

Experiences with ultrasonic cleaning systems

FOR TURBIDITY SENSORS AT BASF'S LUDWIGSHAFEN WASTEWATER TREATMENT PLANT

The wastewater treatment plant of BASF in Ludwigshafen is designed for a capacity of six million population equivalents and is thus one of the largest wastewater treatment plants in Europe. About 120 million cubic metres of wastewater are treated each year.

Most of the wastewater treated is BASF production wastewater, plus a much smaller proportion of municipal wastewater from the connected towns of Ludwigshafen, Frankenthal and Bobenheim-Roxheim.

Because of its origin, the wastewater is anything but an easy mixture to clean. This results in particularly demanding conditions that have to be met, both for the plant management and for the measurement technology used.

As an example, the requirements for a turbidity measurement are shown here.



View over the Ludwigshafen wastewater treatment plant

Measurement task:

Turbidity measurement as proof of optimal process control. Alarm function to prevent hydraulic overload and early detection of biological changes to instability in the form of disintegration. This means plausible and reliable mapping of process stability.

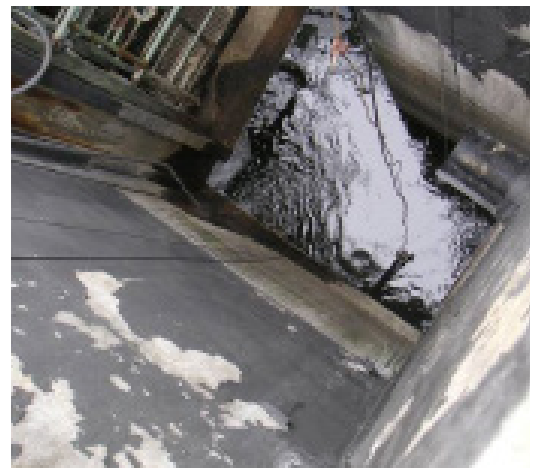
Measurement location:

Total effluent, after mechanical secondary sedimentation, mounted in a six-metre deep shaft structure.

Problem:

Due to the special composition of the wastewater, an adapted bio-cenos, which leads to a faster growth of a biological lawn on otherwise smooth surfaces, can be detected. This has a negative effect on the optical measurement windows of the sensors, as they become contaminated. A further complication is the lime content in the measuring medium of the BASF wastewater treatment plant. Together with the biological growth, deposits form here that cannot be dealt with in the long term using mechanical wiper systems.

A high manual maintenance effort is just as much the consequence as unreliable measured values. In practice, this means almost daily maintenance by the staff.



Measurement location in the six-metre-deep shaft of the overall drain



Solution approach:

Since the wiper systems proved to be susceptible and maintenance-intensive for the given measurement task, an alternative method for sensor cleaning was sought, ideally without external mechanically moving parts. Therefore, turbidity and total suspended solid (TSS) sensors from the Xylem brand WTW (VisoTurb® 700 IQ and ViSolid® 700 IQ) with integrated ultrasonic cleaning were used as a test. The ultrasonic source integrated in the sensor generates high-frequency vibrations, which should significantly reduce or completely prevent the growth of all kinds of soiling on the optical windows right from the start.

Test result:

In practice, the sensors with ultrasonic cleaning system, in this difficult application, proved to be significantly more suitable. In direct comparison to the probes with wiper system, which often have to be cleaned daily, the VisoTurb® 700 IQ probe (with turbidity measurement according to ISO EN DIN 7027) was able to measure correctly and without problems for more than four weeks. After that, however, manual cleaning of the sensor was also necessary. The ViSolid® 700 IQ sensor (measures turbidity at a more acute angle than DIN requires) was even able to measure reliably for more than six weeks in this particular application without additional manual cleaning.



BASF employees checking the sensors



The optical windows of the ViSolid® 700 IQ are clean even after several weeks of operation.



The optical windows of the VisoTurb® 700 IQ are clean even after several weeks of operation.

Do you have further questions?
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