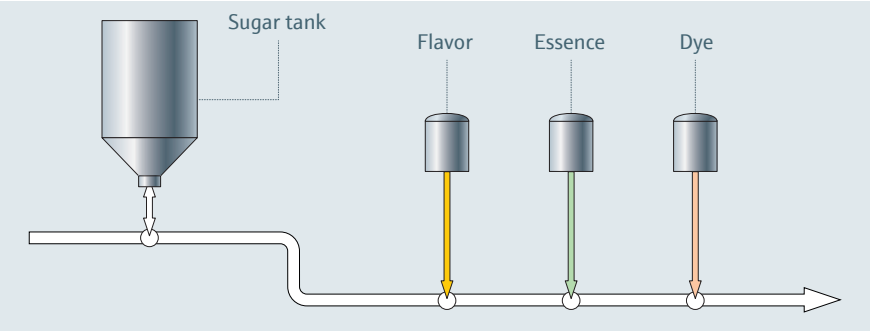
Liquitrend QMW43

Eliminate the need for manual inspection and transit to condition based cleaning

- Check chosen signal zero point after CIP
- Monitor buildup behaviour during production
- Raise profit and turnover by > 200,000 Eur/year

Customer process

At a fruit juice-based drink production plant, the customer mixes different kinds of ingredients (syrup) with water and pasteurizes the mixture through a heat exchanger. The pasteurized products are stored in a buffer tank prior to filling. Pasteurizing the product involves transfer of the product through a heat exchanger to reduce the microbial load thereby prolonging the shelf life. Product heating results in fouling of the entire installation which is a major issue. Fouling can lead to the deterioration in the product quality because the process fluid flowing through the product transfer lines can be contaminated with deposits dislodged by the flowing liquid. In case of fouling, cleaning cycles also need to be more intense to ensure clean state of installation before continuation of production.



Softdrinks syrup preparation and subsequent mixing

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Customer challenge

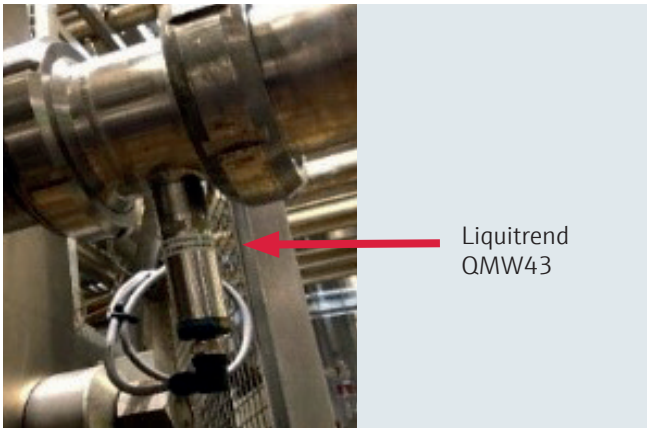
The customer often experienced product contamination even after CIP which presents a risk – if undetected- to generate product complaints amounting to financial loss and possible loss of customer loyalty. Also, the customer did not know under which circumstances the fouling occurred in his installation. However, to determine the adequate cleaning frequency and cleaning detergent choice and strength, this knowledge is required. When he did the CIP, he did not have the security that the installation was well cleaned after competition of the CIP cycle.

How did the customer ensure a clean installation?

As a result of the above challenges, the customer instituted a weekly CIP process at the end of the production week. Additionally, a biweekly dismantling of the installation was done for visual inspection of residual fouling after CIP. This was a quality assurance step to prevent product contamination. Due to dismantling, a second CIP was required even if the installation was found to be clean resulting in loss of productivity and increasing cost.
A means to automatically and accurately monitor fouling rate in order to know the real-time status of the installation during production and after CIP could be a problem solver.

