

## Rotary screw blowers for wastewater treatment applications



Energy efficiency is becoming an ever more important factor in wastewater treatment. Whilst keeping this point in mind, the treatment plant at Lüneburg also wanted a solution capable of delivering a stable supply of air under fluctuating weather conditions – combined with a sophisticated control system.

The answer was a rotary screw blower from HPC KAESER, which in addition to a clear reduction in energy costs, provided precisely the results they were looking for.

### About the customer

The wastewater treatment facility at Lüneburg, in the German state of Lower Saxony, is designed to cater for the needs of around 325,000 inhabitants. It features a number of clarification tanks with depths of up to 7 m, into which the air required for the biological treatment procedure is delivered via a diaphragm control valve.

Until recently, four classic turbo blowers, each equipped with a 200 kW motor, were used to provide the compressed air for this aeration system. However, the operator was looking for a solution that would enable them to control compressed air production in a more direct and dynamic fashion, with a broader control range. They also sought to achieve a more constant air delivery that would remain unaffected by extreme weather conditions.



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By measuring and documenting the air mass flow generated and the associated power consumption, the impact of installing the new rotary screw blower very soon become apparent.

## Rotary screw blower in perfect harmony with turbo blowers

The rotary screw blower at Lüneburg was subjected to a one-year maximum usage trial. As the facility's master control system was set up to control the turbo blowers by means of adjustments to their guide vanes, it was necessary to adapt the software in order to be able to operate the rotary screw blower using speed control. The blower communicates with the control system via Profibus DP; optional communication via Modbus TCP / RTU, Profinet IO, DeviceNet, EtherNet/IP or classic hard wiring are all also available, as is the option of pressure control or – just as with the system at Lüneburg – speed control. When the rotary screw blower reaches a pre-specified speed limit, the control system switches a turbo blower on or off as needed so as to prevent inefficient overlapping.

Thanks to adjustable ramp-up times, powering the rotary screw blower up and down does not result in pressure peaks that could damage the turbos. A head-to-head performance comparison is simple, owing to the fact that the rotary screw blower directly replaces a turbo with 4000 - 9000 m<sup>3</sup>/h, in operation for almost 24 hours, for 12 of which it runs stand-alone.



*Aeration tanks at the Lüneburg wastewater treatment plant.*



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## Up to 15 percent energy savings

In the eyes of the operator, even more important than the potential energy savings was the challenge of making the air delivery more precise and more constant; a goal which was achieved thanks to significantly more dynamic control behaviour and the fact that, with positive displacement compressors, the flow rate fluctuates far less at varying inlet pressures and temperatures than it does with turbos.

This means that, even under extreme weather conditions, the electronic controller can adhere to the required process values. What is more, a significant reduction in the influence of pressure fluctuations on the machine's control behaviour very quickly became apparent, which also served greatly to simplify control. On top of a marked improvement in process management, a significant amount of energy could now be saved thanks to continuous measurement of the air mass flow and performance.

The rotary screw blower, operating in conjunction with the turbo blowers, also made its presence felt when it came to the question of overall power consumption: it transpired that around 250,000 kWh could be saved annually, which corresponds to around 10 to 15 percent, depending on the total annual requirements. This result is perfectly in line the predicted energy savings, which can be calculated in advance using the figures provided for the usable flow rate and total power consumption of the rotary screw blower within the strict tolerances of ISO 1217, Annexe E.



*Rotary screw blower from with a max. flow rate of 160 m<sup>3</sup>/min and max. pressure differential of 1100 mbar.*



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## Uniquely efficient

Whether rotary screw blowers, turbo blowers or a combination of both offer the best solution for any given application depends on the frequency distribution of the air demand (i.e. the amount of time the flow rate is distributed between minimum and maximum demand). Equally important is the actual working pressure, which has a major influence on the control range and coverage of the air demand, particularly in the case of turbo blowers.

It is better not to approach the task of identifying the correct solution with preconceived ideas about which individual model or technology will work best, but rather to remain open-minded until all factors have been evaluated. Priority should be placed on determining the air demand profile and actual working pressure required. The overall operation of the machine network in the future should also be taken into account.

HPC KAESER is well versed in the advantages of both positive displacement compressors and dynamic compressors, and is therefore always able to offer the best individual solution for each customer's needs.

The Lüneburg wastewater treatment plant has scored a major victory thanks to its openness to new technologies. It is now reaping the rewards in the form of efficient, intelligently controlled coverage of its compressed air needs.

[Get in touch](#) if you have any questions or are looking for advice about the best compressed air solution for your operation to achieve the lowest total lifecycle costs. HPC KAESER offers a range of products, including blowers and rotary screw compressors supported by experienced and knowledgeable engineers and a nationwide network of authorised distribution partners. [Contact us](#) to find out more.



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