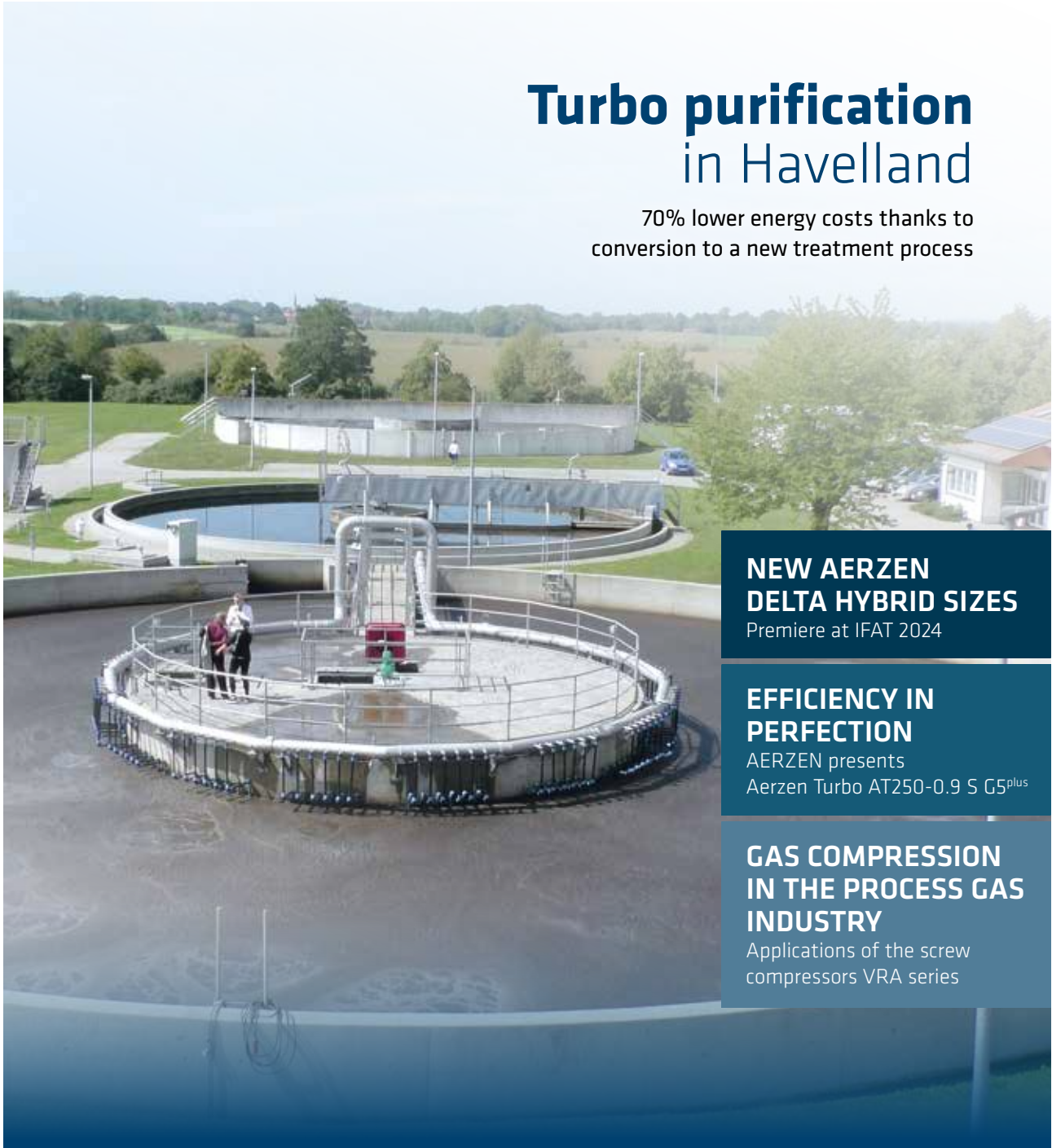


# COM•PRESS

## Turbo purification in Havelland

70% lower energy costs thanks to  
conversion to a new treatment process



### NEW AERZEN DELTA HYBRID SIZES

Premiere at IFAT 2024

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**Michael Stemmermann,**  
**Managing Director Aerzen Rental Deutschland GmbH**

Dear Readers,

The specialist world is looking forward to IFAT in Munich, the world's leading trade fair for the water and wastewater industry, and AACHEMA in Frankfurt, the largest fair for the process industry. Both exhibitions offer the ideal platform to present our new and innovative products, such as the latest generations of the Delta Hybrid series and the new turbo blowers of the G5<sup>plus</sup> series, to international trade fair visitors and to familiarise them with their respective advantages.

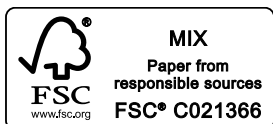
Today's buzzwords are sustainability, reducing resource consumption, increasing efficiency, process reliability, digitalisation and increasing capacity. Based on its 160-year history, AERZEN can contribute to serving the world with sustainable products and solutions for a good future for generations to come.

In this issue of our customer magazine COM.PRESS, you will find very interesting articles on topics such as energy optimisation, reducing energy demand and thus CO<sub>2</sub> emissions, and lowering thermal and mechanical losses by optimising machine room ventilation.

The AERZEN family is constantly growing, and we are therefore delighted to introduce you to new colleagues from the global AERZEN Group. Now please enjoy reading the new issue of COM.PRESS and I hope to see you at one of our trade fair stands to discuss one topic or another in greater depth.

Yours,

Michael Stemmermann



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**Imprint**

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### Sustainability efforts rewarded with EcoVadis bronze medal

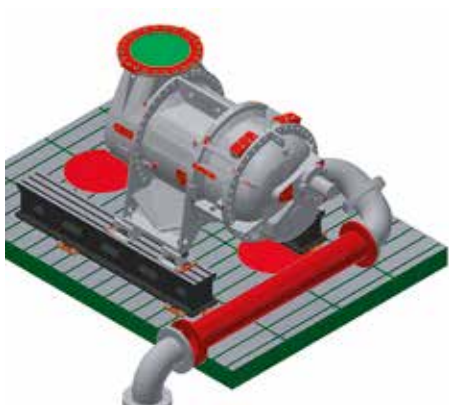


In December 2023, the AERZEN Group was honoured to receive the EcoVadis bronze medal. This means that AERZEN exceeds the requirements for social and environmental sustainability worldwide in a direct comparison exercise.

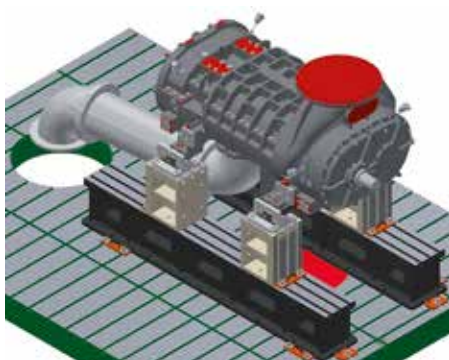
EcoVadis claims to be the leading provider of sustainability ratings and operates the platform [www.ecovadis.com](http://www.ecovadis.com). Experts from EcoVadis inspected various aspects of our business including of environment, labour and human rights, ethics and sustainable procurement. With this award, the AERZEN Group now ranks in the top 38 percent of the most sustainable companies rated by EcoVadis.

The bronze medal helps AERZEN to align with the customers' increasing focus on sustainability. However, the AERZEN journey towards a more sustainable future has to continue. Goal for 2024 is to achieve a higher EcoVadis score. ○

Sophie Krenzek (AERZEN Quality & Sustainability, Head of Sustainability)



Design of oil flooded compressor VMY 836



Process gas compressor design

### A new test department is being built at **AERZEN**

The new VMY 836 H - the largest oil flooded AERZEN screw compressor ever - is the result of an important construction project: a new test department is being built at the AERZEN location, which will go into operation at the end of 2024 and will enable the testing of VMY and VR process gas compressors from size 536 upwards. The test department will be rated for a drive power of up to 5 MW. This will also allow testing of the VMY 836, which weighs about 35 tonnes and has an intake volume flow of approx. 35,000 m<sup>3</sup>/h.

The new compressor test bench will be integrated into the assembly area of product line 3 process gas in hall 4F.

In order to achieve maximum flexibility, the installed piping can be connected as required, e.g. for indoor suction, circulation operation (also with gases other than air) and chimney operation. The power requirement of the bare-shaft stage is measured via a torque measuring shaft, the volume flow selectively via a suction-side orifice or an ultrasonic measurement on the discharge side.

In order to channel the heat from the system, the existing water system is expanded from 1.7 MW to 5 MW. The purchase of a mobile crane, which can also be used outdoors, will enable lorries of up to 45 tonnes to be loaded in future. ○

Ruben Steinbrenner (AERZEN Quality & Sustainability, Head of Test Bench)

#### Key data of the test bench motor

- Nominal power: 5 MW
- Voltage: 3,300 V
- Peak current: 1,500 A
- Speed range: 400 - 3,600 rpm
- Torque: approx. 50,000 Nm

## Relocation: **Aerzen Turbo Europe** prepares for the future



The land at Aerzen Turbo Europe's new location covers 13,000 m<sup>2</sup>.

Aerzen Turbo Europe GmbH moved into a new location in Hastenbeck near Hamelin at the end of 2023. Compared to the previous company headquarters in Rinteln, the new domicile offers significantly more assembly and office space for the 16 employees who currently work there.

The 2,500 m<sup>2</sup> production area, which also includes a test department, enables the assembly capacities to be expanded to include turnkey turbo container solutions. The minimum stock of finished turbo packages which are "ready to ship" has significantly increased.

"A second test department is expected to be set up in August," says Stephan Brand. The AERZEN Director Marketing & Director Turbo Business looks ahead with confidence: "Thanks to the investments we've made, we can take our turbo business in Korea and the EMEA region to a new level, as we're well-positioned for the future." ○



Greg Janse van Rensburg,  
Chief Operating Officer of  
Aerzen Sub-Saharan Africa

## New Chief Operating Officer **Aerzen Sub-Saharan Africa**

The AERZEN Group welcomes Greg Janse van Rensburg as the newly appointed Chief Operating Officer of Aerzen Sub-Saharan Africa. He brings a wealth of expertise to his new role, as a qualified Chartered Accountant and an MBA with distinction. With a successful career in corporate finance and strategy consulting, he has previously held executive leadership positions at Richmark and Evertec. Aerzen Sub-Saharan Africa serves customers across a vast region of over 46 countries, with physical points of presence in the major cities of Johannesburg, Durban, Cape Town, and Lagos.

