



AERZEN COM·PRESS

AERZEN Management

Focused on the future



Biogas project with AERZEN

Security of energy supply counts



Performance³ technology mix

Efficiency in the aeration tank



Björn Thümler (Minister of Science and Culture, Lower Saxony), Prof. Dr. Volker Epping (President of Leibniz University Hanover), Stephan Weil (Minister President of Lower Saxony), Hauke Jagau (President of the Hanover Region), Dr. Christian Grahl (Mayor of Garbsen) and Prof. Dr.-Ing. Jörg Wallaschek (Dean of the Faculty of Mechanical Engineering) gave the starting signal for the first run.

The test air supply system of AERZEN meets the highest requirements for controllability, measuring accuracy, flow quality, repeatability and constancy.

Research for energy system transformation

Highly complex, extremely flexible test air supply system from AERZEN for energy research

AERZEN has built a test air supply system for the new research building "Dynamics of Energy Conversion" at the Leibniz University of Hanover, which is unrivalled in terms of precision, dynamics, complexity and size, and places the energy technology research facility in Garbsen among the top 10 worldwide.

industrial prototypes with many hundreds of megawatts. The total investment volume for the Mechanical Engineering Campus amounted to €175 million.

Energy technology research at a new level

The heart of the building, on the newly opened Mechanical Engineering Campus in Garbsen, is the large compressor station made by Aerzener Maschinenfabrik GmbH. The plant supplies the individual test benches with compressed air and meets the highest requirements for controllability, measuring accuracy, flow quality, repeatability and stability. "Research into complex flow phenomena in high-performance turbomachines requires technologies that can precisely provide and repeat inlet and outlet conditions and mass flows. This is the only way to achieve the flow speeds and stage pressure ratios found in modern turbomachines as realistically as possible," explains Dr. Hans-Ulrich Fleige, Head of R&D at AERZEN, and adds: "With our test air supply

Dear Readers,



Stephan Brand,
Vice President
Marketing/
Director Turbo
Business

We started work on this edition of COM.PRESS some weeks ago - at that time our world was still in order! Unfortunately, everything looks rather different today. The coronavirus epidemic now determines our everyday life, our economic situation, our coexistence. And the situation is changing by the day, almost by the hour.

At this difficult time for all of us, we would like to state very clearly: You can count on us! We are at your side! Aerzener

Maschinenfabrik has been a reliable partner for over 150 years, and this will remain the case even in times of crisis. Our supply chains are currently intact and we continue to be prepared for service calls.

We had been wondering whether or not we should send out this edition of COM.PRESS at all. After careful consideration, we have decided that it is important to maintain contact and keep communicating even in the most challenging of times. We therefore hope that our newsletter will provide something positive for you to read during this turbulent period.

And together we will survive this and any future crises!

Stay healthy!

Sincerely yours

Renewable energy is the future and good for the climate but creates special challenges for conventional power plants. This is because sun and wind are not always available, and fluctuate according to weather conditions, time of day and season. The consequence is peak loads and undersupply. However, existing power generation plants are not designed for such fluctuations. In order to ensure security of supply and system stability in the future, power plants must operate more dynamically and guarantee fast start-up and efficient partial load behaviour.

Solutions for energy system transformation

But how do power plant components behave under changing loads? The Institute

of Turbomachinery and Fluid Dynamics (TFD) at the Leibniz University of Hanover (LUH) deals with questions like this. Since September 2019, one of the world's most modern research facilities is available to scientists for this purpose. The new research building "Dynamics of Energy Conversion" (DEW) of the research association of the same name is home to approximately 2000 square meters of test benches for experiments on turbomachinery and power plant components such as motors, generators, turbines, diffusers and compressors, and enables tests of up to 6 MW. Therefore, the facility closes the gap between typical university laboratory experiments, which generally have a power output of only a few hundred kilowatts, and the testing of



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One of the two parallel connected VRa 736 S screw compressors



View into the instrument air supply



With the test air supply system made by AERZEN, the test benches (here air turbine) can be operated dynamically with almost freely selectable load ramps.

