



AERZEN COM•PRESS

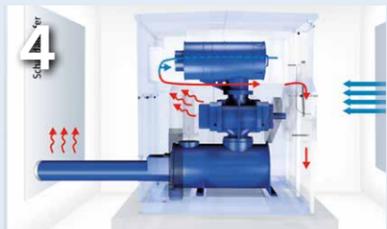
New production centre Supply of the Americas region



Free webinars AERZEN provides expertise



Designing the machine room It's the oxygen that counts



Dear Readers,



Axel Cichon,
Head of
Biogas Unit

I'm sure we all feel the same way: after nearly a year and a half of corona-induced renunciation of many things which had previously been taken for granted, and lots of limitations on our lives, we can hardly wait to return to pre-corona life. There is great hope that the vaccinations will bring the desired success. Will it be like it was before? We will see - but certainly we will do many things differently in the future. One thing is certain: home offices, webinars, as well as ever increasing digitalisation, will all be key components of our future working day. But we must not ignore the risks and dangers that go hand in hand with this. As you will see when you read our new COM•PRESS, we address these topics in a number of articles.

Despite all the digitalisation, on-site presence is still the be-all and end-all for a strong and successful customer relationship. AERZEN has therefore been very active on this front in recent months and has set up a new production centre in Mexico. We are now even closer to our customers in this region and can thus react more quickly to their wishes and requirements. You will find more details about this, and much more, in this issue.

We hope you will enjoy reading this issue and wish you a pleasant and hopefully carefree summer season.

Yours,

Axel Cichon



After the modernisation of the Bramsche wastewater treatment plant, each of the two aeration tanks is equipped with a machine group of Aerzen Turbo and Delta Hybrid. The AERsmart integrated control system manages the operation with regard to energy efficiency.

Now the air comes from the ground

Energy demand reduced by more than 50 percent: Bramsche wastewater treatment plant's new aeration system

With an investment of around one million euros, Stadtwerke Bramsche has fundamentally modernised its wastewater treatment plant. The main focus of the project, which received almost 50 percent public funding, was on upgrading the aeration tanks. The objectives: great cleaning capacity with improved energy efficiency. One of the triggers for this ambitious modernisation project was the expansion of production at a large food processing plant in Bramsche.

Fifty-fifty or 50 percent municipal, 50 percent industrial: this is how plant manager Frank Möller describes the composition of the wastewater from his wastewater treatment plant, which was built in 1962. The wastewater treatment plant in Bramsche is designed for 60,000 population equivalents (p.e.) and has a current capacity utilisation of 54,000 p.e. After two expansions in 1972 and 1988, fundamental modernisations have been on the to-do list for the past three years. In focus: new aeration technology for the two aeration tanks. They each have a ca-

capacity of 4300 cubic meters. Instead of introducing the atmospheric oxygen with surface rotors as before, fine-bubble aerators were planned at the bottom of the five-meter-deep tanks. This measure primarily pursues the twin goals of improving cleaning performance and energy efficiency. A combination of turbo blower and rotary lobe compressor from AERZEN now provides the necessary oxygen input for each tank. The two assemblies work together to supply the aeration system as required - with optimised efficiency and thus maximum energy efficiency.

Efficiency rates optimally combined

The combination of Aerzen Turbo and Delta Hybrid creates the basis to cover the complete operating range of the wastewater treatment plant according to the load curve with maximum efficiency. The AT150 0.85 turbo serves as the base load machine and covers about 60 to 70 percent of the complete operating time in an energy-efficient manner. In low-load phases, the turbo goes off-line and the oxygen supply of the activation is transferred over to Delta Hybrid D52 S rotary lobe compressor. In the high-load phase with correspondingly abundant COD values, both assemblies are again active.