With Greg Janse van Rensburg at the helm, Aerzen Sub-Saharan Africa is well positioned to strengthen its status as a leading provider of solutions for industrial applications in the mining, cement manufacturing, food production, and wastewater treatment sectors in the region. ○

## **Aerzen Rental** with new managers worldwide

**Adeel Khan** has assumed the role as Managing Director at Aerzen Rental with responsibility for Middle East in mid-June 2023, bringing with him a wealth of experience and leadership skill with technical sales background. Among other things, he worked for more than 17 years with Aggreko as Area Manager involved in running their rental business in Saudi Arabia.

In August 2023, **Chingchan Kusolthammarat** has taken up his position as Sales Manager at Aerzen Rental Thailand. He has experience in the rental of compressors in a global specialised rental company. As Aerzen Rental Sales Manager, Chingchan Kusolthammarat brings oil-free process air solutions to the market for oil and gas customers in Thailand.



Adeel Khan,  
Managing Director  
Aerzen Rental Middle East



Chingchan Kusolthammarat,  
Sales Manager Aerzen  
Rental Thailand



Ramon Castro, General  
Manager Aerzen Rental  
México

Aerzen Rental starts in Mexico with **Ramon Castro** as the new General Manager. In his previous role he was Customer Support Manager at Aerzen México. Ramon Castro's strong background in industrial engineering has led to a career in the food, textiles, and services industries. He has management skills in key areas such as after-sales service, sales, and production processes. ○

## Market position is strengthened: **AERZEN** with new turbo production in South Korea



*Inauguration of the new turbo production facility in South Korea*

Together with customers and other business partners, AERZEN celebrated the opening of the new Osong plant in Cheongju, South Korea, on 12 March 2024. Covering an area of 5,614 square metres, Aerzen Turbo Co. Ltd.'s production facility represents a significant achievement as part of the company's commitment to innovation, efficiency and continuous expansion. The programme for the opening ceremony included factory tours and presentations by AERZEN managers.

### **Continuous further development**

AERZEN's presence in Korea is synonymous with the birth and validation of air foil-bearing technology in turbo blowers. Supported by a robust supply chain, the skilled technicians and experts capitalise on optimal operational efficiency and continual advancement. The establishment of the new plant will strengthen this synergy and further expand its growth potential. The most important key data encompass:

- 1. Advanced technology:** our new facility is outfitted with the latest technological advancements to streamline production processes, ensuring precision and efficiency at every phase.
- 2. Enhanced capacity:** with additional production lines, AERZEN can now meet the escalating global demand in sectors such as water treatment, food processing and lime and cement industry, all while upholding the highest standards of quality.

**3. Green initiatives:** AERZEN takes pride in incorporating environmentally friendly practices into its operations, that aim to minimise waste, reduce energy consumption, and uphold the company's commitment to sustainability.

**4. Employment opportunities:** the expansion has resulted in the creation of more job opportunities within the community.

**5. Product innovation:** Aerzen Turbo Co. Ltd. has recently unveiled a new line of turbo blower models with 35 and 60 horsepower, marking a substantial advancement in meeting the market requirements. Furthermore, the turbo container solutions are aptly designed to meet the demands of more intricate markets. With the upcoming product launch in May 2024 (see page 16), industries can leverage a noteworthy 10 per cent enhancement in energy efficiency and a reduction in carbon footprint.

"Aerzen Turbo would like to thank its customers, employees and the local community for their unwavering support during the company's growth phase," said Stephan Brand at the official inauguration. The Director Global Marketing and Turbo Business added: "We are convinced that the success of our company will continue and have a positive impact on the sector and the region." ○

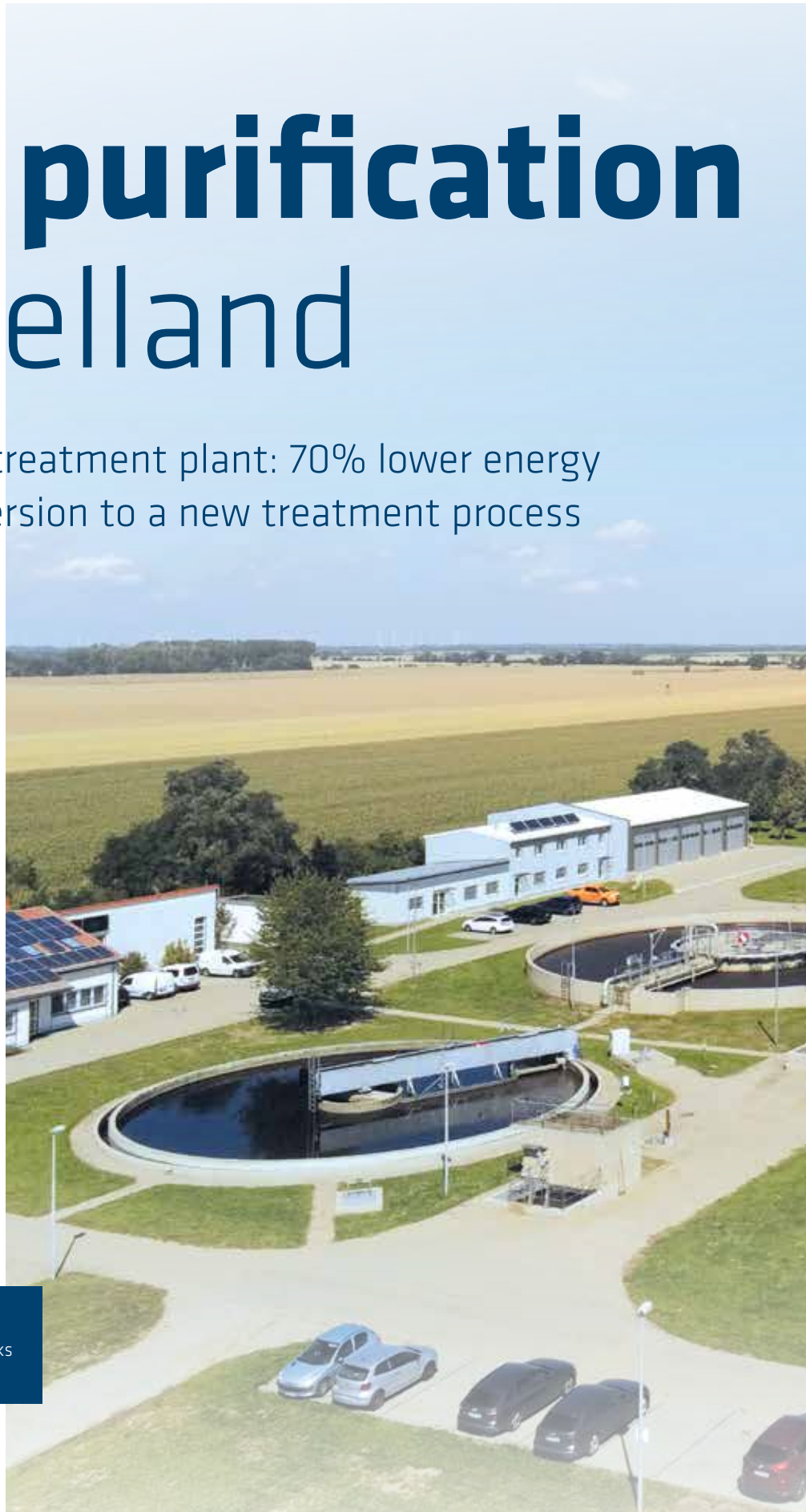
# Turbo purification in Havelland

Roskow wastewater treatment plant: 70% lower energy costs thanks to conversion to a new treatment process

When it comes to reliability, energy efficiency, service-friendliness and low life cycle costs, turbo blowers are simply unbeatable. The Roskow wastewater treatment plant in Havelland has carried out the practical test - and is completely satisfied. By switching to AERZEN's highly efficient turbo technology and state-of-the-art aerator technology, it will reduce energy consumption in biology by 330,000 kWh per year and thus significantly reduce wastewater cleaning costs.

## Digital info

Further information on various website links and QR codes on pages 11 and 13





**T**o the west of Berlin stretches the Havelland - an idyllic landscape that Theodor Fontane once memorialised in his “Wanderungen durch die Mark Brandenburg”. Today, the area on the outskirts of the capital is a popular excursion and holiday region and the declared destination of many city escapees. The public drinking water supply and wastewater disposal is the responsibility of the Havelland Water and Wastewater Association (WAH) which operates eight waterworks and three wastewater treatment plants (Roskow, Nauen, Ribbeck) in its catchment area. The largest wastewater treatment plant is located in Roskow. It was built in 1994 and is now rated for 49,000 population equivalents (PE). Every day, 4,000 cubic metres of wastewater from Wustermark, Brieselang, Ketzin and Beetzseeheide are treated. Calculated over the year, this amounts to 1.45 million m<sup>3</sup>.

### **The target: reducing energy demand and lowering CO<sub>2</sub> emissions**

In order to reduce energy demand and CO<sub>2</sub> emissions, the Roskow wastewater treatment plant carried out extensive construction work between 2021 and 2023.

“A lot has changed structurally in these three years,” says Thomas Hantke, Technical Director of the WAH: “We have completely modernised the machine technology, the construction technology and the E/I&C and process control technology. The plant is now up to date in terms of energy efficiency. This results in a number of positive effects regarding energy consumption, CO<sub>2</sub> emissions and costs.”

### **Energy optimisation of aeration technology: key to higher energy efficiency**

A central component of this was the energy optimisation of the aeration technology in two aeration tanks. By switching to highly efficient turbo technology from AERZEN and new aerators, the Roskow wastewater treatment plant was able to reduce its energy demand in 2023 by around 330,000 kWh compared to 2022, saving 177 t of CO<sub>2</sub>. In addition, a digestion plant including an associated CHP plant and upstream pre-treatment was installed in a separate construction phase, which has an annual output of 660,000 kWh. This will save a further 354 t of CO<sub>2</sub> per year.





### Turbo blowers replace old compressor station

Biological treatment is at the heart of every wastewater treatment plant, but it is also the biggest consumer of electricity and therefore costs. Previously, rotary lobe compressors and Delta Blower positive displacement blowers (two GM 25 S) supplied the microorganisms in aeration tanks 1 and 2 with oxygen. These have now been replaced with five turbo blowers: one AT 50 and one AT 100 per tank and one AT 150 as a central reserve. "The Havelland Water and Wastewater Association has always used AERZEN technology on its wastewater treatment plants. We are well looked after there and feel that we are in good hands. The machines are reliable and the services are outstanding," says Thomas Hantke, who is delighted with the excellent cooperation. With regard to the turbos, he adds: "We are very happy that the Turbos are so compact. This is very beneficial for our limited installation capacities. They are also service-friendly. An oil change is not necessary. This makes work easier for our operating staff. The brand loyalty also has advantages in terms of spare parts stocks, standardisation, control technology, operation and maintenance."