Maximum precision and flexibility

The test air supply system (total dimensions: 82 x 15 x 9 m.) comprises a compressor station with a multi-stage compression, a cascaded bypass for fine control of the mass flow rate, a central mass flow rate measuring section, an air distribution system to and from the test benches including piping, valves, silencers, coolers, settling chambers and supporting steel structure as well as a sophisticated control system for selecting different operating modes, types, configurations and test bench inlet conditions.

The test benches work with expansion ratios between 1 and 6. The inlet pressure ranges from 1 to 8 bar (abs) with a maximum mass flow rate of 25 kg/s (90000 kg/h). Under all conditions, the inlet temperatures can be controlled between 60 and 200°C. The system can be operated in both open and closed loop modes, is designed for steady as well as transient ($\pm 30\%$ of the maximum volume flow rate per minute) operation and can be either pressure or mass flow controlled. Volume flow rate, temperature and pressure are freely definable and can be regulated independently. To achieve the desired flexibility and dynamics, and in particular to meet the requirement for extreme accuracy, the AERZEN engineers were driven to deliver technical high performance. For example, the deviation of the volume flow is just 0.015 m³/s - and that with an effective maximum value of up to 80000 m³/s. The average static pressure can be set to an accuracy of 0.5 millibar and the average static temperature fluctuates by a maximum of 0.3 K, to give just a few examples.

Make 5 out of 1

The central mass flow rate measurement unit is also unparalleled, with a total uncertainty of only 0.55 percent. "The control requirements were higher than the inaccuracies of normal measurement technology," emphasizes Jens-Olaf Wittenberg, Project Manager Supply Process Gas at AERZEN. The test air from the supply line in DN 700 is distributed via a diffuser to five parallel ultrasonic gas meters (4 x DN 500 and 1 x DN 200). The number of active lines depends on the flow rate and is automatically regulated by the control system, so that all gas meters are operated with the lowest measurement uncertainty. In order

to achieve an even distribution of the flow to the individual measuring sections and uniform velocity profiles at the gas meters, flow rectifiers were provided upstream of the individual gas meters and the diffuser including the upstream pipe bends was flow simulated. In addition, vortex generators are installed at the diffuser inlet and special components are fitted to reduce the outlet area. Splitting of the mass flow rate measurement became necessary due to the size of the project. "There was simply no transportable gas meter available in DN 700 for the in-situ calibration which was required by the TFD," says Jens-Olaf Wittenberg.

Multi-stage compression

The thermodynamic treatment of the test air is carried out in the compressor station (total size: 27 x 15 x 9 m.). As a first stage, this uses two parallel-connected Roots blowers of type GM 20.20, each with an inlet volume flow between 9600 and 48600 m³/h and a maximum pressure difference of 0.8 bar (inlet pressures between 0.2 and 3.5 bar, max. outlet pressure: 4.3 bar). The second stage consists of two parallel screw compressors type VRa 736 S with an inlet volume flow between 6900 and 21600 m³/h and a maximum pressure difference of 10 bar (inlet pressures between 0.2 and 3.5 bar, max. outlet pressure: 9 bar). All four machines are driven by separate electric motors (690 V) with speed control and can be operated at variable speeds in single or tandem operation. "Due to its modular design, the compressor station is extremely flexible and has an extraordinarily large control range," Dr. Hans-Ulrich Fleige makes clear, and adds: "Low pressures are taken over by the positive displacement blowers, for medium pressures the screw compressors start up and high pressures can be achieved with a two-stage operation of the blower and screw compressor."

AERZEN has paid special attention to sound insulation. All four compressors have two reactive silencers; the positive displacement blowers are additionally equipped with two lambda quarter resonators. This largely reduces pulsations and their effects. "The large control range results in an enormously wide frequency spectrum. It was a bit of a challenge to get a grip on the sound," admits

Dr. Hans-Ulrich Fleige. In order to protect the surrounding research buildings, where, among other things, highly sensitive acceleration and vibration tests are carried out, the machine foundation was completely decoupled from that of the compressor room.

