REFERENCE PROJECT

Wastewater Treatment Plant Oberschleißheim

Process engineering and energy optimization

2017/2018

German Water Partnership
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Gemeinde Oberschleißheim

KEY DATA

Capacity: 30,000 PE

Load: 15,000 PE,
approx. 2,000 m³/d

Tank volume all streets:
originally 8,000 m³, reduced to
4,000 m³ during the optimization

Objective: holistic energetic and
process-technical optimization of
the activated sludge system

Result: tank volume reduced by
50 %, effluent values improved
(constantly low, without overflows),
55 % of the energy consumed in
biology saved.

THE INITIAL SITUATION

The old mode of operation with four aeration tanks

Built in 1960, the Oberschleißheim wastewater treatment plant with aerobic sludge stabilization has a capacity of 30,000 PE, although the actual load is currently only 15,000 PE (wastewater volume approx. 650,000 m³/year).

Originally, the influent was divided into four aeration tanks operated with agitators and tube aerators. The agitators ran continuously, and for nitrogen removal the tanks were aerated intermittently according to fixed time intervals and air quantities. Due to the aeration tank volumes being too large in relation to the load and the lack of a dynamic oxygen input control, energy consumption was high and partial excesses over the permissible effluent parameters had occurred.

The phosphate elimination system had already been retrofitted in advance. Via online measurement with associated freight-based precipitant control (Hach Lange), it was already possible to achieve savings in operating resources and reliable compliance with the phosphorus limits.

In 2007, a new disc thickener (Huber) made it possible to automatically thicken the sludge and then feed it into the digester. As part of the 2017–2018 remodeling measures, the aeration volume of the plant was to be reduced and, above all, the machine technology was to be optimized in terms of energy.

IMPLEMENTATION MEASURES

The new mode of operation with 55 % energy optimization and a cost reduction of approximately € 40,000 per year

In 2017, the sand classifier was replaced (Huber). The grit is now transported from the circular grit chamber directly to the grit classifier where the

organic components are separated from the grit. The classified sand is then dewatered and discharged into a waiting container via a classifying screw. The entire process takes place in an odour-encapsulated manner. The existing measurement technology of the plant was replaced and extended by an ammonium and nitrate online measurement (Hach Lange). The measurement data provided is essential for the success of the optimization and requires a high level of reliability of the measurements.

Two of the plant's four aeration tanks were taken out of operation. The inlet and outlet situation in the remaining aeration tanks was adapted to a pipe flow system and an energy-efficient surface aeration system was installed with 44 MESSNER Plate Aerators® per tank line. The intermittent, ageing operation of the two aeration tanks is controlled by the MESSNER® ICS control system depending on the load. The decisive factor here is the concentration of oxygen, ammonium, and nitrate in the aeration tank. The required air volume is controlled according to the principle of sliding pressure control via the pressure value and provided by AERZEN Delta Hybrid blowers (new compressor station). The turbo takes over the basic load: at peak times the hybrid steps in and at low load the blower runs. The innovative AERsmart machine control system then distributes the required volume flows to the machinery in such a way that the blowers are operated very close to their theoretically highest level of efficiency. Continuous recording of the operating parameters and real-time visualization allow early detection of drifting of individual values (for the avoidance of process failures).

The mixing of the activated sludge during the unaerated denitrification phases is realized via the RMU Impulse Aeration® by regular air blasts from the aeration system, so that agitators are no longer required. The oxygen demand is determined dynamically by the MESSNER ICS control system based on online measuring probes, generated by the AERZEN blower station, and introduced intermittently via the MESSNER plate aerators in an energy-efficient manner.

CONCLUSION

Talking to each other, listening, and understanding – the way to optimum success

The intensive cooperation of all stakeholders and the comprehensive optimization measures (energy efficiency analysis, modernization of the AERZEN blower station and the aeration system, including control and process conversion, as well as the elimination of agitators and the reliable interaction with the Hach measuring technology used) have paid off. While maintaining operational safety and stable compliance with the effluent values, the monthly electricity consumption of the biological stage dropped to 16,500 kWh/month, or 195,900 kWh/year (previously: approx. 37,000 kWh/month or 435,629 kWh/year). This corresponds to an energy saving of approximately 55 % (€ 40,000 per year).

Process control and planning of operational activities (e.g. maintenance) have also been significantly improved through better measurement technology. This benefits the wastewater quality: previously, the effluent values showed relatively high fluctuations; with the new control technology, the values are uniform and in a very low range.

Finally, we are proud to say that, especially in terms of process technology, the Oberschleißheim wastewater treatment plant is now one of the most modern of its kind in Germany.

German Water Partnership

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