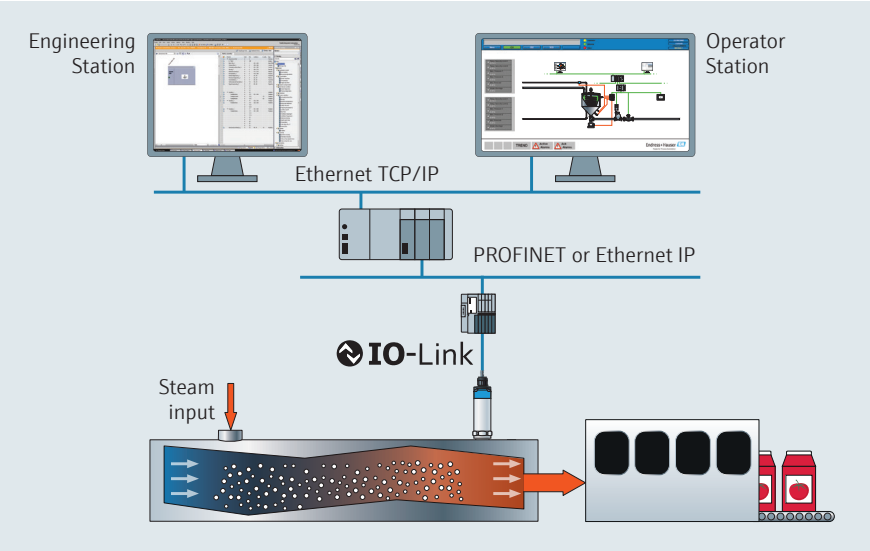
Liquitrend QMW43

Improve process efficiency and product quality with transparency

- Improve cleaning and production cycles by knowledge of what happens in the pipe
- Monitor buildup signal behaviour during production and compare to chosen signal zero point
- Save cleaning detergent cost of > 4,500 Eur/year and improve production efficiency

Customer process

A customer specializes in the production of Tomato based sauce and condiments. To enhance the shelf life at room temperature, these low pH, high salt content products need to be pasteurized. The customer uses direct steam injection during the heating process. The products are heated up to 100 °C and held at this temperature for several minutes in the pasteurizer holding tube. The pasteurized products are cooled and then packaged.



Customer Challenge

The customer observed frequent pressure increases in the production system which affected his production runs due to reduced product flow caused by pump restrictions. As a result, his adherence to HACCP standards was severely limited. The customer assumed that the high pressure was due to the accumulation of materials (buildup) on the piping or tank surfaces, however, he had no means of validating his assumption. As a result, the customer would very often stop production and initiate a harsh CIP process to remove the potentially accumulated materials on the process lines. Despite the increased safety measures taken, the customer had no means to monitor his accumulation of material (buildup) during process nor could he validate his cleaning efficiency after CIP.

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How did the customer ensure a clean installation?

Given the above, the customer could not predict the frequency of his line blockages nor could he prevent it from occurring. In order to prevent frequent production stops and lower the risk of inadequate cleaning, the customer increased the concentration of his cleaning detergent from 1% to 1.5% almost doubling his cleaning detergent usage at a cleaning flow rate of 10m^3/hr. for 45 mins. However, even with the increase in the detergent strength, the customer was still not satisfied with his cleaning output hence not confident in his CIP process. He was desperate to find an effective means to monitor his buildup formation during production and validate the efficiency of his CIP process.

Residual tomato sauce on surface

Installation of Liquitrend QMW43 to address the Customer Challenge

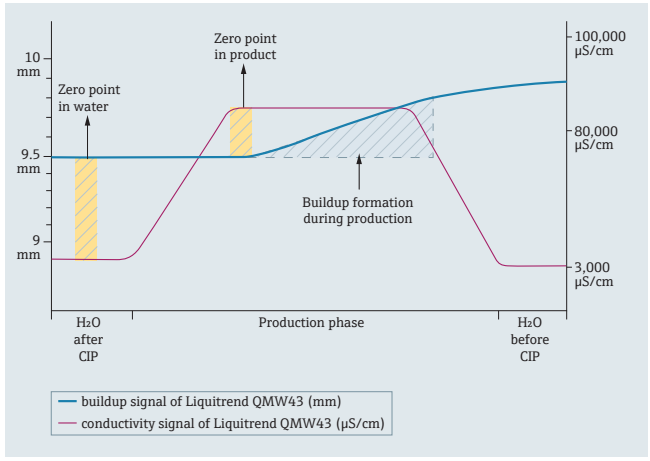
The Liquitrend QMW43 is a smart new device which is capable of monitoring buildup thickness and conductivity of fluids in process installations. The Liquitrend QMW43 can handle both conductive and non-conductive media since it uses conductive and capacitive technologies. The signal outputs can be used with IO-Link communication or analog signals. It was proposed as the perfect solution to address the customer's challenge.
The device was installed (flush mounted) in the middle of the holding pipe using a varivent process connection to monitor both buildup thickness and conductivity of the flowing media.