Perfection down to the smallest detail

A special feature of the system is that it was completely integrated into an existing building. The challenge was to deal with the limited space available and the already fixed statics of the building. For example, around 190 tons of steel beams were used to dissipate the resulting forces. In addition, virtually all components and parts of the system were specially designed and manufactured - starting with the mass flow measuring section, the diffuser and the settling chambers in front of individual test cells. Even the pipelines - a good 500 metres in total (from DN 200 to DN 1000) - and most of the pipe bends are anything but standard. Elaborate flow simulations and improved corrosion protection thanks to galvanisation are just a few of the points that make the difference here.

Further step towards application orientation

The two-year construction phase was preceded by a multi-year planning phase by the engineers from AERZEN and Hanover. Due to the demanding requirements regarding stability and reproducibility of the test air, a fully functional scaled model with a power of 300 kW was built for pre-testing the measurement and control technology. "We have many years of experience in the field of process gas technology, but this project was something special - and not just because of its size and complexity," says Jens-Olaf Wittenberg. "For the first time, we were able to demonstrate our plant engineering competence in the field of special purpose machines, and that right away with a project of this magnitude. After all, this is the largest domestic order in the history of our company." Lower Saxony's Minister President Stephan Weil successfully started the first run at the campus inauguration in September 2019. Final commissioning will follow in 2020.

> system, the test benches can be operated dynamically with almost freely selectable load ramps and investigations can be carried out under high load gradients over wide operating ranges. To generate aerodynamic similarity between reality and model test, both Mach and Reynolds number can be adjusted - independently of each other. The actual operation of existing and future turbomachines can therefore be optimally modelled." Thanks to the new possibilities, the TFD and the energy technology research at Leibniz University are among the top 10 leading research centres in the world in this field.

Successful premiere: blower specialist as plant manufacturer

For over 150 years the name AERZEN stands for innovative, efficient compressor technology that is precisely tailored to the respective process. For Garbsen, the application specialists not only supplied the blower and compressor packages, but also appeared for the first time as plant engineers and were responsible for the design, planning, manufacture, assembly and commissioning of the entire plant, including the measurement and control technology. The business unit Special Purpose Machine Construction (Process Gases) was in charge of the development and construction in close cooperation with LUH and the TFD. They were supported by a multitude of external and internal partners, including Emmerthaler Apparatebau, Kratzer Automation, AERZEN After Sales Service and the AERZEN R&D Group.

Jens-Olaf Wittenberg,
Project Manager Supply Process Gas AERZEN



We have many years of experience in the field of process gas technology, but this project was something special.

Dr. Hans-Ulrich Fleige,
Head of R&D AERZEN



The actual operation of existing and future turbomachines can therefore be optimally modelled.

Klaus-Hasso Heller moves to the supervisory board

AERZEN Management focuses on the future

A change in management is taking place at Aerzener Maschinenfabrik GmbH. CEO Klaus-Hasso Heller will be taking over the chairmanship of the AERZEN Supervisory Board in May 2020. Klaus-Hasso Heller's successor as Commercial Managing Director of Aerzener Maschinenfabrik GmbH will be Dr. Carsten Bruns.



With the move of CEO Klaus-Hasso Heller (3rd from left) to the AERZEN Supervisory Board (from left) Björn Irtel, Klaus Peter Glöckner and Dr. Carsten Bruns form the management of Aerzener Maschinenfabrik GmbH.

In 2000, Klaus-Hasso Heller took over the management of the company from his father Hasso Heller, which at that time had a turnover of around €110 million. The company, under Klaus-Hasso Heller, has grown to over 50 subsidiaries worldwide (there were 13 in 2000) and a turnover of €450 million. Since 2000, the number of employees in the group has risen from 1,225 to around 2,500 today. "AERZEN has a solid base because we have achieved a great performance through the hard work of all executives and employees," says the graduate industrial engineer as he looks back on his years as CEO. I have therefore made the decision to concentrate fully on strategic corporate development and future orientation as Chairman of the Supervisory Board in the future and thus to shape the direction over the next few

years of our family-owned company," explains Klaus-Hasso Heller in respect of the forthcoming change. The objective of the shareholders is to maintain the company as a family-owned enterprise.