*The turbo blowers in the G5plus series are among the most compact and efficient turbos in their class.*



*Biological treatment is at the heart of every wastewater treatment plant, but it is also the biggest consumer of electricity and therefore costs.*

**The Aerzen Turbo is unbeatable in terms of energy**

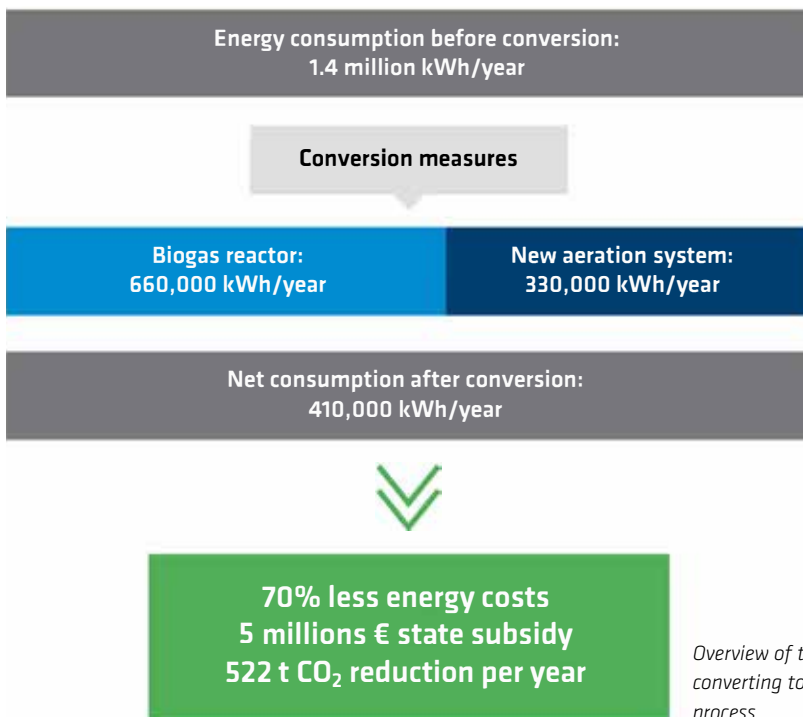
The Turbo blowers of the G5<sup>plus</sup> series which are now in operation at the Roskow wastewater treatment plant, are among the most compact and efficient turbos in their class and are currently unbeatable in terms of energy efficiency: compared to conventional turbo technology, their energy efficiency is up to 10% higher. Compared to displacement machines such as positive displacement blowers, savings of up to 30% can even be achieved. This can be accomplished by highly efficient individual components, such as the extremely powerful and energy-saving permanent magnet motor, which meets the future requirements of the IE5 classification (Ultra Premium Efficiency) thanks to the particularly aerodynamic design with turbo impeller and spiral casing and the innovative multilevel VFD technology with up to 90% less power loss in the motor compared to conventional converter technology. "Aerzen turbos stand for maximum energy efficiency, absolute reliability, reduced maintenance costs and low life cycle costs, making them an ideal solution for supplying oxygen of the aeration," emphasises Sales Engineer Christian Meyer from AERZEN.



**Minimum machine footprint**

Thanks to the air foil bearing with double coating, Aerzen turbos offer an extended bearing service life of up to 80,000 operating hours regardless of start-stop cycles and are virtually maintenance free. The only thing that

needs to be done is to change the filter regularly. The reduced dimensions warrant a minimum machine footprint - ideal when space is limited. AERZEN manufactures and develops all of its products via in-house production. This means that all components can be perfectly matched with each other and ideally adapted to the operating process. This guarantees maximum reliability, operational reliability and cost-effectiveness.



**50% higher oxygen input thanks to state-of-the-art aeration**

The aeration elements were also modernised as part of the renewal of the blowers. Instead of candle diffusers, large-format aerators ensure that the air provided by the AERZEN packages reaches the pool. At the same time, the configuration was optimised and the area increased from 60 m<sup>2</sup> to 160 m<sup>2</sup>. 50% more oxygen can now be entered with the same amount of air. This enables enormous energy savings.

Thanks to the new technologies - blowers and aeration elements - as well as the construction of a pre-treatment and digested sludge plant, the tank volume could be reduced: instead of three, only two aeration tanks are need-

*Overview of the benefits achieved by converting to the new preparation process*



Five turbo blowers from AERZEN ensure the oxygen supply in the aeration tanks.

## Subsidies secured the financing

The conversion of the Roskow wastewater treatment plant cost a total of 19.5 million euros - a sum that the Havelland Water and Wastewater Association could not afford on its own. The energy efficiency measures could only be financed thanks to subsidies. For the energy optimisation of the ventilation technology, the WAH generated 200,000 euros as a grant via the municipal guideline, a funding programme of the Federal Republic of Germany. Support was provided by e.qua. e.qua is a network of municipal water management companies and focusses on the topics of energy efficiency, energy (recovery) and resource management. Together, AERZEN and e.qua offer time-saving help with applying for government subsidies. "We provide information about the available subsidies, offer advice, prepare the potential study and, on request, take care of the total subsidies management," says Philip-Leander Rausch, outlining e.qua's range of services. The association received EUR 4.88 million from the state of Brandenburg and the European Union via the "RENplus 2014-2020" programme for the separate project "Construction of a sludge digestion plant with downstream block-type thermal power stations" (without e.qua's participation).



<https://www.e-qua.de/startseite>



<https://www.aerzen.com/applications/water-and-waste-water-treatment/adviser>

## AERZEN is the market leader in the field of water treatment

For 160 years now, AERZEN has been supporting operators of wastewater treatment plants on their way to maximum resource efficiency and has long been recognised as the market leader in the field of water treatment. The range of services covers all aspects - from bespoke machine and technology design to smart, needs-based control systems, customised ROI calculations and flexible rental solutions (Aerzen Rental) through to support with funding applications.



<https://www.aerzen.com/applications/water-and-waste-water-treatment>

Further  
information



*New aerators ensure that the air provided by the AERZEN packages reaches the pool. As a result, the oxygen input is 50 % higher than with the old candle aerators.*



*The Roskow wastewater treatment plant is now up to date in terms of energy efficiency and has been able to significantly reduce its energy consumption, CO<sub>2</sub> emissions and costs as a result.*

ed. The third basin, which had its own compressor station with a further three machines, was taken out of permanent operation and serves as a buffer basin.

**Extensive construction measures**

The primary clarifier and digestion tower reduce the COD freight for biology by a third, as the primary sludge from the primary clarifier is fed to the digester (capacity approx. 2,500 m<sup>3</sup>) together with the excess sludge. This results in an increase in capacity from 36,000 to 49,000 PE of the wastewater treatment plant. A gas storage facility (capacity approx. 500 m<sup>3</sup>), a gas flare with condensate water shaft and two block-type thermal power stations with a total output of 160 kW were also installed. In addition, the construction of a rake and grit trap, the switch from a belt press to a modern centrifuge for sewage sludge dewatering and the complete renewal of the EMSR technology and the associated process control technology (including visualisation system and remote

maintenance option). To ensure sufficient performance, the capacity of the transformer station had already been doubled a few years earlier.

**Massive cost reduction thanks to lower energy consumption and a higher proportion of self-generated electricity**

In 2022, the Roskow wastewater treatment plant drew around 1.4 million kWh from the public electricity grid. The conversion to the new treatment process drastically reduces this value. In 2023, the plant only needed 410,000 kWh of public electricity. That is a reduction of 70%. 330,000 kWh are saved by renewing the aeration technology and 660,000 kWh are produced thanks to sewage sludge digestion.

Broken down to biology, the following image emerges: Before the optimisation measures, four packages were in use for aeration tanks 1 and 2 and two packages for aera-

tion tank 3, i.e. a total of six machines (not including the redundant machines). Following the switch to turbo technology and new aerators, only two machines will be in operation on average - namely one AT 50 each for aeration tanks 1 and 2. That is an annual saving of 330,000 kWh - and that with a 36% increase in capacity from 36,000 to 49,000 PE.

**AERZEN technology at all wastewater treatment plants in the association's area**

In connection with the construction measures at the Roskow wastewater treatment plant, the energy optimisation of the Nauen wastewater treatment plant will follow. AERZEN turbo blowers will also be installed there - two AT 50 and one AT 100. AERZEN technology is also in use at the small wastewater treatment plant in Ribbeck (350 PE). "AERZEN is a competent, reliable partner and we are very satisfied," emphasises Thomas Hantke. ○



The gas storage tank has a capacity of approx. 500 m<sup>3</sup>.

Additional information



<https://www.aerzen.com/products/turbo-blowers>



<https://wah-nauen.de/>



<https://rmu.de/en/products>

# New at IFAT 2024: **AERZEN** Delta Hybrid with new records

Maximum volume flow with the smallest footprint and best energy efficiency



*The new AERZEN Delta Hybrid (screw blower) is an absolute high performer in process air generation.*

For 160 years, AERZEN has been developing high-performance machines for industry and continuously driving the development of compressor technology with innovations. The latest coup: the new sizes of the successful Delta Hybrid series. The innovative screw blowers with direct drive using gear wheels, optional IE5 synchronous permanent magnet motor and integrated VFD are digitally ready and impress with maximum energy efficiency, the smallest footprint, maximum user-friendliness and absolute process reliability. A compact plug & play solution for the highest demands.

**A**ERZEN rotary lobe compressors, also known as screw blowers, stand for the highest level of innovation, uncompromising quality, exceptional energy efficiency and unconditional reliability and are used worldwide in a wide variety of applications. With the innovative further development of the successful series AERZEN is now taking the next step. The future-oriented design sets new scales regarding energy efficiency, durability, machine footprint, digitalisation, low noise levels and maintenance requirements, making the new sizes an absolute high performer in process air generation.

#### Efficiency in a new dimension

The new Delta Hybrids provide reliable, 100% oil-free process air and operate highly efficiently and economically in an extended turndown ratio of up to 1:5. Energy savings of up to 37% compared to conventional blowers are possible. This is unique on the market and supports applications in a targeted manner to greater resource and cost efficiency. This major leap in efficiency is achieved thanks to a sophisticated technology concept that is precisely tailored to customer requirements. The most important components include an innovative compressor stage with new, highly efficient screw rotor profiles and internal flow optimisation, a direct drive for use of motors with energy efficiency class IE4 or IE5 including an integrated VFD and a smart oil system. The synchronous reluctance permanent magnet motors also offer high efficiency in partial load operation.

