

WHITEPAPER

Water treatment of the future

Energy-efficient and resource-saving



AERZEN
EXPECT PERFORMANCE

Efficiency in wastewater treatment

Optimise aeration and save



The costs for electricity in Germany are about **42 % higher than the European average (2018)**. And the trend is upwards: since the year 2000, the German electricity price has already risen by about 18 %.

How efficient is your aeration really? Many wastewater treatment plants consume a lot of energy and resources due to inefficient aeration of the aeration tanks. It is important to find and exploit untapped savings potential. In order to achieve the highest possible energy and resource efficiency, AERZEN accompanies you from the planning to the maintenance of a modern machine park.

Cost item water treatment

Rising energy prices, increased cost pressure and the targeted CO2 reduction according to the Paris Agreement make energy and resource efficiency a major issue for industrial and municipal wastewater treatment plant operators. The costs for electricity in Germany are about 42 % higher than the European average (2018). And the trend is upwards: since the year 2000, the German electricity price has already risen by about 18 %. Water resources are also dwindling worldwide. Resource-efficient treatment is therefore becoming increasingly important. With the appropriate know-how, appropriate technology and smart control and regulation technology, it is possible to operate water management in an energy-saving and resource-saving manner.

Modernisation is worthwhile

The investment in modern wastewater treatment usually pays off within 2 years by significantly increasing the operational efficiency of the plant. Even the replacement of existing plants with efficient blower and compressor technology can reduce the operating costs of a wastewater treatment plant by an average of 30 %. A holistic view and planning according to the latest technologies and applicable standards avoids unplanned costs.

How can energy costs and resources be saved in wastewater treatment?

With this whitepaper we would like to bring you closer to our answers to this question.

AERwater

The flexible concept for more resource efficiency



Resource efficiency about:

- | | |
|-----------------------------|------------------|
| ✓ AERaudit | ✓ Implementation |
| ✓ Performance ³ | ✓ AERsmart |
| ✓ Machine room optimisation | ✓ AERprogress |
| ✓ Financing | ✓ Service 4.0 |

With the 360-degree view on aeration processes, AERZEN developed with AERwater a holistic solution approach with coordinated performance modules. Hardware, software and service interact smoothly. With AERwater, wastewater treatment plants can work energy-efficiently, resource-saving and future-oriented.

Challenge accepted

The AERwater concept addresses the challenges that the wastewater market presents to planners and operators. It helps to adjust plants to the innovations of Water 4.0 and to benefit from them. The aim is to make processes flexible, sustainable and efficient through digitisation and automation.

The concept

AERwater consists of different service areas.

- AERaudit provides temporary flow, pressure, power and temperature measurements to determine the actual load profiles.
- Performance³ optimises the machinery with customised machines and technologies consisting of positive displacement blowers, rotary lobe compressors and/or turbo blowers.
- Machine room optimisation for room ventilation, sound insulation and heat recovery.
- Support with financing, for example with the application for subsidies.
- Support for implementation, for example dismantling, commissioning or rental machines.
- AERsmart forms a higher-level machine control system and offers continuous optimisation of the energy balance and networking, including data analysis and data management.
- With AERprogress, AERZEN offers customised solutions for an even more efficient waste water treatment based on process and machine data.
- Service 4.0 provides spare parts and service management.

Wastewater treatment plants offer numerous set screws which can be adjusted to save energy and resources. The holistic AERwater concept appeals to them all. It enables wastewater treatment plants to achieve the highest possible efficiency and sustainable plant transparency and maintain their long-term competitiveness. The building blocks of the concept can also be integrated independently of each other, in order to take individual steps towards the future.



30 % Reduce operating costs by replacing existing systems with efficient blower and compressor technology.

AERaudit

Recognise savings potential



Worksheet DWA-A216

With this worksheet, the German Association for Water, Wastewater and Waste (Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall e. V.) has created a uniform method for tapping existing energy potentials in wastewater plants.

Load operation in wastewater treatment plants is subject to considerable fluctuations. The recording and evaluation of the operating data of a blower station with AERaudit provides binding results on the utilisation and efficiency of the plant. In this way potential savings are identified.

Work more energy efficiently, remain competitive

Wastewater treatment plants are usually the largest energy consumers in municipalities. As municipalities have to be conscious in their use of public funds, it is particularly important for them to exploit savings potential. But also for industrial wastewater treatment plants, the reduction of energy costs is an important element of competitiveness. The biological treatment stage accounts for 60 to 80% of the total energy demand of a wastewater treatment plant. If you want to save money, this is where you start. The basis for a process- and energy-efficient wastewater treatment plant is the analysis of the existing situation and the evaluation of the current operating data.

In 3 Steps to economical plant configuration

1. On-site measurement

The AERZEN service team brings transparency to the key figures of your blower station. With a mobile measuring station, all relevant data of your process air generation and load curves are recorded: volume flow, system pressure, temperature and rating. This is done over a longer period of time, in order to take different load profiles into account.