The individuals who will be responsible for the management of Aerzener Maschinenfabrik GmbH in future are Klaus Peter Glöckner (Managing Director Sales and future Chairman of the Management Board) and Björn Irtel (Managing Director Operations) - both are long-serving and very experienced senior executives of the company. The third member of the trio is new Commercial Managing Director, Dr. Carsten Bruns, who will be responsible for Finance, IT, Personnel, Compliance and Legal Affairs. The business graduate had been responsible for these areas for the past 13 years as a member of the Execu-

tive Board of the family-run diagnostics group R-Biopharm AG. Dr. Carsten Bruns' other professional positions include RWE AG, the family business CLAAS KGaA mbH and Deutsche Telekom AG. The 49 year old was also active in the commercial sector at each of these companies, with a focus on M & A (Mergers & Acquisitions).

Klaus Peter Glöckner will be responsible for Sales, Marketing and After-Sales in future, while Björn Irtel, as Managing Director Operations, will continue to head the Production, Technology, Quality, Purchasing and Process Gas divisions.

"I am pleased about this constellation, because with them we have an extremely powerful team, and they will complement each other very well," says Klaus-Hasso Heller about the new management of Aerzener Maschinenfabrik. ○

Aerzen Digital Systems: new data-based services provider

AERZEN is expanding its service portfolio with a new digital offering: Aerzen Digital Systems GmbH develops solutions in the field of digitalisation



Lutz Geerken (l.) and Ricardo Wehrbein are Managing Directors Aerzen Digital Systems.

that make AERZEN standard blowers and compressors even more efficient, reliable and durable. The cloud will provide the customer with a comprehensive insight into the status of his machines. Depending on the service booked, preventive maintenance, for example, should also be made possible on the basis of appropriate analyses. Such data-based services will be designed and implemented by Aerzen Digital Systems in a cost-effective and risk-optimised way. The market launch of the digital service for the AERZEN machine park management is planned for May 2020.

New Appointment in Product Management

Thomas Kuhn was appointed to the role of AERZEN Product Manager for the oil-injected screw compressors, accessories and services division on 1 February 2020. In addition to being responsible for VMX compressors, his new area of responsibility includes the higher-level AERZEN AERsmart control system, accessories (including air-to-air and water-to-air aftercoolers) and the AERaudit service.



Thomas Kuhn

AERZEN Deutschland started successfully

Full focus on the German market

Since January 1st, 2020 AERZEN Deutschland GmbH & Co KG is responsible for all sales and after-sales service in Germany. The new AERZEN subsidiary has around 90 employees and is managed by Dirk Koob, Chief Executive Officer, and Sascha Adam, Chief Financial Officer.

The establishment of AERZEN Deutschland is a logical consequence of the global AERZEN strategy: while Aerzener Maschinenfabrik is the central production location, the approximately 50 subsidiaries worldwide take care of sales in their respective markets. This constellation applies now also for Germany until now, by far the largest sales market for the AERZEN Group. The responsibilities for production and sales in Germany were separated. "We are thus clearly responsible

for the costs and results of our activities. Customers will benefit from faster decisions and more flexible reactions because we can concentrate fully on the German market," emphasises Sascha Adam.

AERZEN Deutschland is responsible for the sales of the complete product portfolio of the AERZEN Group in Germany. In addition to the headquarters in Aerzen the company has six sales offices (see map), which provide customers in their regions with all-round care packages. „We supply

everything from a single source, and every customer has a personal contact person in sales," emphasises Dirk Koob.

The after-sales service of AERZEN Deutschland includes 25 service technicians for maintenance, repair and commissioning as well as 15 colleagues in the area of maintenance contracts and spare parts business. Nearly all service technicians act as support point fitters, i.e. they are based locally in the regions. The aim is to shorten journey times and costs and strengthen

customer loyalty. "The motto 'one face to the customer' will also apply to after-sales service," emphasises Dirk Koob and resumes: "We want to strengthen customer loyalty over the long term. It is our aim to give competent advice, to prepare project- and enquiry-compliant offers, to offer professional order processing as well as high quality after-sales service, and to pass on market trends innovatively and creatively to the product development colleagues with the involvement of the customer." ○

AERZEN Deutschland offers competent consulting and fast service nationwide.