#### User-friendly plug & play solution with the smallest footprint

The robust design ensures unrivalled reliability. Even under the most difficult environmental conditions, the Delta Hybrids ensure safe operation. The new screw blowers are designed for intake temperatures from -40 °C to +50 °C and therefore cover an extended field of application. An optional acoustic hood for outdoor installation allows the machines to be used even under direct weather conditions. Delta Hybrid packages are ready for im-

mediate use on delivery and take up a minimum of floor space. The space-saving side-by-side installation and the excellent volume flow per square metre value result in smaller machine rooms and thus lower building investments. Massive capacity increases can thus be realised in the smallest of spaces.

#### Digitally ready thanks to AERtronic

The intelligent AERtronic package control system is already integrated and takes over the efficient control and monitoring of the Delta Hybrid. All data can be transmitted to the master control system and accessed via browser, tablet or mobile phone. The result is maximum machine availability, reliability and efficiency.

#### Easy to use, easy to transport

The new Delta Hybrid sizes achieve a maximum sound pressure level of 75 dB(A), making them among the quietest on the market in their performance class. Thanks to the flexible modular system, the silencer technology can be selected to comply with customer and application requirements. Operation and maintenance are performed exclusively from the front and rear. The exceptionally long oil change and maintenance intervals reduce service costs. The drive components are completely maintenance free. The machines are already filled with oil on delivery and can be easily transported by pallet truck, fork lift truck or crane. ○



*Even under the most difficult environmental conditions, the Delta Hybrids ensure safe operation.*

#### New Delta Hybrid sizes

- 4 Sizes: D40S, D50S, D65S, D80S
- Differential pressure: up to 1,250 mbar (g)
- Volume flow: 400 to 4,800 m<sup>3</sup>/h
- Motor rating: 30 to 160 kW
- Sound pressure level: max. 76 dB(A)

# Efficiency in perfection

**AERZEN** presents the new Aerzen Turbo AT250-0.9 S G5<sup>plus</sup> at IFAT 2024



*The new Aerzen Turbo AT250-0.9 S G5<sup>plus</sup> is a compact plug-and-play package and enables significant energy savings.*

AERZEN turbo blowers stand for unbeatable energy efficiency, extreme compactness, maximal durability and lowest life cycle costs. Now the blower and compressor specialist has added a new size to its successful series: the Aerzen Turbo AT250-0.9 S G5<sup>plus</sup> with air-foil bearings delivers a volume flow of 155 m<sup>3</sup>/min and impresses with an extremely large turndown, consistently high overall efficiency and a minimum machine footprint.



**A**ERZEN has been building turbo blowers since 1911 and has continued to push these packages to the peak of technology over many decades. Today, the Aerzen G5<sup>plus</sup> turbo blower series is one of the most compact and efficient turbos of its class. Compared to conventional turbo technology, the energy efficiency is up to 10% higher, and compared to displacement machines, such as positive displacement blowers, savings of up to 30% can even be achieved. With the new AT250, AERZEN is extending the series upwards, making the advantages of efficient turbo technology accessible to an even wider range of uses and applications.

### Innovative turbo blower for higher volume flows

The new Aerzen Turbo AT250 is rated for a volume flow of 155 m<sup>3</sup>/min, a maximum differential pressure of 900 mbar and speeds of up to 26,000 rpm and has a very large turndown of 1:4. A powerful and energy-saving permanent magnet synchronous motor, which meets the future requirements of the IE5 classification (ultra premium efficiency), as well as the particularly aerodynamic design of the turbo impeller and spiral casing ensure a consistently high overall efficiency. Even in partial load operation, the AT250 delivers exceptional performance and high power density.

### Pioneering technological advantages

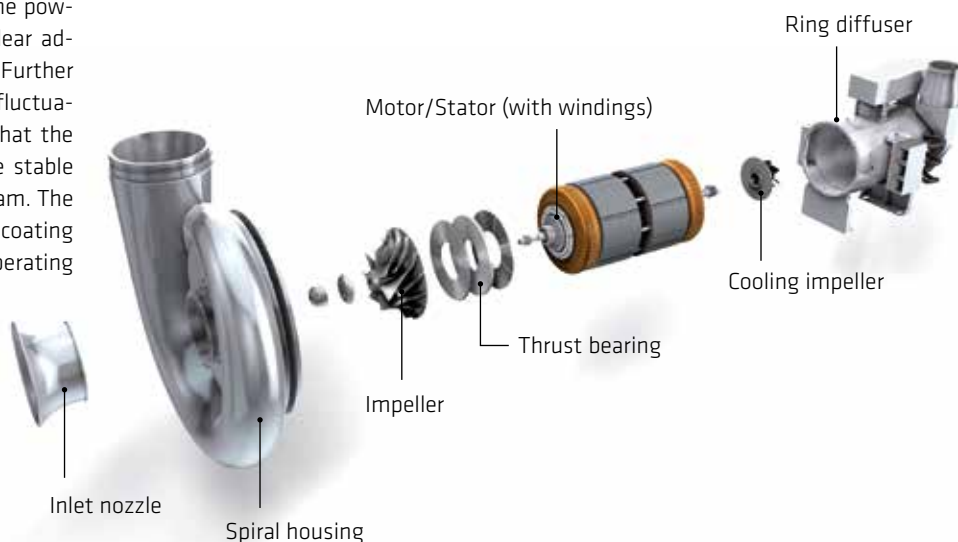
The modern multilevel VFD technology reduces the power loss in the motor by up to 90%, giving it a clear advantage over conventional inverter technology. Further advantages are greater insensitivity to pressure fluctuations and better control behaviour. This means that the turbo packages can be operated in a much more stable manner across the total turbo characteristic diagram. The innovative AERZEN air foil bearing with double coating ensures an increased service life of > 80,000 operating hours and maximum reliability. The packages are sound-optimised and guarantee quiet operation of 72-73 db(A). In addition, the powerful turbo blowers are 100% oil-free, incredibly robust and child's play to operate. The maintenance requirement is negligible.

### Compact plug-and-play package

AERZEN manufactures and develops all of its products via in-house production. Only in this way can all the components be perfectly coordinated with each other and ideally adapted to the operating process. This means maximum reliability, operational reliability and cost-effectiveness. The AT250 is already completely configured and assembled ready for connection when it is delivered on site. Thanks to the compact design, the machine footprint is extremely low. For example, a turbo machine requires only a third or a quarter of the footprint of a positive displacement blower with comparable performance. As a result, the machine room can be a lot smaller.

### Highest power density, smallest footprint

With the smallest footprints on the market and maximum energy efficiency, the new Aerzen Turbo AT250 offers compact power that is indispensable for numerous processes - be it oxygen input in wastewater technology fermentation in yeast production or cooling and combustion air for e.g. lime and cement production. Thanks to their high power density and reliability, the new packages keep life-cycle-costs low and enable significant cost reductions. ○



<https://www.aerzen.com/product/aerzen-turbo-blower-generation-5plus>



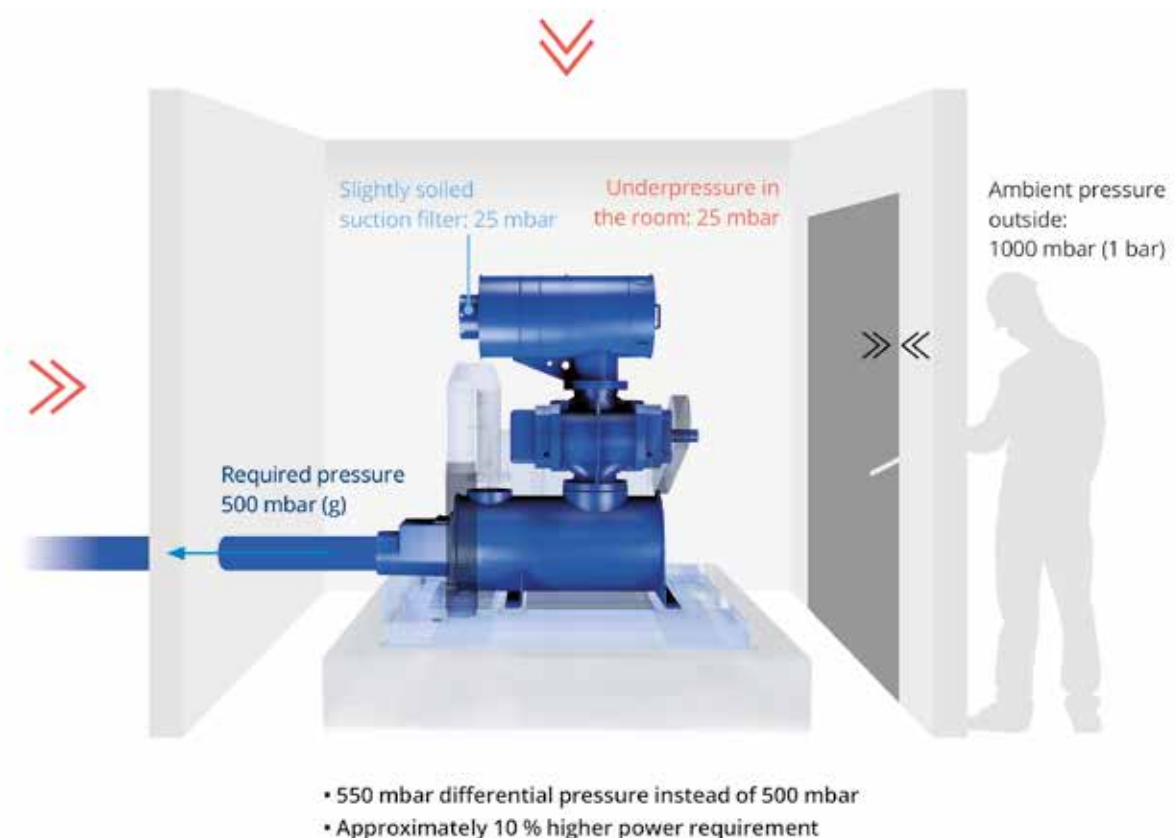
<https://www.aerzen.com/applications/water-and-waste-water-treatment>



<https://www.aerzen.com/applications/cement-industry>

# Machine room ventilation: So that the packages do not run out of air

The machine room - The unnoticed stepchild



Compressors, blowers and turbos are at the heart of countless processes worldwide. They are generally designed for maximum efficiency and maximal energy savings, thus reducing costs and CO<sub>2</sub> emissions. However, 15 per cent of 100 per cent of the energy used is typically lost in a poorly designed machine room - thermal losses due to heat radiation from the packages and mechanical losses due to underpressure in the machine room and intake losses.