AERsmart: the energy manager

This solution, which involves a hybrid and turbo blower combination, means that electrical energy is handled much more intelligently - and thus more efficiently. This architecture results in energy savings of more than 50 percent at the Bramsche wastewater treatment plant compared to the previous aeration of



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The combination of turbo blower and rotary lobe compressor creates the basis to cover the oxygen demand in the activation with maximum efficiency.

Plant manager Frank Möller operates the AERsmart on site. The new version of the integrated control system is even easier to operate thanks to its revised visualisation - the range of functions has also been extended.

Clean water: the discharge values at Bramsche have improved noticeably. Frank Möller is particularly pleased that the operation of his plant is also noticeably more energy-efficient after the modernisation.



> the two five-meter-deep aeration tanks with surface rotors. Markus Leidiger, Application Manager Wastewater at AERZEN, sees the success of the Bramsche project not only at the hardware level. "The energy savings of more than 50 percent were achieved by all project participants working together. A number like that doesn't just happen on its own. It involves everyone working well together." What is also required is control intelligence that regulates the network completely automatically. At Bramsche, AERsmart coordinates the two blower types in a load-optimised manner according to optimum

efficiency. As already briefly described, at Bramsche the AERZEN Turbo serves the basic oxygen load - which is the case during most of the nitrification period. In low-load phases, AERsmart intervenes, takes the turbo off the grid and switches at this operating point to the more efficient Delta Hybrid of type D52 S. Both assemblies operate together when the wastewater values require maximum oxygen due to a high load.

AERsmart takes over the regulation

To ensure that the air rising from the aerator plates at the bottom of the aeration tanks carries sufficient oxygen, AERsmart is in turn connected to the plant control system or the process control system of the Bramsche wastewater treatment plant. The plant continuously measures the ammonium and nitrate values for control purposes. The data flows into an Optec biology controller that takes into account all the interrelated degradation processes. Having this holistic view means that necessary oxygen demand can be calculated, which the AERsmart in turn converts into a

volume flow, and determines, according to the efficiency curves, which assembly best covers the demand energetically.

Using heat effectively?

The wastewater company gains further efficiency through heat recovery on the discharge side of the D52 S Hybrid packages. About 40 kW of thermal power can be used today to heat the heating return. "That's enough for the entire workshop building and is nominally about 80 percent of our total demand," says Frank Möller, Manager of the wastewater treatment plant. The aim of heat recovery is to use the thermal energy produced during the compression of gases as effectively as possible.

Optimal room ventilation

The system installed in Bramsche is characterised by coordinated ventilation of the machine building and thus ensures optimal operating conditions for the blowers. Because rising internal temperatures in the machine room also have an effect on efficiency - and thus on power consumption. A 15°C higher room temperature means an

energy loss of 5 %. Warm air has a lower density than colder air. Consequently, less oxygen per cubic meter arrives in the aeration. This in turn lengthens the switch-on times and means higher energy costs.

Conclusion

The Bramsche wastewater treatment plant shows how today, with available technology and the appropriate control intelligence, the biological degradation processes in wastewater can be supplied with oxygen in an efficient and, above all, energy-saving manner. All in all, we have succeeded in increasing the cleaning capacity with the help of a more intelligent process, while at the same time reducing electricity costs. "Investments were made in optimisations and not in concrete - in other words, the structural expansion of the tanks," says Markus Leidiger. The savings are significant. The demand for electrical energy fell from just under 140,000 kWh per month to around 60,000 kWh per month. In monetary terms, this represents an amount of over €195,000 per year, assuming a kilowatt hour price of 21 cents.

COMPACT

Three Aerzen Turbo machines in a special container

Mid-April 2021 was the time: the Trink- und Abwasserverband (TAV) Börde commissioned three turbo blowers with the AERsmart intelligent integrated control system at its Oschersleben wastewater treatment plant (Saxony-Anhalt/Germany). The special feature: the turbo trio is housed in a specially manufactured container, which is able to meet the demanding noise control requirements.