Sales office North, Walsrode 05161 48128 0 vbnord@aerzen.com	AERZEN Deutschland, Aerzen 05154 81 4000 deutschland@aerzen.com
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Sales office Central, Kahl 06188 9104 0 vbrmitte@aerzen.com	● Service points

Sascha Adam,
Chief Financial Officer
AERZEN Deutschland

Personal contact, precise guidance and short reaction times are part of our understanding of performance.

Dirk Koob,
Chief Executive Officer
AERZEN Deutschland

We offer everything from a single source because of the close connection of sales and service.



Screw compressors from AERZEN compress the biomethane for feeding into the local gas network.



Christoph Bente, responsible for biogas feed-in plants at EWE Netz: "What is important to us with this turnkey plant construction is that the technology used operates with a high degree of availability and with few disruptions."

Screw compressors from AERZEN feed biomethane into the gas network

Security of energy supply is what counts

Whereas smaller power plants, solar farms or wind farms can be shut down in a relatively simple manner or completely taken off the network, this is much more difficult with biogas plants. Biological processes cannot simply be stopped, which is why maximum reliability and redundancy are required for the technical equipment.

Processing biogas into biomethane and feeding it into the natural gas network: this represents an effective way of storing the regeneratively produced energy source. In contrast with the direct generation of electricity from biogas on site in a block-type thermal power station, however, the producer must process the biogas into biomethane before it can be fed into the natural gas network. The local natural gas network operator is responsible for the feed-in with special equipment. One functional area here is pre-compression, for which EWE NETZ GmbH uses screw compressors from AERZEN. This process is divided into two pressure stages. In the first pressure stage assemblies from AERZEN are used, and for the high pressure range reciprocating compressors from Neumann and Esser are used.

Ensuring gas quality

As much as 700 standard cubic metres of biomethane from a biogas treatment

plant in the district of Cloppenburg reach the EWE NETZ GmbH feed-in station every hour at a transfer pressure of around 100 millibar. The company is responsible for the biomethane qualities handed over, the necessary pressure adjustment and the adjustment of the calorific value for the safe feed-in of biomethane into the natural gas network. The guidelines of the DVGW (German Technical and Scientific Association for Gas and Water) must be observed. The rules and regulations specify, among other things, the methane content transferred, the limit values for carbon dioxide and hydrogen sulphide, and the water dew point. If the transferred biomethane remains within the limits, the pressure is increased from about 100 millibar to five bar by means of screw compressors from AERZEN. The local network itself is operated at a pressure of between 0.8 and 0.9 bar and supplies the connected companies and households with natural gas or injected biomethane. Christoph Bente, who is responsible for biogas feed-in plants at

EWE NETZ: "The German legislative authority stipulates that when we feed biomethane into the natural gas network, we must achieve a technical availability of the feed-in plant of at least 96 percent." For this reason, EWE NETZ GmbH maintains a redundant operation of two identical VMX 110 assemblies from AERZEN. Each of these delivers a capacity of 700 standard cubic metres per hour. "If one machine malfunctions, the second machine automatically takes over."

Approved system solution

Compression of biomethane, biogas and other mixed hydrocarbon gases: this is exactly what the oil-lubricated direct-drive VMX screw compressor packages are designed for. In five sizes, the series covers volume flows of up to 2500 standard cubic metres per hour in continuous operation and delivers an overpressure of up to 16 bar. For use in the vicinity of biogas plants, the assemblies are certified in accordance with the ATEX directive 2014/34/EU and the machinery directive. The VMX series meets the latest safety standards of EN 1012-3 as well as the DVGW regulations for use in Germany.

The screw compressors are installed in the feed-in plant in the district of Cloppenburg in a compact concrete building, which is located right next to the biogas process-

ing plant of the biogas plants. The unit is designed as a ready-to-connect system that can be put into operation quickly.