2. Analysis

The recorded data are carefully and extensively evaluated and each low and peak load is assessed. Based on the results, AERZEN develops tailor-made concepts which are as efficient as possible for you.

3. Report

All data of your blower station are displayed in detail and transparently. We will also show you your Performance³ solution, i.e. the optimised adaptation of the blower capacity to individual load fluctuations with the optimum machine configuration. This illustrates how great the potential for saving energy or CO₂ is and what amortisation times can be achieved.



Savings potential

Benefit from energy saving potentials of 30% on average and amortisation times of less than two years.

Performance³

Using technology efficiently



Every **AERZEN** technology has its advantages. The best solution emerges through individual analysis and design.

The aeration of wastewater treatment tanks is energy-intensive, because it has to cope with the constant fluctuations in the load profile at all times. Only rarely do the machines run at the operating point where they work efficiently and in a resourcesaving manner. Performance3 ensures optimum utilisation of the machine park.

Adaptation through diversity

Up to now, mainly blowers of one size have been used. However, the solution lies in the individual design. This can be a mix of different sizes of one technology, or a mix of two or three technologies that work seamlessly together. Of course there are also load curves where the use of only one technology and one size is most efficient. In principle, however, the individual load profiles of each system must be tailored to the specific needs of the customer. Each blower technology supplies a specific load range with the ideal efficiency. Thus, a load curve-oriented machine park ensures better adaptation to the requirement profile and saves considerable energy.

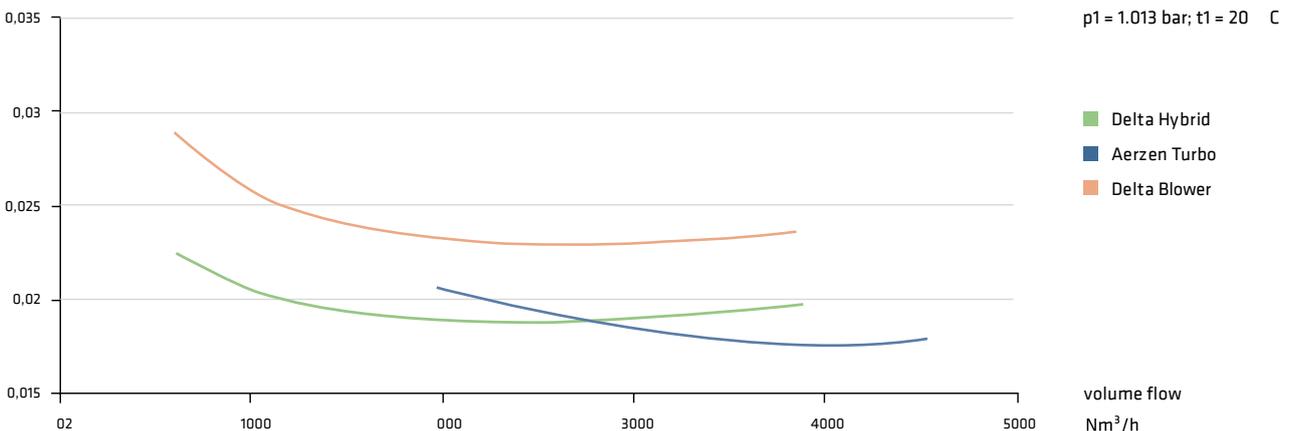
Three machines for more performance

AERZEN offers three different technologies for the aeration of wastewater treatment tanks, which serve different load ranges. The concept is based on the positive displacement blower Delta Blower, the rotary lobe compressor Delta Hybrid and the turbo blower Aerzen Turbo. The strengths of each type of blower compensate for the physical limitations of the other technologies. The turbo blower offers optimum energy efficiency at the design point. Delta Hybrid combines the advantages of the positive displacement blower with those of the screw compressor and delivers the best energy efficiency in the partial load range with a control range from 25 to 100 %. The positive displacement blower also impresses with its wide control range from 25 to 100 % and is characterised by its robust and simple design, which makes the Delta Blower the most cost-effective variant.

↓
Integrated approach: energy efficiency, control range, investment costs, service

A comparison of power requirements and volume flow range

Specific Wire-to-Process Power [kW/Nm³/h]



AERsmart

Control wastewater treatment plants according to demand



15% of the energy expenditure of the wastewater treatment plant are additionally saved with AERsmart.