It is essential to include the machine room in the efficiency concept to ensure the most economical operation possible. Room ventilation plays a central role here, as the air pressure and temperature in the room where the machines are installed are crucial for efficient operation. Or in short: Without a professional machine room ventilation system, users literally lose their money in the air.

#### There is still plenty of room for improvement

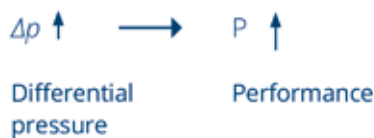
Machine room ventilation is rarely at the top of the priority list. This is a big mistake, because if the ambient conditions in the installation room are not appropriate, the blowers and compressors have to work harder or run longer to achieve the required capacity. System operators often do not realise how much they are counteracting the efficiency benefits of their packages with inadequate

ventilation of the installation rooms. The losses caused by excessively high temperatures and/or incorrect air pressure are striking. That quickly adds up to more than 10,000 euros per year. The consequences:

- Higher energy demand of the packages
- Faster wear of the system components
- Reduced machine service life
- Unhindered sound propagation

**Air pressure, temperature and sound - The values must be right**

It is completely irrelevant where the packages get their intake air from: It is important that there is enough air at correct temperature. Sounds banal, but it is by no means trivial.



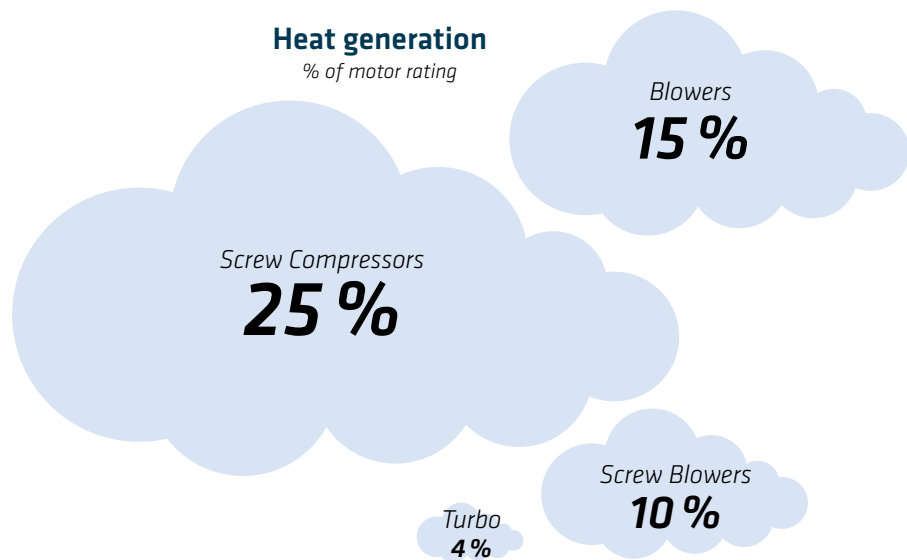
**Without supplies, the machines run out of air**

AERZEN packages work according to the positive displacement principle (compressor with internal compression, blower with full-pressure compression) and are so-called forced conveying systems. This means that they extract air from their surroundings - continuously. If no or too little air can flow in, there is lack of air in the room. An underpressure is created. This can go so far that doors can no longer be opened. For example, with a 2 m<sup>2</sup> door leaf and 25 mbar underpressure in the room, a compressive force of 5,000 N acts on the door. This corresponds to approx. 510 kg. People in the machine room would then no longer be able to leave it - a dangerous situation.

In addition, there is a loss of efficiency in the machines. As the air pressure drops, the density of the air decreases and the blowers (compressors) must increase their power requirement to achieve the intended performance. For applications with a differential pressure of 500 mbar, this quickly means an increase in performance of 10 per cent.

**Process air generators like it cool**

When air is compressed, a lot of heat is generated during the process - both in the generated air flow and under the acoustic hood due to the waste heat from the motor, silencer and compressor. If this waste heat is not conducted out of the room, the ambient temperature can rise to unacceptable levels. As a result, the packages can overheat, which leads to a loss of efficiency, faster wear and a shorter service life - up to and including acute (total) damage. This effect occurs with all machine technologies, but to varying degrees. Positive displacement blowers, which are very common in pneumatics and wastewater technology, generate particularly high levels of heat. As a result, these are increasingly being replaced by rotary lobe



compressors and turbos, which offer higher energy efficiency and lower heat dissipation.

**Loud instead of warm? Not a good idea.**

Anyone who thinks they can simply open the door or window of a machine room to improve the indoor climate in operation has reckoned without the sound. This is because sound can escape unhindered through the openings - an undesirable side effect that makes it difficult to comply with occupational health and safety and noise protection regulations. The other extreme is just as ineffective. If the focus in the design of the machine room was solely on making the external shell as soundproof as possible, too little outside air could flow into the internals due to the sound insulation. The packages would literally run out of air due to a lack of replenishment. Suction of the machines via piping, i.e. directly from the outside, can also have disadvantages, as the suction noise is shifted almost directly to the outside.

**Supplementary problems in pneumatics**

When pneumatically conveying sensitive media in the food industry - for example sugar, cocoa powder or similar - certain temperature ranges must be maintained. If the conveying air is too warm, the conveying material will be damaged. If sensitive products are to be conveyed, operators must ensure that the intake air is cool. The higher the suction temperature, the higher the discharge temperature of the compressor. As a rule of thumb: For every 100 mbar increase in pressure in the compression process, the temperature on the outlet side rises by 10 Kelvin. With a conveying pressure of 500 mbar and an ambient temperature of 20 degrees, this results in a discharge temperature of 70 degrees (20 degrees suction temperature plus 50 degrees temperature increase due to the compression process).

*every 100 mbar more pressure = 10 Kelvin warmer conveying air*

If the discharge temperature is too warm for the conveying medium, the conveying air must be cooled down. For blowers up to 1,000 mbar, this is done on the intake side. The advantage here is that intake cooling systems usually predry the air.

For screw compressors, on the other hand, cooling on the discharge side is recommended. Due to the higher pressures, compression temperatures of approx. 200 degrees are achieved. However, this is not possible without pressure losses through aftercoolers, condensate drains and, if necessary, dryers to dry the cooled air. In the case of longer conveying distances, convection on the piping also leads to cooling of the conveying air and thus, under certain circumstances, to remaining under the pressure dew point. If the pressure falls below the pressure dew point, water wastes. Temperature management is therefore of crucial importance for the efficiency and quality of the conveying processes.

### The biggest sins of efficiency - Costs without benefits

If the supply and exhaust air ducts are insufficiently dimensioned and/or the internal temperatures are too high, the packages must increase their performance in order to provide the necessary quantity of process air. At the end of the day, these reductions in efficiency add up to a glaring loss in energy efficiency and thus to rising electricity costs. It is therefore not insignificant for the efficiency of the process and compressed air generators how the machine room is designed. The key points are above all sufficient volume flow, the correct air pressure, effective limitation of the temperature in the installation room and the alignment of the room or building according to the direction of the compass.

The following faults should be avoided:

- Ventilation openings too narrow
- Ventilation grilles blocked

- Internal temperatures too high
- Intake air too warm
- Clogged filter mats
- Noise protection concept without consideration of sufficient air supply (hazard of underpressure)
- Open machine room doors (keyword: noise emissions)
- VFD in the machine room (= heat source)

The consequences of inadequate or non-existing machine room ventilation are losses - losses in efficiency, losses in the service life of the packages, losses in the supply of the pneumatic conveying system and losses in finances.

In a poorly designed machine room, the blowers and compressors must typically have a 15 per cent higher capacity to provide the required quantity of process air.

### Optimum room ventilation - The heat must be blown out, the sound stays in

Whether suction of cooling and/or conveying air directly from the machine room or from outside via a separate piping: Sufficiently dimensioned room ventilation is required for all intake types. The machine room ventilation fulfils three functions: Supply of conveying air, temperature regulation and noise protection.

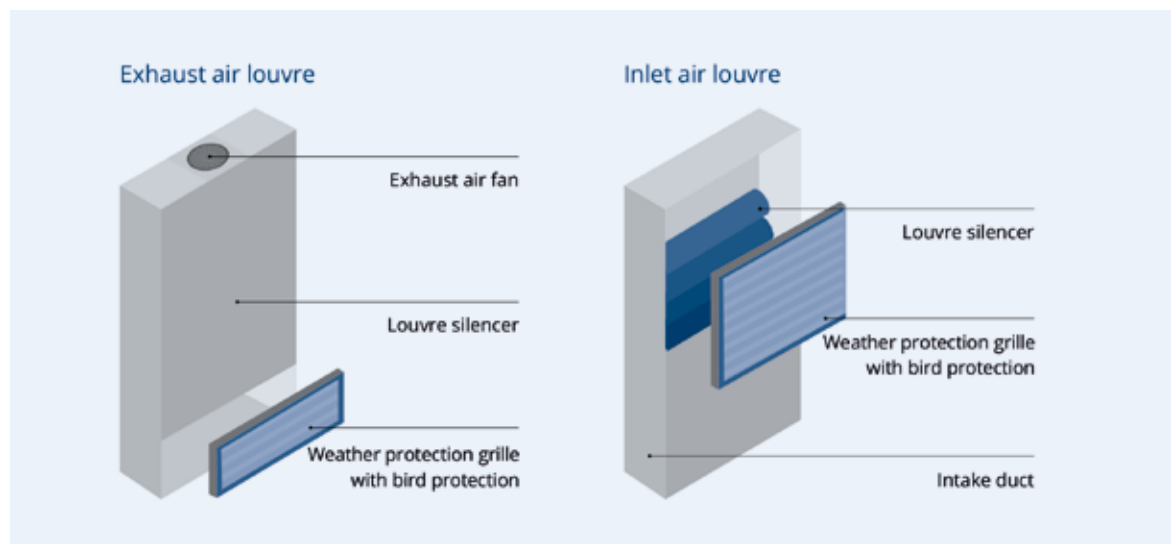
### An art in itself

When calculating, designing and implementing the ideal machine room ventilation, a large number of factors must be taken into account - from the performance data of the packages and the geographical conditions to the optimum position of the supply and exhaust air louvres in the room. The design of the machine room ventilation should therefore exclusively be carried out by professionals. The room ventilation calculator from AERZEN provides initial assistance for planning and optimisation. Planning offices and system manufacturers can enter existing values such as motor rating, ambient temperature, volume flow, flow

# 15 %

*higher power consumption due to insufficient ventilation!*

*Functions of the machine room ventilation:  
Supply of conveying air,  
Temperature regulation,  
Noise protection*



velocity and installation height as well as other relevant data in the online tool - the room ventilation calculator then automatically calculates the necessary room ventilation.