TAV Börde had invited tenders for the construction of a new digestion plant for energy production. The plans also called for new blowers for activation. Up to now, five Delta Blower GM 35 S, equipped with special hoods for outdoor installation, have been used at the Oschersleben wastewater treatment plant. The main criteria of the new tender were: high energy efficiency of the blowers, maximum noise level of 79 dB(A), outdoor installation close to the aeration tanks and an installation area limited in size on an existing foundation. The contract was finally awarded to Aerzen Turbo Europe GmbH for its technologically and economically convincing container solution.

Compact, efficient, sound-optimised: the container solution with three turbos convinced the Trink- und Abwasserverband Börde.



Highest energy efficiency with smallest footprint

AERZEN expands its general Turbo program

The Aerzen Turbo G5^{plus} series is one of the most compact and efficient turbos in its class. The new AT 60 size brings with it numerous innovations. In addition to increased system pressure, the new turbo also scores with an extended control range and an efficiency increase of up to 10 %.

The powerful turbo blowers of the Aerzen Turbo series are especially suitable for applications in municipal or industrial wastewater treatment plants and now, with 19 different models available, cover a volume flow range from 300 m³/h up to 16,200 m³/h and system pressures up to 1,000 mbar.

The latest edition to the turbo series, Aerzen Turbo AT 60-0.9S, is designed for volume flows from 900 - 2,640 m³/h and assembly capacities up to 50 kW. Thanks to a completely new motor design, the maximum differential pressure has also been optimised to 900 mbar.

The development team was able to achieve significant increases in efficiency. Improved energy efficiency has been made possible through an aerodynamic redesign of the turbo impeller and the spiral hous-

ing. Complex CFD analyses formed the basis for this.

For a turbomachine of this size, the new Turbo AT 60 also has a very high control range of 35 - 100 % and a constantly high overall efficiency over the entire control range thanks to the AERZEN permanent magnet motor, which already meets the future requirements of the IE5 classification. The dimensions of the revised power assembly are also impressive. The footprint of less than 1 m² facilitates transport through the narrowest of door openings. The footprint of the assembly alone takes up approximately 60% less space. Like all other models, the AT 60 features the innovative AERZEN air bearing with double coating for extended bearing life and the new multilevel frequency inverter technology for extended applications.



With the new AT 60 the Aerzen Turbo G5^{plus} series includes 19 different models with a volume flow range from 300 m³/h up to 16,200 m³/h.

Location in Mexico

New AERZEN production centre for the Americas region

At the AERZEN México site in Metepec in the Toluca metropolitan region, the AERZEN Group commissioned a new production centre in March 2021.

In our changing world, globalisation has reached its limits in many ways. Materials, components and machines must be available in all parts of the world with very short delivery times to meet customer needs. These requirements are changing faster and faster, following global trends, making it even more difficult for companies to respond from a central location within a reasonable timeframe. Against this backdrop, AERZEN has set the course for a new production centre in the Americas region. "We chose Mexico for this because the country has numerous trade agreements with over 40 countries and regions around the world, many of them in the Americas. This makes Mexico ideal for supplying the Americas region with products quickly and efficiently. Mexico has also established itself as a production location for many other important markets, including the USA," explains Friedrich Harten, Vice President AERZEN Americas. The new production centre, managed by industry

A view of the new AERZEN production centre for the Americas region



expert Omar Ramirez, will manufacture or assemble AERZEN standard products tailored to the needs of regional customers. Only components from local manufacturers that meet AERZEN's high quality standards will be used. The first products will be blower packages of the type Delta Blower in the versions GM 4 S to GM 150 S. In the next phase, rotary lobe compressors of the Delta Hybrid series will follow. "The product range will be expanded even further in the coming years," says Gabriel Ventosa. The General Manager of AERZEN México also points to the positive impact of regional manufacturing on the environment: "When components no longer have to be

transported long distances, our CO₂ footprint is significantly reduced. As a result, our machines also have a better environmental balance."

Under the leadership of Omar Ramirez (at right), a team from AERZEN México takes care of the production and assembly of regional products.



