

## A TURBO FOR THE BASE LOAD BLOWER FOR THE PEAK LOAD

### Background:

A biologically working municipal wastewater treatment plant with a considerably fluctuating discharge quantity can only perform its function with utmost energy efficiency and reliability, if the process air consumption of the aeration basin can be adjusted continuously and fully automatic also to considerably fluctuating loading quantities. This especially applies for the sewage treatment plant in Bremervörde, designed for an overall capacity of 30.000 EGW and with approx. 29.000 EGW nearly used to capacity. At present up to 3.000 m<sup>3</sup> waste water are fed into the sewage treatment plant every day. However already approx. 1.200 up to approx. 1.500 m<sup>3</sup> of the totally max. 3.000 m<sup>3</sup>/day - consequently nearly 50 % of the capacity of the wastewater treatment plant - are generated by one single production, the share of which fluctuates very much last but not least due to the rest from work on weekends. Whereas the amount of wastewater of the resident population in the catchment area in the course of a week with max. approx. 1.500 m<sup>3</sup>/day is nearly constant.

### Requirement:

Already in the more distant past the process air for the aeration basin was generated by means of positive displacement blowers made by Aerzener Maschinenfabrik, from Aerzen near Hamelin. These old units were replaced in 1999/2000 by two AERZEN blowers series Delta Blower (type GM 50 L, nominal power 75 kW, delivery spectrum from 37 up to 42 m<sup>3</sup>/min). One unit finally covered the requirement, the second one served as redundancy. Both units were already speed controlled, so that they could be adjusted to the fluctuating requirement in a range of approx. 35 to approx. 50 Hz. However in their lower performance range the blowers could not cover anymore the even lower load requirement, so that the units were shut down frequently. Therefore in Bremervörde they were looking for a new solution for the process air generation, which absolutely had to meet two essential conditions:

1. The units of the new concept should be speed controlled and should have a wider performance spectrum especially in the lower performance range, to be able to cover also the low load requirement.



<b>Segment</b>	Environmental engineering
<b>Problem</b>	Aeration adjustment on intense fluctuating wastewater loads
<b>Solution</b>	Aerzen Turbo, Delta Blower
<b>Results</b>	High energy savings by combined operation mode
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2. If possible the units should be run 100 % in speed-controlled load-run operation across the entire requirement spectrum.

#### **Solution:**

In November 2010 approx. one year after the informational event a new AERZEN turbo compressor type TB 100 - 0,6 (driving capacity 75 kW) was installed. Since it has been commissioned about 14 months ago the unit ran 10.700 operating hours (as of February 2012) and consequently ran nearly without no-load operation periods around the clock in volume controlled load operation - which proves its optimal design. This unit with a capacity spectrum of 36 up to 80 m<sup>3</sup>/min now arranges as base load generator for process air supply of the wastewater treatment plant in Bremervörde. The two AERZEN positive displacement blowers of the old supply concept can be connected automatically as stand-by units and as peak load generators. As per information from Heiko Müller about 75 per cent of the electrical energy used in the wastewater treatment plant Bremervörde is used for generating process air. Therefore for the new concept the particularly economical handling of electrical energy was an absolute precondition. Before making the decision to purchase they had determined that under consideration of the available depth of the basin a discharge pressure of 0.4 bar is sufficient for an optimal aeration. Onto this value the impeller of the blower was customized for the highest possible energy efficiency. Higher pressures up to max. 1,0 bar are possible by using corresponding impellers.



#### **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

#### **Result:**

All three units, the new AERZEN turbo blower as well as the two approx. 12 years old positive displacement blowers series Delta Blower, were installed optimally in a separate building. The supply air enters from the outside. A filter mat prevents dust from penetrating into the unit. Warm exhaust air supported by a fan escapes the room. All the units supply via a busbar in the station directly into the aeration basin. A probe in the basin measures continuously the oxygen content and controls the delivery volume of the process air via the speed of the units. At the end of the treatment process the treated water is discharged into the adjacent river Oste with a purity degree of approx. 95.

#### **Conclusion:**

With this concept we meet our requirements optimally and with highest possible energy efficiency. The turbo blower works with its wide performance spectrum as ideal base load unit in spite of our considerably fluctuating input quantities between 1.500 and 3.000 m<sup>3</sup>/day. Depending on the requirement the positive displacement blowers can be connected fully automatically as peak load units", praises Heiko Müller.



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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