### Louvre silencer for the supply and exhaust air side

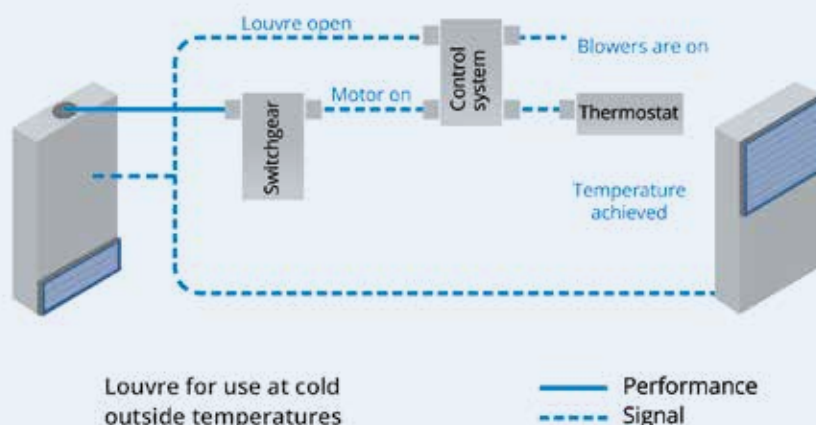
The main work is taken over by supply and exhaust air louvre silencers. They ensure that sufficient air is available for compression, that the room does not heat up and that noise emissions do not exceed the limit values. The louvres inside are designed to effectively reduce noise and generate little flow resistance so that the packages in the machine room do not draw underpressure. The inlet air louvre is completed by a weather protection grille, which also prevents birds and leaves from getting into the intake duct.

### From north to south

The main purpose of the exhaust air louvre is to conduct excess heat to the external air. As a rule, it is only half the size of the inlet air louvre and should be positioned in the machine room - in relation to the inlet air louvre - so that the air flows through the interior as diagonally as possible. For exhaust air, the same applies in terms of noise emissions as for inlet air: The heat must be blown out, the sound stays in. The exhaust air louvres are therefore equipped with soundabsorbing elements and use exhaust fans to ensure that the warm air leaves the room quickly. The exhaust fans are best assembled at ceiling height, as this is where the air is warmest.

The cardinal points also play a role. For example, the inlet air in the northern hemisphere is ideally located in the north, as the air there is colder and therefore has a higher density. The exhaust air is ideally aligned to the south.

### Exhaust and supply air element: Louvre with thermostat

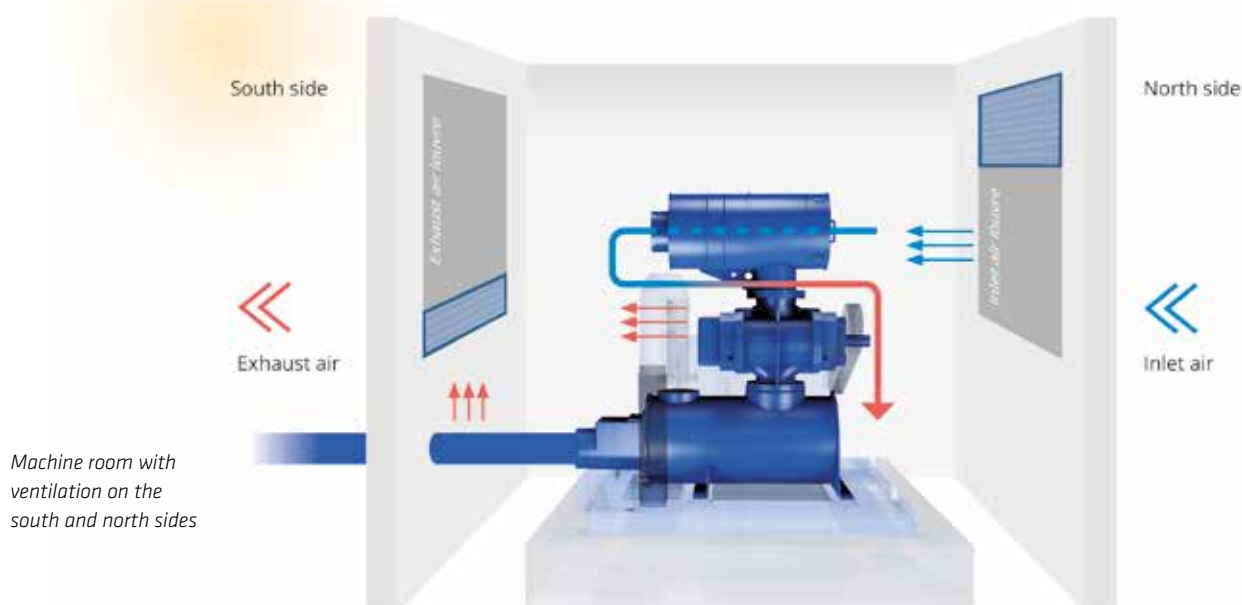


This is what ideal machine room ventilation looks like:

- Sufficiently dimensioned ventilation openings
- In the northern hemisphere: Alignment of the inlet air to the north (colder air with higher density) and the exhaust air to the south
- Room is flowed through diagonally
- Use of louvre silencers on the supply and exhaust air side
- Exhaust fans at ceiling height (where the air is warmest)
- Louvre blades for use in cold outside temperatures (with manual adjustment or automated)
- Regular maintenance of the suction filters

### Louvre blades against the cold

Optional louvre blades can be used to close and open the supply and exhaust air louvres - either manually by hand control or automatically using a thermostat and switchgear. This is useful for application in cold outside temperatures. If it is below freezing outside, it is neither desirable for heat to leave the room nor for cold to enter the room. By closing and opening the supply and exhaust air



Machine room with ventilation on the south and north sides

louvres as required using louvre blades, both can be prevented while still securing good room ventilation.

### Regular filter changes pay off

The filter is normally changed once a year. In most cases, this is too rarely the case. In view of the immense efficiency and cost losses caused by filter contamination of the suction filter, a replacement cycle of two months is recommended. It is not enough to blow out the clogged filter with compressed air. Clogged filters quickly cause a pressure resistance of 25 and more millibars. In an average plant with four blowers, each with a motor rating of 37 kW, a total of 6,900 operating hours per year and 40 cents per kilowatt hour, the clogged suction filter alone

would demand five per cent more performance from the blowers. That's more than €20,000 a year. Frequently changing the suction filters is therefore worthwhile and also saves costs.

### Realising efficiency potential

To summarise: any reduction in efficiency - even if it is only a few percentage points - has a negative impact on the energy balance and thus increases electricity costs. To ensure that the machine room does not become an efficiency killer, criteria such as a sufficient air supply, a cooler suction temperature, optimum air pressure, alignment of the supply and exhaust air to the direction of the compass and regular filter cleaning should not be ignored. ○

## Invest once, profit forever - Modern ventilation concepts make the difference

High energy costs, increasing scarcity of resources, growing environmental awareness and increased cost pressure are forcing companies and plant operators to optimise their processes and use resources more economically and efficiently. The use of highperformance technologies and energysaving packages is an important step. However, the key to maximal energy and cost efficiency lies in a holistic approach - and this includes optimising the design of the installation room for the blowers, compressors and turbos.

- Application with a differential pressure of 500 mbar at an ambient pressure of 1,000 mbar (1 bar)

In the application example, excessive temperatures, underpressure in the room and dirty suction filters result in annual costs of around €40,848 - an enormous sum.

These costs are absolutely avoidable. Even simple measures help to eliminate these unnecessary losses and at the same time solve the noise problems that can occur during process and compressed air generation.

The following calculation example illustrates the costs incurred due to inadequate room ventilation.

Initial situation:

- 4 packages with a motor rating of 37 kW each
- 6,900 operating hours per year
- 40 ct/kWh electricity costs

### Minimum costs, maximum efficiency

Efficiency losses of blowers and compressors resulting from insufficient ambient conditions in the installation room can be eliminated with little effort and a manageable financial investment. Compared to the annual savings, the costs for the one-off investment in a machine room ventilation system are negligible.

Costs due to lack of room ventilation

**€40,848**

annual expenditure

**VS.**

Costs for the installation of a room ventilation system

**€5,000 to 8,000**

one-off expenditure

Calculation example: losses due to inadequate room ventilation

	Efficiency losses	Higher power requirement needed	Additional costs per year
25 mbar underpressure in the room	5%	7,4 kW	€20,424
25 mbar filter contamination of the suction filter	5%	7,4 kW	€20,424
<b>Total</b>		<b>14,8 kW</b>	<b>€40,848</b>



Melter tapping at the blast furnace of Salzgitter Flachstahl. With the SALCOS® programme, Salzgitter AG aims to replace the coal currently used in the conventional blast furnace process with green hydrogen. This should reduce CO<sub>2</sub> emissions by 95 percent.

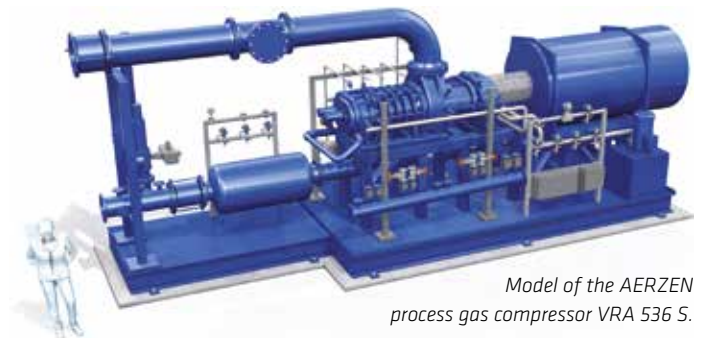
# AERZEN supports the production of green steel

Salzgitter AG orders “Energiron ZR® Direct Reduction” technology for CO<sub>2</sub>-low steel production

In order to drastically reduce CO<sub>2</sub> emissions, Salzgitter AG, Germany, plans to switch steel production at the Salzgitter location from coal-fired blast furnaces to initially natural gas-based and later to hydrogen-based direct reduction by 2033. Aerzener Maschinenfabrik delivers a PTS compressor for the first direct reduction plant (DRI plant). PTS stands for Pneumatic Transport System.

