

## ENERGY-EFFICIENT PROCESS AIR PRODUCTION IN SEWAGE PLANTS

### Background

Hans Kempfle, manager of the sewage works in Kötz, a few kilometres to the South of Günzburg, has sufficient experience with the production by turbo blower as well as by positive displacement blowers. In Kötz, both systems are working. Since 2000, here, in the current equipment, two positive displacement blowers have been supplying the activated sludge basins divided into two groups, and since 2009, two air-bearing turbo blower in completely separated systems. Moreover, since 2000, two small positive displacement blowers have been supplying oxygen for the sediment collecting tank ventilation. Both systems have proved excellently despite their different technical concepts in Kötz

### Requirement

The sewage plant in Kötz was designed for 45,000 inhabitants. At present, approximately 20,000 inhabitants are connected. By the additional introduction of industry-waste waters, this corresponds to an average daily volume consumption of approximately 35,000 inhabitants. Depending on time of day, day of the week, precipitation amount and contamination load of the fed-in wastewater, the oxygen demand of a wastewater treatment plant can vary considerably. As a special feature, the nitrification is effected in Kötz in two stages from the beginning. The reason for this special solution according to the manager of the sewage works is the fact, that during commissioning of the sewage plant, first of all, also the waste waters of a today's no longer existing leather factory had to be treated which were discharged with a high CSB-value.

### Solution

Wastewater treatment plant Kötz compensates these fluctuations with AERZEN turbo blowers (Type AT 50-0.6s, 37 kW, max. 2.187 Nm<sup>3</sup>/h) and positive displacement blowers (Type K61-81R, 35 kW, max. 2.370 Nm<sup>3</sup>/h) installed in separate groups. A very efficient alternative offer concepts, with which air-bearing AERZEN turbo blowers work as base load generators. For covering the peak load and/or low load requirement AERZEN supplies adjustable positive displacement blowers



<b>Segment</b>	Environmental engineering
<b>Problem</b>	Intense fluctuating oxygen requirement
<b>Solution</b>	Combined concept Aerzen Turbo, Delta Blower
<b>Result</b>	Energy efficient process air generation
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and rotary lobe compressors of the series Delta Blower and Delta Hybrid. They work each paired in „shifts“: One unit is always in continuous operation running around the clock, while the second unit is provided as redundancy. Due to this concept there will be a yearly running time of approximately 4,400 operating hours for each unit. All four units are run speed controlled dependant to the demand and ensure the expected oxygen content of 2.4 mg/m<sup>3</sup> in all six basins, whereas the minimum value of 2.0 mg/m<sup>3</sup> must not be fallen below. Furthermore, in a third building, on the premises still two small AERZEN positive displacement blowers of type K20R/BS4 (delivery quantity 6.0 up to 30.0 Nm<sup>3</sup>/h), installed in year 2000, have been working for ventilation of the sediment collecting tank.

Due to this parallel operation of several years of the nearly equally powerful air-bearing turbo blower and positive displacement blowers for oxygen supply of the activated basins, Mr. Hans Kempfle is very familiar with the technology of both systems. Although, the turbo blowers have already been active for approximately 24,000 operating hours in the sewage works Kötzt since its commissioning six years ago, they have worked nearly maintenance-free up to now. Only small work, such as filter change has been carried out by the operator himself. The two positive displacement blowers each are maintained by own service specialists for the generation of activation air and for the sediment collecting tank ventilation according to manufacturers specifications necessary - that is approx - 8,000 operatins hours - also concerning these units in spite of an operation period of 14 years and nearly 60,000 operating hours.

## Result

The proven AERZEN concept offers the operator of a biologically working sewage plant two important advantages: It ensures for each load situation – also with widely fluctuating process air consumption! – an optimally adapted and safe process air supply and enables a specially energy-efficient generation. Finally, the energy consumption of a sewage plant can be as high as 80 % of the total costs for the process air generation.

## Conclusion

There is now a unique portfolio of solutions for oil-free oxygen supply to aeration tanks provided by three high-performance machines Aerzen Turbo, Delta Blower and Delta Hybrid – all from the same manufacturer. With a number of models to choose from, these units can be used to satisfy a wide variety of plant-specific requirements. In combination they can guarantee performance that for the first time can be cut precisely to the needs of an ever-changing load profile – from basic loads to peak demand. Innovative ventilation combinations comprised of blower, hybrid and turbo technology from AERZEN. These combine the advantages of various machine technologies – efficiency and adjustment ranges – while guaranteeing for the first time a requirement led process air supply to the aeration tank. Basic loads are served reliably and in an energy saving manner, while supply peaks are covered precisely as required. This solution portfolio is what AERZEN calls Performance<sup>3</sup>.



## The company

Aerzener Maschinenfabrik GmbH, founded in 1864, is a worldwide leading manufacturer of twin-shaft positive displacement machines and turbo machines. The range of products includes rotary lobe compressors, positive displacement blowers, turbo blowers, screw compressors and gas meters. Aerzener Maschinenfabrik has about 1,800 employees and more than 40 international subsidiaries. The

innovative technological solutions from AERZEN include empirical values of a company history of more than 145 years. Industrial plants all over the world are provided with gaseous media using AERZEN blowers, compressors, turbos and gas meters. Besides standard products the company also develops customer specific special solutions. Moreover, AERZEN offers a wide range of After Sales services - from repair and modernisation of existing plants up to Condition Monitoring.



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