APPLICATION NOTE

Water & Wastewater

Gauge pressure measurement in the aerator line of an aeration basin

- Reliable detection of the contamination degree of aeration elements
- Determination of cleaning intervals based on overpressure threshold values
- Robust, drift-free pressure transmitter for monitoring oxygen supply and aerator performance
- Timely removal of deposits without maintenance-related basin drainage

1. Background

A municipal water association in eastern Germany is, among others, responsible for the treatment of wastewater and rainwater from surrounding municipalities. Via a separate system the wastewater loads are transferred to a centralised wastewater treatment plant (WWTP) with a biological treatment stage. To be able to biochemically convert the organic matter in the wastewater into biomass and carbon dioxide, the aeration basin must be supplied with oxygen. The aeration process accounts for around 70% of the wastewater treatment plant's total electricity consumption. In order to substantially increase operational safety and efficiency, the plant operator recently extensively modernised the aeration system and also replaced the aerators.

2. Measurement requirements

Next to parameters such as the air volume, the condition of the membrane aerators plays a vital role in injecting oxygen effectively. This is best achieved through fine-bubble distribution over a large area. The blower performance and thus the power consumption depends on the throughput and the back pressure. The condition of the pores in the aerator membranes has a significant impact on the back pressure and the uniformity of the fine bubbles. These pores become clogged with various deposits over time. This reduces the efficiency of the oxygen input while the energy demand increases.

Draining the aeration basins to clean the aeration elements is in most cases not possible or very costly. Depending on the contamination level, the operator therefore injects formic acid (methanoic acid) together with the air flow. In this way, acid soluble deposits can be effectively removed. In order to be able to determine the degree of contamination and to ensure a constantly high aeration performance as well as efficient and uninterrupted operation, the operator decided to use state-of-the-art process measurement instrumentation.

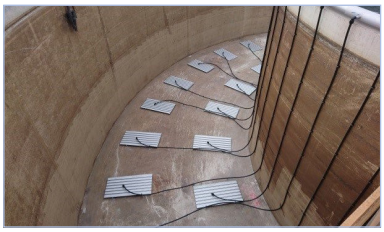
KROHNE

3. KROHNE solution

The customer uses the OPTIBAR PM 5060 pressure transmitter on the various aerator lines. The KROHNE device continuously monitors the degree of contamination of the various aerator lines by gauge pressure measurement. Depending on contamination trends and the stored limit values, the system operator runs a targeted cleaning cycle. For the injection of formic acid, the customer uses the pressure monitoring of the individual aerator lines in relation to a defined delivery rate and immersion depth. In addition to oxygen measurement, the overpressure also serves as an important parameter for controlling the blower output. The OPTIBAR PM 5060 transmits the measured values directly to the control room.

Gauge pressure measurement in an aerator line with the OPTIBAR PM 5060

The process pressure transmitter is insensitive to pressure surges and pulsation and enables reliable, long-term stable measurement. It has a fully welded metallic diaphragm and thus offers a high level of protection against leakage. Since the weld seams of the diaphragm are drawn over the sealing surface, there is no contact of the process medium with the less corrosion-resistant weld seam and the material transition of the diaphragm to the base material. This makes the OPTIBAR PM 5060 well designed for the prevailing operating conditions of the sewage treatment plant, in particular the rotary lobe compressors and the corrosive process conditions.



Aeration elements of an aeration basin

The gauge pressure transmitter was supplied for this application with an electropolished stainless steel housing, which makes the measuring device robust against external influences that can sometimes be abrasive at the WWTP. Commissioning of the pressure transmitter is either possible via the keyboard on the modular display, via Bluetooth® using a mobile device with the KROHNE Pressure Mobile app or quickly and easily via HART®.

4. Customer benefits

The OPTIBAR PM 5060 makes an important contribution to maintaining the high performance of the aeration system and accurately determining the right time for cleaning intervals. Continuous pressure monitoring enables the operator to detect contamination trends at an early stage. The customer can take immediate action to prevent efficiency losses and operate the aeration basins in the most energy-saving way possible and without process interruption. Defective aerator elements can be identified in time.

5. Product used

OPTIBAR PM 5060

- Pressure transmitter for process pressure and level applications
- Rugged design with fully welded metallic diaphragm suited to high pressure ranges and hygienic requirements
- 100 mbar...1000 bar
- Various housing materials available: plastic, aluminium, stainless steel
- 2-wire, 4...20 mA/HART®, FF, Profibus-PA, Bluetooth®

Contact

Do you have questions or are you interested in this or other applications?
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