When the biomethane is fed into the natural gas network, it must be observed in which network it is fed. The local distribution network works with a maximum of 1 bar, the high pressure network with up to 70 bar. As long as intake capacities are available within the local distribution network, the AERZEN screw compressors feed in. If a bottleneck occurs, the feed into the high-pressure network is automatically activated. Then reciprocating compressors from Neumann and Esser take over. The AERZEN screw compressors remain in operation and generate the primary pressure for the high-pressure compressors. This design means that the reciprocating compressors are only used for energy reasons when the local network is no longer absorbing anything and 70 bar feed pressure is required.

Conclusion

The injection of biomethane into the existing natural gas network improves the storage possibilities of biogas and the use of the generated energy independent of the location of the biogas plant. Moreover, a time-related decoupling of generation and use is possible. With a total length of 530,000 kilometres, the infrastructure of the natural gas network with the associated caverns is considered well developed in Germany. Complete system solutions for the compression and injection of gas make it easier for network operators to develop new locations. ○

The feed station is mobile and space-savily installed in a concrete container directly next to the gas treatment unit.



Each assembly delivers a flow rate of 700 standard cubic metres per hour - and is certified for this application in accordance with ATEX.



AERZEN delivered for EWE a ready-to-install complete solution including piping and connection to the control level.



Certificate for effective risk management

Food Safety: AERZEN has the ISO 22000

The management system for food safety ISO 22000 unifies the standards landscape at international level. AERZEN is one of the first companies in the compressed air industry worldwide to comply with ISO 22000 - and, thus, underlines the importance of product safety, especially in the food industry. The certificate is valid for all blowers and compressors built by AERZEN at its headquarters in Lower Saxony.

Process air solutions from AERZEN are used in many ways in the food and feed industry. The confidence of plant manufacturers and manufacturing final customers is correspondingly high. With ISO 22000 certification, the technology leader is taking process safety to a new level in numerous food-related applications, such as pneumatic conveying of powders and granulates or the loosening of bulk materials.

Especially in the food industry, it is crucial to be able to rely on process air

that is really free from impurities such as oil, abrasion or insulating material. For a good reason, AERZEN has developed silencers without absorption materials for example and equips them with a special spark arrester in view of explosion protection.

Structured identification of potential hazards

With the uniform framework for action, risks in the direct and indirect environment of the food production chain can be safely



AERZEN products are often used in the food and animal feed industry.

identified. The structured identification of potential hazards, then, forms the basis for effective risk management. As already successfully practiced in other management standards, the continuous improvement process (CIP) is an essential tool for sustainable process improvements in ISO 22000.

For AERZEN the certification according to ISO 22000 represents in this context a further international component for product safety.

Complete solutions for rent - for example for wastewater treatment

Aerzen Rental contributes to production safety

Aerzen Rental offers complete solutions for short and medium term rental of AERZEN machines for oil-free compression of air and neutral gases. Customers benefit from this when things have to be done quickly.

Aerzen Rental is able to mobilise technological, logistic and personnel resources around the clock in order to guarantee production continuity for customers. Now, the customer of a water treatment company, which had worked with Aerzen Rental previously, has benefited from this.

A food producer had engaged the renowned water treatment company to treat and purify the waste water from the production of fruit juices. The construction of the necessary sewage plant had been delayed - but to postpone the production of the juices for four months would have meant loss-

es of €200,000 per week for the food company.

Temporary treatment facility in a sludge storage tank

Aerzen Rental installed a temporary treatment facility in a sludge storage tank on behalf of the waste water company - because, in addition to blowers, the AERZEN subsidiary also offers fine-bubble aeration plates for rental, through which each basin can be modified into an aerobic treatment

unit. In this case, Aerzen Rental delivered an AERZEN blower with a volume flow of 1,500 m³/h and three fine bubble diffuser plates.

Once the temporary wastewater treatment plant was up and running, the customer was able to concentrate on its actual business again. Aerzen Rental made a decisive contribution to this thanks to fast availability, adherence to delivery dates and tailor-made equipment.