Web seminar offer will be expanded

AERZEN makes it possible: acquire the latest specialist know-how free of charge

Flexible, compact, practice-oriented: AERZEN web seminars provide you with expert knowledge about different sectors and industries. They have proved a great way of acquiring AERZEN specialist know-how during these times of contact restrictions.

After a successful start in 2020, with numerous participants signing-up, further online training courses with new and interesting topics have already taken place this year. In the second half of 2021 you can expect exciting lectures from different application areas. Our experts will take you on a digital journey through the AERZEN worlds of waste water, pneumatics and process gas. So please feel free to take advantage of this opportunity and register for the topics of your choice at www.aerzen.com/webinare.

45 minutes well spent

The web seminars each last for 45 minutes - a time investment that will be well worth your while: at a place of your choice, you will receive useful and precise information which will enhance your knowledge. Additional added value: questions can be asked at any time via the live chat option, and our experts will continue to answer questions after the event - and all this is completely free of charge.

AERZEN Web Seminars 2021	
Free for you to download*	Web seminar topics coming in the second half of 2021
Differences between blower and compressor technology in pneumatic conveying	System analysis of the Zillertal wastewater treatment plant
AERZEN RENTAL: tailor-made rental solutions 24/7	Individual product solutions for pneumatic conveying
System analysis of the Bramsche wastewater treatment plant	Operating principles of a wastewater treatment plant and what potential this technology has for plant operators and end users
	The Nereda wastewater treatment process
	The AERZEN safety concept: 100 % product purity, safety and reliability
	Easy and smart retrofit for blower technology. How to turn an Industry 1.0 plant into an Industry 4.0 plant
	Individual and reliable solutions for process gases

*www.aerzen.com/webinare

Several new AERZEN web seminars are planned for the second half of the year. Please sign up!

Free recordings

What if you are interested in one of our web seminars, but cannot participate live? No problem! You can also view recordings

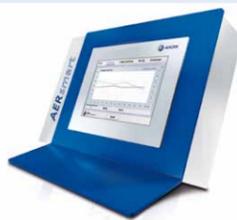
of past events free of charge - our know-how is available to you on demand at any time!

The new AERsmart: able to handle variable pressures

AERZEN has further developed the AERsmart: The control system for the composite operation of different compressed air assemblies offers new features and improved visualisation. All in all, this opens up new areas of application.

The AERsmart can now also control a machine network in an energy-efficient manner when variable pressures are present in the application. For this purpose it is sufficient to define the minimum as well as the average pressure. AERsmart, then, calculates the maps of the connected machines in this pressure window using the current target pressure. If this changes by more than 20 mbar compared with the map pressure, AERsmart simply recalculates the map of the assemblies. This function is also effective when the oxygen input is controlled by volume flow. The intelligent control unit is, therefore, able to use the energetic performance of positive displacement blowers (Delta Blower), rotary lobe compressors (Delta Hybrid) or turbo blowers (Aerzen Turbo) in the best possible way even under changed operating conditions. The end result is energy efficiency close to the theoretical optimum.

New areas of application for AERsmart are, for example, SBR plants. Behind a "Sequencing-Batch-Reactor" are small wastewater treatment plants, which allow a high purification capacity in a small space. Biological purification and secondary sedimentation are combined in one chamber. Batch operation results in different pressures. With a view to operability AERZEN has also revised the AERsmart software. The new control system can, now, be conveniently parameterised directly on site using a touch panel. The visualisation has a new design. It is also designed for working ergonomics and opens the way to combining maximum energy efficiency and comfort.



AERZEN's energy-efficient composite control system AERsmart opens up new areas of application.