How was the Liquitrend QMW43 used in this application?

After flush mounting of the Liquitrend QMW43, the customer ensured a cleaned installation. He measured the zero point of the installation when filled with water and at start of the production run and used these values as references. The buildup and conductivity values were continuously monitored during production to determine the extent of deviation from the zero-point values which gave the customer a real time status-based process insight.

Buildup formation during production.

At the end of the production week, it was observed that the buildup signal had increased from the zero-point of 9.5 mm to 9.8 mm implying that there was fouling or accumulation of deposits on the sensor surface. To verify, the pipe was emptied and the varivent connection of Liquitrend QMW43 was opened for manual inspection. Analysis of the accumulated deposit indicated that it was due to buildup of organic materials on the sensor which were cleaned off with a paper towel getting back to the zero-point of a cleaned installation in air (0 µS/cm / 0 mm).

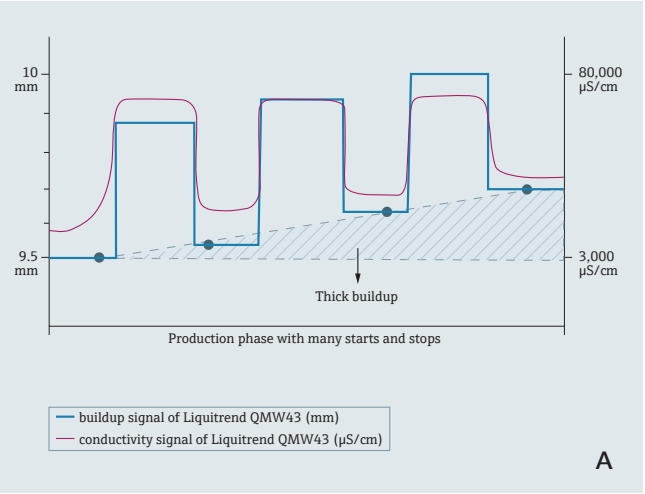


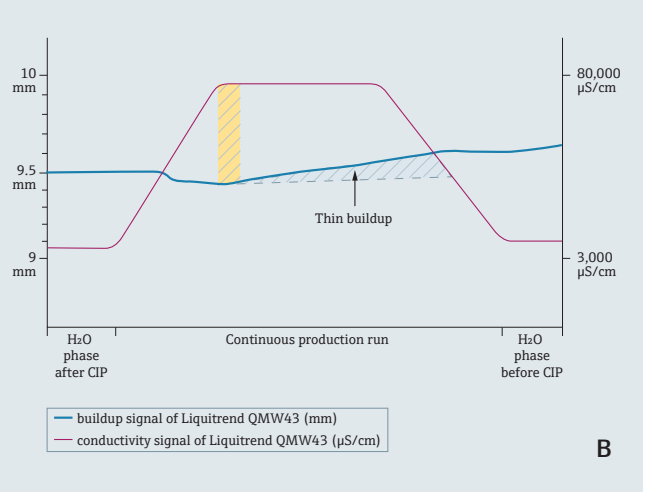
Optimization of the process using Liquitrend QMW43 insights

By monitoring the extent of deviation from the zero-point values under product for buildup thickness and conductivity values during production, the customer could precisely tell when the fouling started forming.

Based on the observance of the zero points in water after CIP, the customer reduced the concentration of his cleaning detergent to 1% and doubled the detergent flow rate to increase shear forces while maintaining the CIP duration. Using the Liquitrend QMW43 signals, this concept was successful saving cleaning cost while adhering to HACCP standards. Using the Liquitrend QMW43 process signal trend, the customer noticed that frequent starts and stops or product changeovers during heating led to a faster and greater accumulation of buildup as the heated media became attached to the wall surfaces (see diagram A on the right).

However, with a continuous production run the buildup accumulation was very slow as indicated by the Liquitrend QMW43 signals (see diagram B on the right). Hence the customer was able to determine the root cause of his challenges which led him to adequately adjust his production runs.





Conclusion:

Based on the insights obtained from the Liquitrend QMW43, the customer made savings on his cleaning cost as he used less chemicals during CIP. The customer was also able to optimize his process runs to ensure minimal stops which favored a continuous flow. This allowed proper compliance to the HACCP standards which improved his overall process quality. Additionally, he could also detect steam pockets in his process lines leading to optimized equipment availability.

Calculation of only the detergent cost savings as one of many savings with the use of Liquitrend QMW43

	Before Liquitrend QMW43 Values	**With** Liquitrend QMW43 Values
CIP cycles/year	50	30
Detergent cost/L	0.06 € (concentration. 1.5%)	0.025 € (concentration 1%)
Volume flow of cleaning	10 m^3/hr	20 m^3/hr
CIP cleaning detergent duration	20 min.	20 min.
Cleaning detergent cost/year	**9,000 €**	**4,500 €**

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