Bubble tests of the aeration plates in a tank that is being filled up



Signing a contract with Royal Haskoning

In September 2019, AERZEN signed a contract with the new partner Royal Haskoning as an "International preferred supplier". This offers AERZEN the opportunity to enter into aeration projects of the wastewater treatment with one of the world's most renowned engineering companies as early as the consulting phase. Royal Haskoning also offers its customers a patented and very successful processing technology, called Nereda. With this process, a special biogranulate ensures eight times the absorption capacity of the bioorganisms. This means that wastewater treatment plants can be designed to be very space-saving, as pre- and final clarification tanks are completely unnecessary with this technology. This process can reduce investment costs by up to 40 percent. Operating costs in connection with AERZEN compressor technology and a modern aeration system can also be reduced by 50 percent.



Partnership sealed (from left): Siert Wiersema (Aerzen Nederland), René Noppeney (Royal Haskoning), Markus Leidinger (AERZEN), Klaus Peter Glöckner (AERZEN), Rüdger Perdon (Royal Haskoning)

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:

www.aerzen.com/news

Aerzen Rental offers numerous solutions for short and medium term rental.



From left to right: the AERZEN blower connected to the generator and the collector, the pipe system from the collector to the plates in the tank and the connection of the hoses to the plates in the tank before filling it with water





The AERZEN integrated control system AERsmart distributes the required volume flows to the machinery in such a way that low, medium and high loads are processed as efficiently as possible.



In the wastewater treatment plant at Oberschleißheim, the AERZEN Performance³ technology mix consisting of a turbo, a Delta Blower and a hybrid machine ensures an efficient compressed air supply in the aeration tanks.



At the Oberschleißheim wastewater treatment plant, as part of the energy optimisation measures, two of the four aeration tanks were taken out of operation.

Performance³ technology mix from AERZEN for highest energy efficiency in the aeration tank

Sure thing: efficiency that invigorates

AERZEN has developed high-performance machines for industry for more than 150 years and is a pioneer in innovative product solutions. The blower specialist has developed the Performance³ efficiency concept especially for water and wastewater treatment. How this works in practice is impressively demonstrated at the Oberschleißheim wastewater treatment plant.

Biological purification is the heart of every wastewater treatment plant, because this is where the main work is done. Therefore, it is the biggest energy guzzler: the activated biological sludge process accounts for 60 to 70 percent of the total energy requirement of a wastewater treatment plant. Where, if not here, is the best place to make savings in electricity consumption and reduce costs? This is not only good for the wallet, but also for the environment. As a result, the Oberschleißheim wastewater treatment plant, north of Munich, has put its electricity meters on a diet - with a Performance³ technology mix from AERZEN, including the AERsmart interconnected control system, and that in combination with a new aeration concept from another manufacturer.

Lock, stock and barrel

Depending on the time of day, the season, and the amount of precipitation in

the atmosphere, the volume of wastewater and the degree of pollution will change. The consequence of this is that the air requirement in the aeration tanks varies constantly. If this is not optimally controlled, this will result in extreme energy consumption and an unnecessary waste of resources. The key to maximum efficiency therefore lies in the precise operation of the load changes. AERZEN has developed the most efficient, powerful and flexible blower solution for oxygen supply thanks to Performance³ - a customised machine configuration based on advanced technologies. The objective: operate base loads in an energy-saving manner and intercept supply peaks with pinpoint accuracy.

Whether we're talking about positive displacement blowers, rotary lobe compressors or turbo blowers, each technology has its strengths, but also its physical limits. The high art is the precise design of the assemblies to meet actual requirements. A precise analysis of the load profiles that occur and the creation of a daily hydrograph is essential. "It turned out that although our plant has an expansion size of 30,000 population equivalents (PE), the current capacity utilisation is only 15,000 PE," says Anton Mayer, Head of the Oberschleißheim wastewater treatment plant. "Further analysis of the results shows that our wastewater volume has high fluctuations during the course of the day and is characterised by low volumes with relatively high concentrations of load."