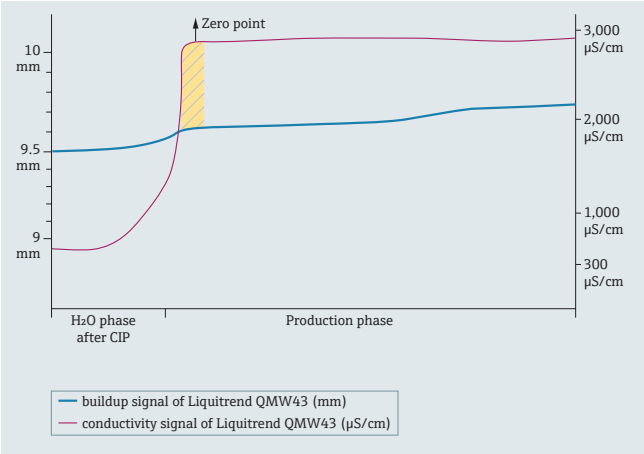
Installation of Liquitrend QMW43 to address the customer challenge

Liquitrend QMW43 is a measuring device which combines two measuring principles: conductive measurement and capacitive measurement. It can measure buildup and the conductivity of media. Because of the severity of fouling in very hot fluids the Liquitrend QMW43 was installed at the outlet of the heat exchanger to mirror the state of the installation at the most vulnerable point. There it monitored in real time buildup/fouling formation during production as well as removal during cleaning. To ensure measurement accuracy, the Liquitrend QMW43 was flush mounted on the pipe to prevent formation of dead space.

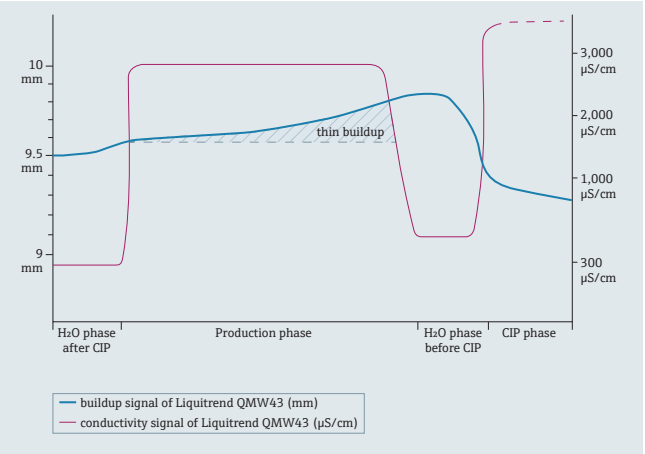


How did the use of Liquitrend QMW43 help in addressing the customer pain point?

The Liquitrend QMW43 is configured to always give two output variables i.e. buildup thickness and conductivity. Based on these output signals, the fouling rate of the entire installation was accurately determined.
After installing the Liquitrend QMW43 sensor, the entire installation was properly cleaned and filled up with water to determine the baseline = zero point in water in the clean installation. It was then filled with the production media for which the baseline was also determined. The buildup thickness/fouling rate was monitored throughout the production run to determine a trend. If the installation is emptied and clean, the sensor displays 0.0 mm.



