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Waste Water Treatment Plant Oschersleben - AQUALOGIC® control system

The Oschersleben waste water treatment plant is the largest plant operated by the TAV Börde and has a capacity of 46,000 PE. As part of an energetic reconstruction, the process is currently being converted from an aerobic to an anaerobic stabilized activation process. In the course of this measure, the five old blowers will be replaced by three turbo blowers and the two intermittently aerated aeration basins will be supplied with air by a collecting air pipe and diaphragm control valve. Since not only the blowers but also their controls needed to be brought up to date, Passavant Process Technology had the opportunity to demonstrate the increase in process and energy efficiency using the Aqualogic® control system as part of a test installation lasting several months starting from October 2020.

Task

- Improved, stable oxygen input,
- Energy-efficient and low-wear control of the turbo blower station,
- Installation of a modern controller system that enables simple operation by the staff,
- Provision of further expansion modules for easy future upgrade.

Solution

The Aqualogic® control system was used to control the duration and intensity of aeration in one aeration basin for a period of several months, while the two blowers in the other basin were still controlled by the previous PLC solution.

After a successful test and the activation of the new turbo blowers, which now supply the two aeration basins by means of a collecting air pipe, two Aqualogic® controllers with the additional module alternating aeration were finally put into operation.

Results

Due to the aeration control based on Fuzzy Logic, the aeration tank controlled by Aqualogic® has a better oxygen input and, on average, shorter aerated phases. This saves energy, the compressors run more evenly and, since there is less “diffuse” oxygen input with carbon degradation, more carbon is available for denitrification.

Average power consumption BB1 (Aqualogic®)	Average power consumption BB2 (PLC)	Average power savings	Savings potential for both aeration basins	Savings potential for both aeration basins
627 kWh/day	722 kWh/day	95 kWh/day (13%)	69.000 kWh/year	17.000 €/year

Chart 1: Comparison of blower power consumption with Aqualogic® or classic PLC control; savings potential for both aeration tanks, projected for one year at 25 ct / kWh.

In addition, more time and carbon is available for denitrification, which is noticeable in significantly improved NO_3 and N_{total} discharge values. Here the comparison can only be made in a period before and after commissioning the Aqualogic® controller:

	01.08.-12.10.	14.10.-09.12.
CSB degradation rate	99,7 %	99,7 %
NH_4^+ degradation rate	99,7 %	99,7 %
NO_3 discharge value	4,5 mg/l	1,4 mg/l
N_{ge} degradation rate	94,7 %	99,7 %
Average water temperature	20,0 °C	13,7 °C

Since the test was very successful, the TAV Börde decided to install the Aqualogic® controller permanently.

In addition to the aeration control and the Enerlogic® module for temperature and load-dependent adjustment of the oxygen setpoint, the alternating aeration module was installed: This extension ensures that the two aeration basins are aerated alternately during times of normal load, so that the turbo blowers do not unnecessarily vary in power - unnecessary power peaks are avoided.

Technical details

- 2 x Aqualogic® controllers with ammonium / nitrate controller, installed on an industrial PC,
- 2 x Enerlogic® controllers for load-dependent oxygen setpoint calculation and to optimize the opening degree of the diaphragm control valve,
- 1 x module alternating aeration for even utilization of the turbo blowers.



Photo: Aerial view of the Oschersleben waste water treatment plant - view of the sewage sludge digestion complex August 2021 (Photo: © TAV Börde)

Advantages

- Optimization of the biological cleaning process with stable operation,
 - Reliable maintenance of the required discharge values, often significantly improved nitrogen elimination,
 - Extensive access of the operating personnel to the controller settings - no programmer required,
 - Possibility of testing the Aqualogic® controller over several months,
 - Customer support and service from Germany,
 - System works with all probe and blower manufacturers
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