



Wastewater Treatment Plant Ginsheim-Gustavsburg, Germany (32,500 PE)

Aqualogic® - Efficiency Improvement by Intermittent Nitrification/
Denitrification

Situation

The wastewater treatment plant Ginsheim-Gustavsburg treats the sewage of the city of Ginsheim-Gustavsburg as well as of the commune Bischofsheim. The system is constructed for a population equivalent (PE) of 32,500 and is currently charged with a PE of 30,000.



Wastewater treatment plant Ginsheim-Gustavsburg

Customer

Zweckverband Abwasser- und Servicebetrieb Main Spitze (ASM)

Capacity

32,500 PE / 30,000 PE

Commissioning

May 2013

Situation

The biological treatment of the wastewater treatment plant Ginsheim-Gustavsburg was separated into two parallel connected basins with an effective volume of 1,500 m³ each as a denitrification/Bio-P step. One basin with an effective volume of 1,420 m³ as a nitrification step was connected to each denitrification basin. The third line of parallel basins was not connected.

Each denitrification/Bio-P basin was composed of three cascades (500 m³ each). Optionally the last cascade could be switched into aeration performance. The nitrification basins were permanently aerated with a setpoint for oxygen of 2.0 mg/l. Depending on the ammonium load it was even able to achieve values up to 5.0 mg/l.

Recirculation was achieved with two unregulated circulation pumps per basin. During the operation of the sludge press, the process water was dosed continuously. The precipitant was dosed according to the phosphate concentration.

Solution

To improve the treatment performance and the energy efficiency of the wastewater treatment plant Ginsheim-Gustavsburg, an optimization plan was developed. In November 2009 the aeration system was renewed. All initial diffusers were replaced by tube diffusers Bioflex® IV and the aeration system was extended. Planned stirring units were not required as a satisfying biomass distribution during denitrification was achieved by short air pulses of the aeration system.

In March 2010 the nitrate and ammonium measurements related Aqualogic® control system, based on Fuzzy Logic, was implemented. For this purpose the whole measurement instrumentation was renewed and extended. Additionally, an controller based on the oxygen consumption was implemented. The permanent aerated nitrification step was converted into an intermittent operation.

The recirculation, as well as the dosing of precipitant and activated return sludge were controlled as required.

In March 2012 the third line of parallel basins was commissioned and the Aqualogic® control system was extended. In May 2012 the Enerlogic® control modules were implemented to improve energy efficiency.

Technische Details

Passavant® Aqualogic®

(energy efficient control via ammonium nitrate)

Module Recirculation

Module Precipitant Dosage

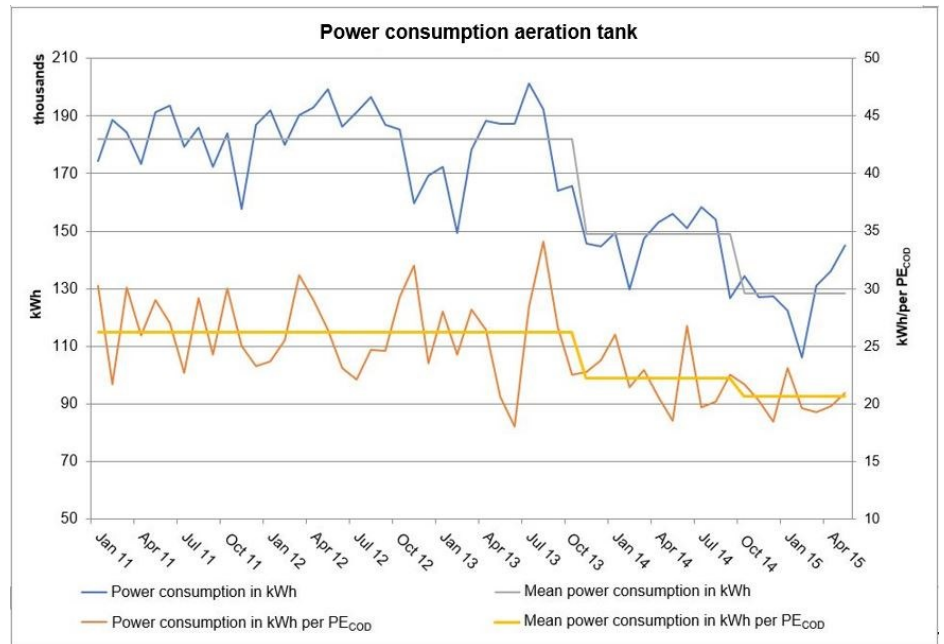
Module Return Sludge Control

Results

During the concept stage for the optimization of the biological treatment, the projected energy savings were approx. 72,000 €/year. Considering a capital investment of 420,000 €, the amortization time would have been approx. 6 years.

A recent analysis revealed an actual energy conservation of 30% (see diagram), which exceeded the expectations. Based on the actual energy costs of 19.8 ct/kWh and a monthly energy conservation of average 53,500 kWh, the actual savings amount to 127,300 € per year, reducing the amortization time to approx. 3.3 years.

The total energy consumption of the biological stage in relation to the load has improved from 26.2 to 20.6 kWh/(PECOD*year). The following diagram demonstrates the savings during the individual optimization stages. The average outlet parameters in terms of overall nitrogen concentration are far below 5 mg/l.

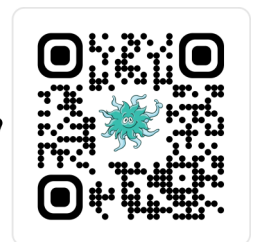


Graphic: Energy savings through optimization measures at the wastewater treatment plant Gotha.

Passavant-Geiger GmbH Water Processing Solutions

Kettelerstrasse 5-11
97222 Rimpfing | Germany
Phone +49 9365 8082 60
info.aqualogic@passavant-geiger.com

www.aqualogic.de/en | www.passavant-geiger.com



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