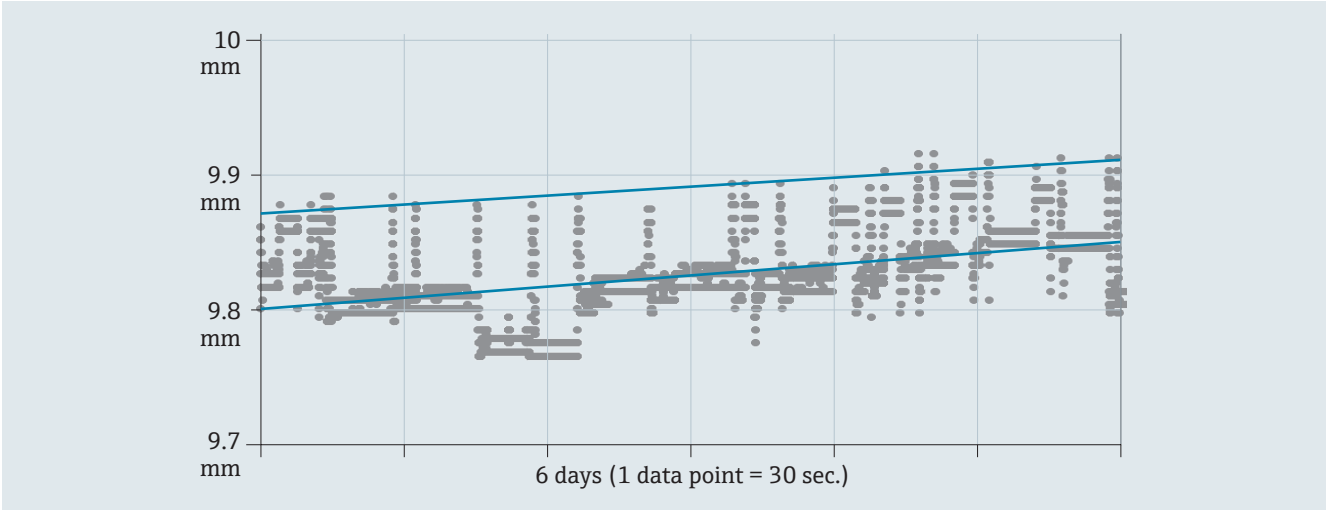
Zero point under product



Buildup formation during production

How to know when to act?

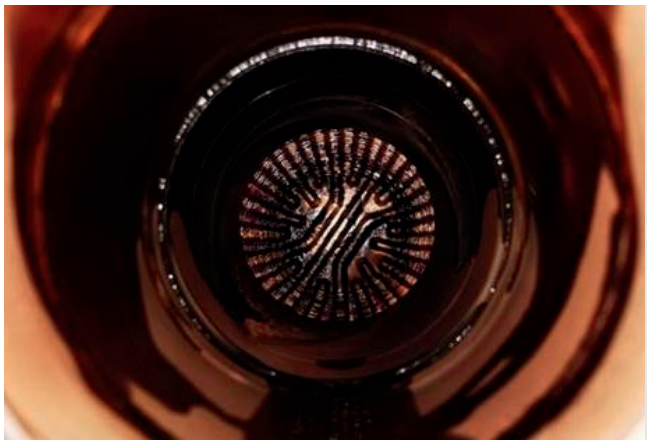
The Liquitrend QMW43 signals were used and evaluated for a duration of 3 months. Monitoring the buildup formation during production runs, the customer was able to determine that the rate of fouling increased with multiple product changeovers.



A long production run was initiated with product change overs in between using water as the push-out medium. Over time, a thin build up was observed to form on the piping surfaces which can be seen from the zoomed-out illustration of the buildup thickness (as seen at the picture above). The relative buildup thickness/fouling during the production run in the filled installation increased as indicated by the Liquitrend QMW43 buildup signal.
With these signals, the customer could determine a buildup thickness level when to initiate a CIP run and therefore evolve to status-based cleaning.

Security without making extra sure

At the end of the production run, a standard CIP process was initiated as usual to remove the accumulated buildup in the installation. The installation was emptied after the CIP. However, with the signals from Liquitrend QMW43 the need for manual dismantling was eliminated because he saw that the installation was not properly cleaned. When this occurred the first time, a confirmation of the suspected buildup was needed. The buildup signal of the emptied installation was 0.1 mm instead of 0.0 mm expected for a clean empty installation! To confirm the suspected residual fouling, the installation was manually dismantled for visual inspection. This verified that everything was indeed coated with a thin film of residual buildup (as seen in the picture below).



Conclusion:

Using the buildup output variable from the Liquitrend QMW43, the customer was able to mirror the condition within the entire installation hence eliminating the need for manual dismantling and visual inspections. This resulted in additional time savings which could enhance productivity. As additional advantage of using Liquitrend QMW43, the customer could use this knowledge to optimize the cleaning agents and the cleaning strategy.

Savings and profit for a soft drink production using Liquitrend QMW43

	Values **before** Liquitrend QMW43	Values **with** Liquitrend QMW43
CIP cycle/year	52	52
CIP duration/cycle	0.87 hrs	0.78 hrs
Dismantling/reassembly of installation/year	20	–
Duration of dismantling/reassembly	1.42 hrs x 2 persons	–
Labor cost/hrs	100 €/hrs	100 €/hrs
Product retail price	1.92 €/L	1.92 €/L
Profit with product	0.3 €/L	0.3 €/L
Product flow rate	29 m^3/hr	29 m^3/hr
Labor **cost** disassembly/reassembly/year	**5,000 €**	–
Additional **turnover** by production time/year	–	**232,200 €**
Additional **profit** by production time/year	–	**36,000 €**

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