It's all in the mix

Since 1994, AERZEN assemblies have been in operation in the wastewater treatment plant which was built in 1960 (wastewater production approx. 650,000 m³ per year) - these were two positive displacement blowers of type Delta Blower (1x GM 15L, 1x GM 50L). Anton Mayer: "We have always been very satisfied with AERZEN. The blowers have run without any problems and have performed reliably with minimum maintenance. The spare parts procurement and the cooperation with the customer service have always worked out very well." Since the beginning of this year, an AERZEN Performance³ technology mix, consisting of positive displacement blow-

er Delta Blower GM 15L (max. 1,038 m³/h, 700 mbar pressure difference), rotary piston compressor Delta Hybrid D 36S (max. 2,150 m³/h, 700 mbar pressure difference) as well as turbo blower AT 50 G5plus (max. 1,900 m³/h, 700 mbar pressure difference), has provided the oxygen supply in the aeration tanks.

"The turbo blower is the most compact and at the same time the most efficient machine," explains Markus Leidingner, Wastewater Manager at AERZEN. "At the same time, the control range of turbo machines is limited to between 40% and 100%, and the efficiency decreases under partial-load operation." The Delta Blower therefore works at low load. It was already there before the retrofitting and optimally covers the low volumes during the night. This way the load peaks in joint operation are served. Completing the trio is the Delta Hybrid. It helps out when the turbo blower is operating at full capacity. The latest assembly generation made by AERZEN combines the advantages of blower and compressor technology in one system and is by far the most efficient machine in the wide control range between 25% and 100%. Should the turbo blower fail, the Delta Hybrid, together with the positive displacement blower, can maintain operation at full load.

The AERZEN blowers not only work extremely efficiently, they are also oil and absorbent free. This guarantees 100% reliability. "Discharge silencers that are lined with absorption material are subject to natural wear. This is caused by the hot air and the high flow velocity as well as the vibrations of the machines," says Markus Leidingner. "As a result, particles are released which constrict the piping and clog the finely perforated diaphragms of the aerators." The reactive silencers by AERZEN work entirely without absorbent and thus maintain the prescribed sound pressure level over the entire life cycle.

Intelligently controlled, efficiently clarified

But how do the AERZEN blowers actually know how high the air demand in the aeration tanks is? The aeration system and the blower technology are optimally matched to the requirement profile of the Oberschleißheim sewage treatment plant. As a holistic approach is essential for maximum energy efficiency. "In addition, AERZEN is the only manufacturer that really combines all technologies - blower, hybrid and turbo with air bearings - under one roof," says the manager.

The control system of the wastewater treatment plant measures the concen-

trations of oxygen, ammonium and nitrate and thus determines the oxygen and air demand. The innovative machine control system AERsmart from AERZEN then distributes the required volume flows to the machinery in such a way that the blowers operate at very close to the theoretically highest level of efficiency. But there's more to it than that: the continuous recording of operating parameters and real-time visualisation allows the early detection of drift of individual values. The user can thus react in time and process failures are avoided.

Talking, listening and understanding each other

The intensive cooperation of all actors and the comprehensive optimisation measures have paid off - in the truest sense of the word. As a result of these measures, the electricity consumption for the biological treatment stage has been reduced from 495,600 kWh to 191,720 kWh per annum. This represents a saving of 60%, which corresponds to €60,800 per year. "We definitely hadn't expected such a good result," says Anton Mayer, happily. By switching to the new technologies, the basin volume could also be reduced: instead of four, only two aeration tanks are now in operation.

"That was definitely the right step for the future," says the wastewater treatment plant manager. "We now have pioneering technology that will deliver optimum performance and savings for years to come." This also benefits wastewater quality: previously, the discharge values showed relatively high fluctuations, but with the new control technology, the values are uniform and in a very low range.

And there is another reason for satisfaction: today, the Oberschleißheim wastewater treatment plant is one of the most modern of its kind in Germany and serves the industry network, German Water Partnership e.V. (GWP), as an international reference plant. ○

The new aeration system with intelligent control system of the Oberschleißheim wastewater treatment plant.



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