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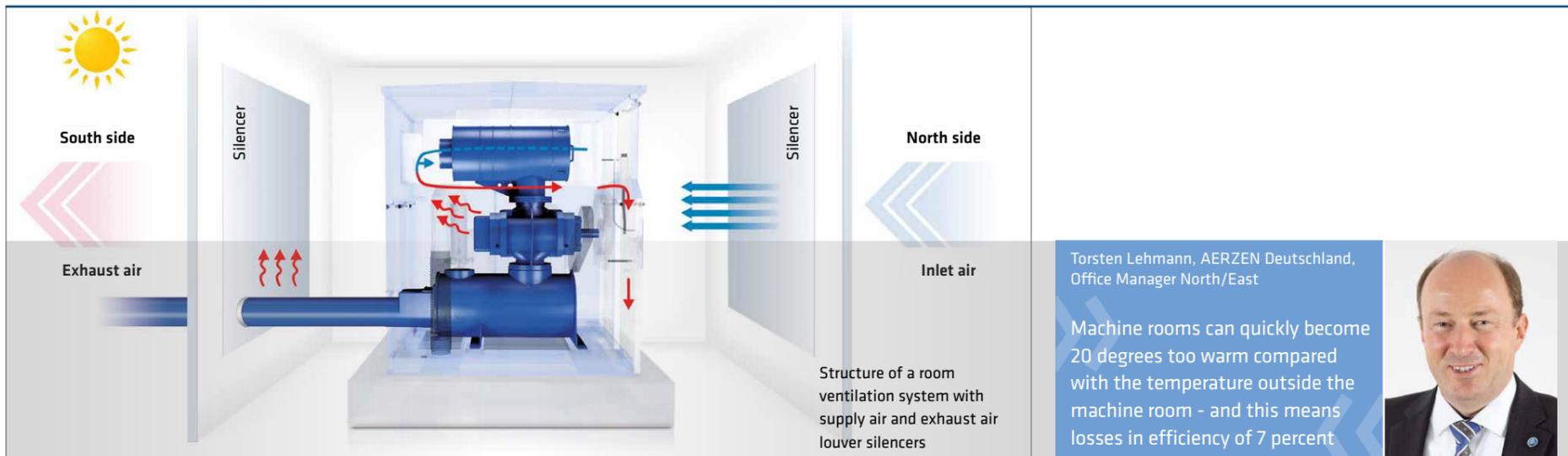
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Thermodynamics in the machine room: so that the blowers do not run out of air

It's the oxygen that counts

Aeration openings which have become too narrow, blocked aeration grids, excessive internal temperatures and clogged filter mats are four examples of situations in machine rooms that drive up energy consumption in wastewater treatment plants. They are the main causes of poor efficiency of the compressed air generators which bring the oxygen into the aeration tanks. The good news: all four can be eliminated with little effort and a manageable financial investment.

Every reduction in efficiency, even if it's only by a few percentage points, can add up at the end of the day to a significant loss in overall energy efficiency and this means, higher electricity costs," says Torsten Lehmann. The Office Manager for Northern and Eastern Germany notes that correct ventilation of machine installation rooms often goes unnoticed at wastewater treatment plants. "After all, aeration of

aeration tanks is not directly about the air volume conveyed, but about the necessary amount of oxygen being brought into the wastewater for effective nitrification. This oxygen is exactly what I want to have. It is the most important thing when we talk about blower technology in "compressed air aeration". Therefore, the industry-standard phrase "compressed air aeration" is actually not correct, as it is not about compressed air but about oxygen input." The key points in the design are above all a sufficient volume flow, the effective limitation of the temperature in the installation room and also the orientation of the building according to the compass direction. Also, alternative suction of the machines via pipe, i.e. directly from the outside, can bring more disadvantages than advantages, as the intake noise is almost directly shifted to the outside.

Typically 15 percent of energy used is wasted in a poorly designed machine room. The reasons for this are thermal losses due to the heat radiation of the assemblies, mechanical losses due to negative pressure created in the machine installation room and intake losses. But that is by no means the end of the story - particularly if mistakes are made in ventilation.