The customer for AERZEN is the plant manufacturer Danieli. Alongside Tenova and the DSD Steel Group, the Italian company is part of the consortium that is building a DRI plant on the premises of Salzgitter Flachstahl GmbH on behalf of Salzgitter AG as part of the SALCOS® (Salzgitter Low CO<sub>2</sub> Steelmaking) programme. Together with an electric arc furnace and a 100 MW electrolysis plant for hydrogen production, the plant forms the first bare-shaft stage of the three-stage SALCOS® programme. “We will be in a position to produce significant quantities of green steel and make it available to our customers as early as 2026,” emphasises Gunnar Groebler, CEO of Salzgitter AG.

The DRI plant is based on the “Energiron ZR® Direct Reduction” technology jointly developed by Tenova and Danieli, which can be operated flexibly with hydrogen and natural gas in any mixing ratio. It will be connected to the neighbouring electric arc furnace via the pneumatic Hytemp® transport system, so that the reduced iron pellets can be fed into the furnace in a hot state, even if the plants are not directly next to each other. For Giacomo Mareschi, CEO of the Danieli Group, “the use of Energiron® technology is a decisive step on the way to a green steel era”.



Model of the AERZEN process gas compressor VRA 536 S.

The oil-free VRA 536 S screw compressor, which Danieli has ordered from AERZEN, is used in the Hytemp® system primarily for the compression of molecular nitrogen (N<sub>2</sub>). The planned delivery date is July 2024. “Our process gas compressors of this type are rated for neutral, toxic, flammable, corrosive gases and mixed gases and are the ideal choice for fluctuating operational states and gases which are incompatible with oil,” says Dr Martin Pfund, Head of Product Line 3 Process Gas at Aerzener Maschinenfabrik. The volume flows range from 300 to 75,000 Nm<sup>3</sup>/h. ○

## The scope of supply

- Screw compressor with gearbox and drive motor
- Process gas piping (suction strainer, silencer, bypass, etc.)
- Integrated oil system (oil pump, oil cooler, oil filter, etc.)
- Seal gas system
- Complete instrumentation
- Built on a base frame

Danieli delivers the compressor control.

ACHEMA2024

# Gas compression in the process gas industry

Presented: oil-free **AERZEN** screw compressors of the VRA series

For bespoke gas compression solutions in the process gas industry, AERZEN offers a wide range of oil-free positive displacement blowers and screw compressors with oil injection and oil-free compression. In this double page spread, AERZEN presents some of the special applications for oil-free screw compressors of the VRA series.

**D**ue to their absolutely oil-free working method and the possibility of water injection, AERZEN screw compressors of the VRA series with gas inlet at the top and gas outlet at the bottom can be used for gases with impurities, polymerisation tendencies and processes which must not contain oil.

**Differential pressure up to 25 bar single-stage, intake volume flows up to 75,000 m<sup>3</sup>/h single-stage**

The operating limits of the equipment are determined by the pressure and temperature ranges and the permissible speed of the compressor. The compressors can withstand mechanical loads with differential pressures of up to 12 bar

## Special applications

### Soda production using the Solvay process - VRA 736

The Solvay process, also known as the ammonia-soda process, is a chemical process for the manufacture of sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>). An oil-free screw compressor can compress both the low-CO<sub>2</sub> lime kiln gas from lime incineration and the high-CO<sub>2</sub> "rich gas", which is used to produce the intermediate product sodium hydrogen carbonate in the so-called carbonisation process by using common salt and ammonia. In the final step, known as calcination, it is heated to approx. 200°C, whereby water and carbon dioxide (as so-called rich gas) escape. What remains is sodium carbonate, better known as soda ash.



### Production of caprolactam (C<sub>6</sub>H<sub>11</sub>NO) as starting material for nylon (polyamide 6) - VRA 336

As part of the production of (poly)caprolactam and emission reduction, toxic nitrogen oxide compounds are (re-)compressed oil-free.





(high-pressure range up to 25 bar) at a maximum final compression temperature of 250°C (160°C for compressor stages made of stainless steel). Single- and multi-stage process gas screw compressors are available with intermediate coolers.

The compressor packages operate at volume flows between 380 m<sup>3</sup>/h and 75,000 m<sup>3</sup>/h with main rotor speeds from about 1,000 to 180,000 rpm. AERZEN oil-free process gas screw compressors have an asymmetrical 4+6 rotor profile (primary rotor 4 teeth, secondary rotor 6 teeth). This profile combination results in relatively large rotor core diameters for the approved differential pressures.

International regulations such as API 619, 613, 614, 671, etc., sour gas regulations (NACE) and customer specifications will all be taken into account in the compressor package.

Water injection is used with gases for cooling or for regulating them to permissible or constant operating temperatures, for example to prevent polymerisation during butadiene compression, which is required for the production of styrene-butadiene rubber. The injection of solvents for purification is also possible on a temporary

basis. The cleaning effect of injection water and sealing water leaks applies as a particular advantage of the oil-free compressor type VRA wherever deposits of gas impurities such as tar, naphthalene and traces of polymerisation accumulate on the rotors and housing walls.

#### Various application areas

Oil-free screw compressors in the VRA series are used in the chemical, petrochemical and steel industries, i.e. in refineries, coking plants, soda factories and steelworks or in the direct reduction of iron. There, for example, they convey nitrogen oxides, flare gases, coke oven gas, lime kiln gas, mixed gases and gases with hydrogen sulphide concentrations (sour gas).

Oil-free screw compressors are also a key technology for compressing "green" hydrogen or wet CO<sub>2</sub> in the decarbonisation and clean energy sector. As flexible boosters, they can also feed downstream high-pressure compressor types with pre-compressed gas and be a component in an optimised overall concept. ○

Jan Gehrmann (Aerzener Maschinenfabrik GmbH,  
Process Gas Product Line, Application Technology &  
Product Management)

## Recovery of flare gases in refineries - VRA 336 and VRA 136

Flare gases are either incinerated as residual gases in petrochemical complexes or increasingly collected in the frame of emission reduction and reused as raw material or fuel gas. The hydrocarbon molecules of different lengths and fluctuating molecular weights in the gas composition require flexible and insensitive compressor solutions from the VRA series.



## Coke oven gas in integrated steelworks

The coke oven gas produced in the coking plant is consumed in conventional steel production both in the blast furnace and in downstream fuel gas applications, for example in the lime kilns. Depending on the distance and the required differential pressure, VRA compressors or multi-stage blower solutions from AERZEN are used, which are able to convey the dirty gases with their sticky components safely and efficiently over the long term with the help of water injection.

## Pneumatic transport of directly reduced iron

The reduced iron ore leaves the reactor and is transported as a cooled intermediate product to an electric arc furnace, where it is liquefied, together with scrap, to produce crude steel. The VRA serves as a pneumatic supplier of the iron ore - with nitrogen gas as carrier medium. This VRA application is equally relevant in integrated steelworks and for "green" steel with hydrogen as reducing agent.



ACHEMA2024

# 3D laser scanning takes revamp projects to a new level

**AERZEN** uses innovative technology to replace a process gas compressor at Solvay

*View of the compressor plant in Solvay's soda production as 3D point cloud via laser scan. True-to-the-original visualisation of the planned plant design using CAD software.*



3D laser scanners provide perfect planning, engineering and documentation data of entire industrial halls and thus facilitate the retrofitting and modernisation of existing plants. Thanks to the cooperation with a software system house, AERZEN can also use this technology for process gas blowers and compressors.

**A**t the end of August 2023 in the soda production of Solvay Chemicals GmbH in Bernburg: with a 48-hour test run under real conditions, the commissioning of an AERZEN VRB 736 S for the compression of coke oven gas was successfully completed and the compressor was handed over to the customer. The new package - a special design based on the standard VRA 736 S model - replaces an old AERZEN VKO 725 compressor from the 1970s as part of the modernisation of the soda plant. The order was placed with AERZEN by Solvay Chemicals. After approximately one year of planning and procurement, the implementation at site took place within just seven weeks.

In order to determine the concrete conditions at Solvay on site, AERZEN used the laser-assisted 3D scan to record the planning data precisely. During engineering in AERZEN,

it turned out that the system geometry required a special design - and so the VRB 736 S was developed, in which the drive shaft is located on the other side of the package compared to the standard model. The three-dimensional method enabled the new compressor to be designed precisely into the existing plant.

#### Enormous advantages

For AERZEN customers, the use of 3D laser scanning technology offers enormous advantages. You receive the actual "as built" condition in original colour for correcting previous drawings, schematics or plans and thus absolute planning security. The results are

- Accelerated project planning and implementation
- Faster installation processes
- Reduced failure and downtimes

- Lower services and assembly costs and
- Increased reusability of dismantled components

#### Other Revamp projects

A Spanish petrochemical industry company also relies on technology from AERZEN and partner. Two AERZEN compressors for mixed gases from refinery processes from the 1980s are to be replaced by new packages at one of the customer's plants. The mechanical design based on a 3D laser scan has already been completed, and work is currently underway on the design of the control system and instrumentation. An Italian manufacturer in the chemical industry has already had its styrene gas plant, in which two AERZEN models are used, measured three-dimensionally. A soda producer in Botswana also expressed an interest in 3D scanning.

# “An attractive option”

The ComPress editorial team spoke about the use of the 3D laser scan for Revamp projects with Tobias Schwickert (Customer Service Spare Parts & Repair in the After Sales & Operations range of product line 3 Process Gas).

## ComPress: Mr. Schwickert, why does AERZEN recommend 3D laser scanning to its customers?

**TOBIAS SCHWICKERT:** Errors can already occur during the manual measurement of plants, which can run through the total planning and, in the worst case, are only detected during realisation. Project and budget planning thus become a challenge that is associated with many risks. With 3D laser scanning, we enable our customers to integrate new bare-shaft compressors or subassemblies into existing plants in a perfect and cost-saving way.

Our aim is to change as few plant components as possible in order to minimise downtimes. This has been achieved excellently at Solvay. Foundations, utilities and very large components of the instrumentation remained untouched.

## ComPress: What are the general arguments in favour of Revamp projects?

**TOBIAS SCHWICKERT:** Revamp projects can be an attractive option for companies that want to increase efficiency, reduce costs and improve their competitiveness in a timely manner without having to invest in new machines. While orders for new machines are often placed via tenders, replacement machines can usually be

procured from the customers' maintenance budgets. This is why Revamp projects are also an elementary part of AERZEN's service concept and after-sales offer. ○



Revamp projects are an elementary part of AERZEN's service concept and after-sales offer.