Challenge:

tank aeration with strongly fluctuating wastewater loads



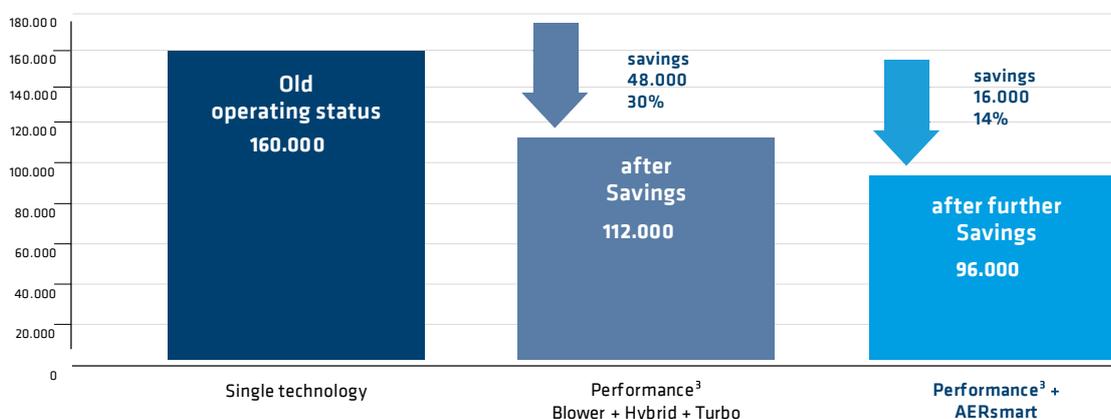
AERsmart is the intelligent control system for the device combination for ventilation of aeration tanks. This is because the machines can only react to load changes as efficiently as the control system allows them to. AERsmart controls every machine or machine combination up to the theoretical energy optimum.

Integrated control system for a new level of efficiency

With AERsmart, the interconnection control for blower, hybrid, turbo and other makes, the performance of the aeration machines can be perfected so that up to 15 % of the energy expenditure of the wastewater treatment plant can be saved. The software contains detailed information about the connected machines and uses it to calculate the optimum load distribution in combined operation. AERsmart also constantly accesses data from the machine park and makes it visible in the interface or control room, so that detailed real-time data on each individual machine can be called up at any time. The machines work comprehensibly in the optimal range of their respective efficiency. With AERsmart, you can achieve efficiency values that are very close to the theoretically possible ideal value. Because the software reacts fully automatically and in real time. In this way, it gets the best performance out of the machine park.

Savings potential in figures - shortest ROI times

Annual energy costs
Euro/year



Example of the German wastewater treatment plant with 326,000 population equivalents (PE)

AERprogress

Transparency through data



Only sustainable and intelligent energy management systems can ensure efficient wastewater treatment in the future.

Data-based services have the potential to support you in the operation of blowers and compressors to a completely different extent than before. The automated collection, evaluation and analysis of data provides you with tailored information, reports and recommendations for action.

Digital Transformation of blower technology

Digitisation opens up new opportunities for companies in many industries to optimise processes. In blower and compressor technology, the trend is moving more and more towards automated recording, evaluation and analysis of operating data. This approach makes it possible to identify potential for improvement and to optimise the operation of compressors in the long term.

The change to networked compressor and blower packages is worthwhile for operators in several respects. On the one hand, it is possible to meet the steadily increasing requirements for CO₂ reduction in accordance with the Paris Climate Agreement by significantly reducing energy consumption. This is accompanied by a noticeable reduction in energy costs through lower power consumption. On the other hand, operators benefit through greater process safety, transparency and reliability. Thanks to automated production data acquisition, compression processes no longer represent a „black box“ but can be systematically analysed for their efficiency. With modern, data-supported service and maintenance concepts, operators of compressor and blower packages can reduce the number of incidents and carry out maintenance work appropriate to the situation.

The AERZEN Group is committed to digital transformation and with AERprogress now offers its customers customised digital services for compressors and blowers.

Transparency by data – The AERZEN Digital Platform

Thanks to its cloud-based platform, AERZEN is paving the way into the digital future of compressor technology. The concept places the operator of the facility at the centre of the overall process. The targeted recording of relevant process data in the facilities makes it possible to ensure maximum transparency in the processes and to sustainably optimise the cost structure in machine life cycle cost management. In the course of digitalisation, customers benefit from cost savings through lower maintenance and personnel expenses, reduced energy costs, higher plant availability and a climate-friendly CO₂ balance. This platform can be used with both stationary and mobile devices via web browser.



IoT solutions in wastewater technology - opportunities for operators

The players in the wastewater industry agree: the networking of plants and digital system components on the basis of relevant data recorded in real time offers great potential for process optimisation. In this context, from the operator's point of view, a high degree of continuity of planning and operating processes through modern hardware and software should be aimed for.



For more information on these and other topics related to AERprogress please visit:
www.aerzendigital.com

AERZEN. Compression is the key to our success

The Aerzener Maschinenfabrik GmbH was founded in 1864. In 1868, we built Europe's first positive displacement blower. The first turbo blowers followed in 1911, the first screw compressors in 1943, and in 2010 the world's first rotary lobe compressor package. Innovations "made by AERZEN" keep driving forward the development of compressor technology. Today, AERZEN is among the world's longest established and most significant manufacturers of positive displacement blowers, rotary lobe compressors, screw compressors and turbo blowers. And among the undisputed market leaders in many areas of application.

In more than 50 subsidiaries around the world, more than 2,600 experienced employees are working hard on shaping the future of compression technology. Their technical competence, our international network of experts and the continual feedback from our customers are the basis of our success. AERZEN products and services set standards. In particular, with regard to reliability, stability of value and efficiency. Challenge us.



LET'S TALK

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