Supply air versus sound

It is completely irrelevant where aeration blowers get their intake air from: it is important that there is enough of it at the right temperature. This statement, which appears simple at first glance, reveals sophisticated cross-correlations and dependencies in practice. If a rotary lobe compressor (screw blower) such as a Delta Hybrid from AERZEN provides air in the aeration tanks, then this is associated with emissions in terms of sound and temperature. If the design of the machine house were to focus solely on making the outer shell as soundproof as possible, the Delta Hybrid could run out of steam. Background: too little outside air flows into the interior because of the sound insulation. This de-

ciency causes the positive displacement rotary lobe compressors (screw blowers) to create a negative pressure inside the building. This can go so far that doors can no longer be opened. From a process engineering point of view, the decreasing air pressure means that the assemblies have to work harder in order to press the necessary amount of oxygen into the aeration. The machines have to overcome more differential pressure because the negative intake pressure increases the total pressure.

The warmer the installation room, the less oxygen is required

Inadequately dimensioned supply and exhaust air ducts give further impetus to another efficiency killer: temperature. What is true for air pressure is true in reverse for temperature. The warmer it gets in the machine house, the thinner the air becomes due to the physical gas laws. It follows that the warmer the air, the fewer oxygen molecules there are per cubic metre. This correlation has a major effect on the biology in the aeration, as with increasing temperature less oxygen is produced. However, the O₂ index is decisive for the aerobic nitrification process. The inference: here as well, the assembly must perform better or run longer in order to get the required oxygen into the tank. The consequence of this is that the demand for energy increases. For example, a temperature increase of 3 Kelvin reduces efficiency by about one percent. "Machine rooms can quickly become 20 degrees too warm compared with the temperature outside the machine room - and this means losses in efficiency of 7 percent," explains Torsten Lehmann. Therefore, for example, heat-radiating frequency inverters do not belong in the installation room of aeration blowers at wastewater treatment plants, but should be in a separate installation room for electrical equipment!

Anyone who thinks that they can simply open a door or a window in a machine

house to adjust the inside temperature during day-to-day operations has misunderstood the situation. With the goal in mind that a system can only work most effectively if all aspects that affect it are taken into account, AERZEN has developed splitter silencers for the supply and exhaust air. The units initially provide an effective insertion loss of 30 db. The louvers inside are designed to effectively reduce sound and create little flow resistance so that the assemblies in the machine house do not draw negative pressure. The supply air louver is completed by a weather protection grid, which also prevents birds and leaves from getting into the intake duct.

Effective exhaust air takes out temperature

The exhaust air louver is to be positioned in the machine building, in relation to the supply air louver, "so that we obtain as diagonal a flow machine pattern as possible in the interior," explains Torsten Lehmann. The main task of the exhaust air louver is to conduct excess heat to the outside. The same applies to the exhaust air as to the supply air in terms of noise emissions: the heat has to go out, the sound stays in. Hence, AERZEN equips exhaust air louvers with silencer elements and uses exhaust air fans to ensure that the warm air leaves the room quickly. Torsten Lehmann: "It makes sense to mount the exhaust fans at ceiling height, where the air is warmest." Particularly with regard to temperature distribution, it is important that the machine house is positioned appropriately according to the compass direction. "The supply air is ideally in the north, the exhaust air in the south," according to Torsten Lehmann, who adds: "The pressure lines in the room should also be insulated. This will make the room noticeably cooler." Another tip: it is not sufficient to blow out clogged filters with compressed air. "Added filters quickly provide pressure resistance of 25 millibars or more." In the case of a typical wastewater treatment plant with four blowers, each with 37 kW motor power, 6,900 operating hours per year and at 20 cents per kilowatt hour, the clogged intake filter alone would demand five percent more power from the blowers - that's more than 10,000 euros a year.

Questions, Suggestions, Ideas?

We are looking forward to all your queries, comments and suggestions on our customer journal, and we are at your disposal for further information on AERZEN products and services. Give us a visit on our website:

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