**Tobias Schwickert**

## 3D laser scanning: What is it?

3D laser scanning enables AERZEN to realise a precise and complete 3D representation of the original environment within a few days, into which our blowers and compressors are integrated. Every detail is captured in paint and highest resolution with all actual dimensions and full transparency - even through walls and objects or across floors as in the Solvay project. The result is a 3D point cloud that can be immediately transferred to all common CAD programmes and used for construction planning (e.g. in Autodesk Inventor). The creation of the three-dimensional plant model takes one to two weeks, depending on the size of the project. Site inspections and measurements become superfluous in the best case, saving time and money. Once the 3D point cloud is available, one can immerse oneself in the digital environment with virtual reality glasses and experience and assess the local conditions from a distance. The so-called collision check is carried out completely digitally within the point cloud as part of the engineering for all scanned and later constructed objects. Assembly collisions can be detected and avoided in advance.

## Fields of application of 3D laser scanning

- Modification and modernisation of existing plants
- Replacement and new integration of blower and compressor technology
- Determining the installation space when building new systems

Further  
information



*AERZEN compressors can feed the boil-off gas, which is produced on LNG tankers during transport by heating LNG, back to the ship's engine after pressure adjustment.*

# Using boil-off gas safely and sensibly

Multistage oil-free compressors from **AERZEN** are energy efficient customised solutions for the shipbuilding industry too

AERZEN offers a wide range of solutions for the multi-stage oil-free compression of gases. For example, AERZEN packages play an important role in the handling and processing of boil-off gas (BOG) in the shipping industry.

**S**afe, protected and efficient shipping on clean seas": this is the motto of the International Maritime Organization (IMO), a specialised agency of the United Nations with 175 member states worldwide. One of the aims of the IMO regulations is to reduce emissions from ships. This also applies to climate-damaging gases such as methane, which can be produced when

boil-off gas is drained (see case). "We expect that boil-off gases from ships will only be allowed to be released into the atmosphere until the end of 2025," says Bernd Klemme, Technical Manager at RKR Gebläse und Verdichter GmbH in Rinteln.

RKR Gebläse und Verdichter GmbH is a wholly owned subsidiary of Aerzener Maschinenfabrik GmbH and spe-

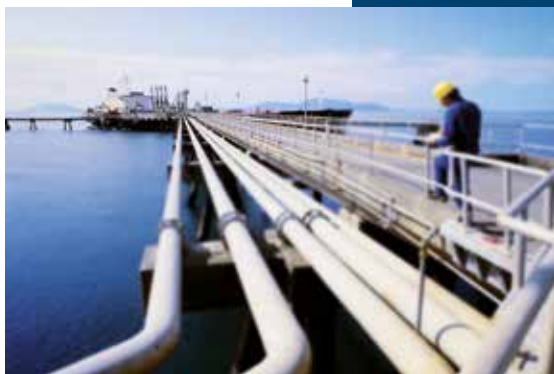
cialises in multi-stage oil-free systems in relation to the application process. “We combine AERZEN standard products with our engineering, design and assembly expertise to create AERZEN customised solutions,” explains Bernd Klemme. Based on the double-stage 2C screw compressor series, RKR has developed a 2C G package that fulfils the safety requirements of DIN EN 1012-3 for flammable gases and therefore also for BOG. In order to guarantee maximum process reliability, the sealings of the AERZEN compressor stages used were optimised and a special material was selected. Depending on the environmental conditions, equipment with ATEX components is also possible.

### Three main processes

With the new double- and three-stage oil-free compressors for gas applications, AERZEN offers the marine industry an energy-efficient solution for the three most important processes in which BOG is produced and can be reused after treatment:

- 1.) In the **“recovery system”** for large container ships, which produce around two tonnes of BOG as exhaust gas every day, which is piped to a plant on land for further use as heating gas, for example. The compressor is required on the one hand for conveying and on the other for compressing the BOG to a different pressure level.
- 2.) The **“Fuel Gas Supply System”**, which is used on ships to transport LNG or other gaseous fuels from the storage tanks to the internal combustion engines or other consumers. The resulting BOG is fed back to the motor by the compressor after pressure adjustment - not only to reduce emissions, but also to lower energy costs through the resulting turbo effect. In addition, the compressor can be used as a component of the BOG’s reliquefaction system.
- 3.) In the **“Cargo Handling System”** on LNG tankers, which is responsible for the secure transport, storage and transshipment of LNG on board the ship. Here, AERZEN packages are used for compression of the BOG and for recirculation into the LNG storage tanks as well as for pressure control of the cargo tanks.

Bernd Klemme is very confident that the AERZEN Group fulfils the requirements of the international shipbuilding industry with the BOG compressors. “We do not deliver off-the-shelf solutions, but bespoke and therefore cost-optimised solutions that secure the sensible and safe handling of boil-off gas for all parties involved, such as shipbuilding companies, ship owners and operators as well as consulting and classification companies.” ○



*Boil-off gas can also be piped to a plant on land to be used for other purposes. AERZEN compressors take over the conveying and compression of the BOG to a different pressure level.*

## About boil-off gas

Boil-off gas is a gaseous by-product that is generated during the storage and transport of liquefied natural gas (LNG). LNG is liquefied at very low temperatures (typically below  $-162^{\circ}\text{C}$ ) to reduce its volume and make it easier to transport over long distances by ship or truck.

When LNG is stored or transported, the product gradually heats up and begins to vaporise. This vaporisation process generates the boil-off gas. It consists of the original components of LNG, mainly methane ( $\text{CH}_4$ ), and possibly small quantities of other light hydrocarbons.

## Wide spectrum

AERZEN offers multi-stage oil-free compression of gases not only for the utilisation of BOG, but for a wide range of industries and applications:

- For the extraction and processing of biogas and landfill gas
- In the chemistry and petrochemical industry for processes such as air and gas treatment, nitrogen and hydrogen recovery as well as gas purification and compression
- In the food and beverage industry for processes such as ventilation of fermenters, gas conveying and treatment as well as filling and packing
- In power plants and other energy generation plants for gas extraction, processing and compression as well as for feeding biogas into the grid



*A manufacturer of specialty chemicals in France needed 4,000 Nm<sup>3</sup>/h of air at 400 mbar and a dew point of -40°C for catalyst regeneration. Thanks to the support of the network of partners, Aerzen Rental supplied two blowers along with two refrigeration machines and a complete dehumidification system. By using this rental solution with 1 bar (g) oil free air an energy saving of 650 kW (222 kW vs 870 kW) was accomplished compared to the traditional method in which 10 bar (g) compressors are used.*

# Aerzen Rental offers a comprehensive, immediately available rental fleet in the low-pressure sector

**AERZEN's** rental machine business remains on course for expansion

AERZEN's entry into the rental machine business with the founding of Aerzen International Rental B.V., based in Duiven, the Netherlands, on 1 November 2000 marked the beginning of a success story.

Since the start, the subsidiary of Aerzener Maschinenfabrik GmbH has grown continuously and has become active in more and more European countries. The global expansion of the AERZEN rental business began in 2018 with Aerzen Rental USA in the AMERICAS region. Rental is now also represented in the AERZEN regions APAC (Asia-Pacific) and MEA (Middle East/Africa) with own branches.

Aerzen Rental products are specially developed for rental use: they are always modular and therefore easy to connect, easy to transport and robust to simplify handling. The machines are equipped with complete control and regulation technology as standard. Special interfaces facilitate integration into the customers' process control.

Aerzen Rental has concentrated on the low-pressure segment up to 4 bar(g) from the very beginning. Today, Aerzen Rental offers a comprehensive range of 100 per cent oil-free air rental equipment (Class 0, ISO 8573-1), plus accessories, and complete solutions covering many sectors.

"Our immediately available rental fleet in the low-pressure sector, for example, is the largest in the European market, and we are also generally well-positioned in the USA," says Gerben Keurentjes. The Managing Director Aerzen International Rental B.V. and Head of AERZEN Product Line Rental adds: "The most important difference to the competitors is that the capacities of our turnkey rental machines offer the widest range in the market in terms of individual volumes for the positive and negative pressure range. Added to this are our process solutions, most of which we keep in our own rental fleet.

With the AERZEN product range for every pressure range - hybrid, turbo, blower and compressor - our solutions are also more energy-efficient and more cost effective than those of our major competitors."

#### Plans for 2024

The new Aerzen Rental location in Mexico went into operation in the first quarter of 2024. Thailand follows in the second quarter and Saudi Arabia in the third quarter of 2024. Further expansion is being planned, says Gerben Keurentjes: "In order to be even closer to our customers in Western Europe, we plan to open a branch in Italy this year. A representative office in the south of France or Spain is planned for 2025."

*Thanks to the competent wastewater partners, Aerzen Rental is able to offer complete temporary wastewater systems including tanks, aeration systems, pumps and pre-treatment.*



### Aerzen Rental at a glance

- Number of employees: approx. 55
- Head office Aerzen Rental and European headquarters: Duiven (Netherlands). All rental machines are usually built here, which guarantees a globally standardised technical and visual design.
- Other companies/subsidiaries/locations:
  - Germany (Europe region): Rinteln
  - Great Britain/Ireland (Europe region): Midlands
  - USA (Americas region): Atlanta, Georgia; Phoenix, Arizona (4th quarter of 2024)
  - Mexico (Americas region): near Mexico City
  - Saudi Arabia (Middle East/Africa region): Dammam
  - Thailand (APAC region): Rayong
  - Stock: France (south of Paris), Sweden (near Stockholm), Spain (Madrid)
- Products: the total AERZEN machine portfolio for low pressure and compressed air applications in pressure ranges from -700 mbar (g) underpressure to 4 bar (g) and limited even up to 10 bar (g) positive pressure - from turbo blowers, positive displacement blowers and rotary lobe compressors to single and double-stage compressors. In addition, there are accessories such as power generators (transformers/diesel generators), power distributors, power cables, piping, coolers (air-air coolers, water-air coolers), dryers, condensate separators and ventilation panels; in future, systems for filling and draining big bags will also be offered.

# Efficient by Nature Sustainable by Design **It's in our DNA.**

The innovative AERZEN  
Roots, Screw and Turbo Blowers



Up to 55% energy saving potential in the biological wastewater treatment process



Minimising CO<sub>2</sub> footprint by 65% to achieve your common climate goals



Optimising blower technology mix for a sustainable aeration process



**LET'S TALK**

about efficiency and sustainability  
[www.aerzen.com/wastewater](http://www.aerzen.com/wastewater)



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