

4. Customer benefits

The KROHNE devices ensure a high level of automation of the customer's most important processes – from raw milk reception to wastewater discharge. All specifications of the customer were considered and supplied as requested, helping Royal-Aware start production on time.

Royal-Aware benefits from the single source supplier KROHNE. Having only one contact person for on-site support and service, make it much easier for the customer to quickly resolve application related issues in the future.

Key to success was the well thought-out project concept and the close cooperation (across companies and countries) between KROHNE as the full service provider for measuring technology, Royal-Aware as the end customer as well as various contractors.

This complex project once again added to KROHNE's large application expertise and years of experience in the food and beverage industry.

5. Products used

OPTIFLUX 6300 C

- Electromagnetic flowmeter for the hygienic measurement of raw milk and other conductive dairy products as well as CIP agents
- DN2.5...150 / 1/10...6", EHEDG and 3A certified



OPTIMASS 2300 C

- Twin straight tube Coriolis mass flowmeter for high volume measurement of milk and other dairy products
- DN100 / 4", EHEDG and 3A certified



OPTIMASS 7300 C

- Single straight tube Coriolis mass flowmeter for milk separation and standardisation
- DN10...100 / 1/2...4", EHEDG and 3A certified



OPTISENS COND 1200 and MAC 100

- Conductive conductivity sensor for monitoring condensate reflux to increase flash pasteuriser safety
- G1/2, G3/4, G1, NPT 3/4 (male); 0...20000 µS/cm



OPTIFLEX 2200 C/F

- Guided radar (TDR) level transmitter for stock management of CIP agents
- 0.6...40 m / 2...131 ft, independent from physical property variations



SMARTPAT pH 8150

- pH sensor for measurement of dairy wastewater
- PG13.5; with integrated transmitter



OPTIFLUX 2100 W

- Electromagnetic flowmeter for dairy wastewater applications
- DN25...1200 / 1...48", with rugged and chemically resistant liner



Contact

Would you like further information about these or other applications?

Do you require technical advice for your application?

application@krohne.com

Please visit our website for a current list of all KROHNE contacts and addresses.



www.krohne.com