Controlled by Liquiline Control

Automated nitrogen removal in Stadtlohn wastewater treatment plant

Ewald Rathmer, Manager of WWTP in the town of Stadtlohn, North Rhine-Westphalia

The Stadtlohn WWTP is designed to handle wastewater from a population equivalent (PE) of 30,500. At present, a PE of approximately 21,000 is connected to the plant, roughly 15% of which is industrial wastewater. The plant's two intermittent basins are activated sequentially (in cascade formation). Commissioned in 1991, the facility has undergone extensive modernization works over recent years.

"At our WWTP, the Liquiline Control controls both phosphate precipitation and nitrogen reduction. We can always rely on this control system. Even in difficult inflow conditions, it works as specified, thus ensuring that the outlet parameters are always adhered to."

Ewald Rathmer
Plant Manager
WWTP Stadtlohn (Germany)

The Stadtlohn WWTP regulates nitrogen reduction using the Liquiline Control. The control system regulates the air supply into the aeration basins depending on the current concentration of nutrients in the wastewater.

The results

- Safe compliance with limit values.
- Stable operation.
- Optimized energy usage.
- High level of process transparency combined with ease of use.
- The switching of the basins from parallel to cascade operation during a plant upgrade posed no problem for the control system.

Customer requirements The customer required a control system that automated nitrogen reduction while also ensuring compliance with the official nitrogen value in the plant outlet (TN ≤ 8 or 12 mg/l, depending on the time of year). It was also important that the control system would be able to function after the clarifiers were switched from parallel to sequential operation. The upstream basin is now used at the peak-load stage, while the second basin is subsequently used at the low-load stage. The nitrogen concentration in the outlet had to be as constant as possible during both peak- and low-load phases. Furthermore, the solution had to be easy to operate, to ensure that staff could make settings quickly and easily when on standby duty during the night and at weekends.

Our solution The WWTP operator opted for a complete solution comprised of several different components:

- One oxygen sensor per basin as well as an ion-selective sensor for ammonium and nitrate.
- Programmable logic controller (PLC) with Liquiline Control software, which controls both basins individually.
- Touchscreen display used to operate the system from the control room.
- Various services, such as consulting, design and configuration of the controller, process integration, system training.

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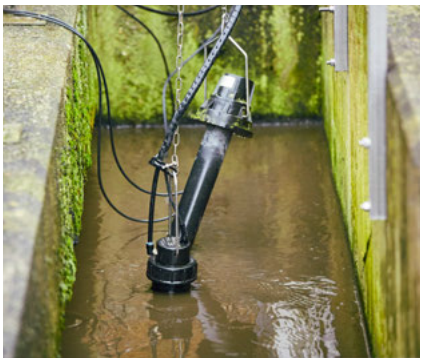
Load-dependent aeration control in Stadtlohn The customer wanted the two aeration basins in the plant to be aerated individually. Sensors in both basins measure the parameters ammonium, nitrate and oxygen. Using the measured values, the Liquiline Control control system configures a dynamic set point for oxygen: depending on the ammonium concentration, the exact amount of air required for complete removal of the ammonium (NH4-N) is injected. This results in process stability while also optimizing the energy efficiency of the blowers.

In addition, the controller dynamically adjusts the duration of the nitrification and denitrification phases. This improves the reduction of total nitrogen (TN), ensuring that it remains at a constant level in the plant outlet.

A high level of process transparency combined with ease of use The control system is designed in such a way that it can be operated using just a few settings. The effect of each setting is always obvious, with the result that the process has become more transparent for staff.

One of the aeration basins at Stadtlohn wastewater treatment plant. The Liquiline Control system monitors the online measurements of oxygen and ammonium to control the nitrification and denitrification phases.

"Key advantages of the control system are its user-friendliness and transparency. It can be operated using only a few very explicit parameters. This makes things easy for us!"
Markus Pries, Electrician, Stadtlohn WWTP



The ISEmax CAS40D sensor measures nitrate and ammonium. In Stadtlohn WWTP, a sensor has been installed in the outlet of each basin.

Additional services The customer worked with our wastewater technicians to define all of the requirements for the phosphate control system, ensuring that the Liquiline Control was adapted to the individual circumstances in Stadtlohn. This also entailed creating a graphical representation of the plant layout on the touchscreen of the control monitor, making for clear and intuitive operation. In addition, our service team supported the customer throughout the commissioning phase and provided the staff with training on the system.

Remote access to Liquiline Control control system

For the Stadtlohn WWTP, the controller was fitted with a remote control unit. This means that staff on standby duty are able to monitor the process and intervene if necessary from the comfort of their own homes.

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