



# AERZEN COM·PRESS

## Wastewater technology

The Aerzen Turbo principle:  
Air as bearing

2



## Amount of air in the limestone production

Size actually matters

3



## Aerzen Italia

On expansion course

4



Dear Readers,



Klaus Grote,  
Vice President  
EMEA AERZEN

The world revolves and technical progress also advances with it. In the current issue AERZEN COM.PRESS you will learn more about already implemented solutions in the field of wastewater technology. As a member of the GWP (German Water Partnership), AERZEN is always informed and actively involved in new innovations in wastewater treatment technology. AERZEN is not only

limited to the "air generators", but has the focus also on the optimisation of the complete plants. In addition to the air supply for the wastewater treatment tanks, AERZEN also has gas blowers including ATEX approval in its product range. Thanks to its local sales companies, AERZEN is also at home in the wastewater business outside of Germany. The example of AERZEN Italia illustrates how suitable equipment and know-how for wastewater treatment plants can be installed on site. The success of the last ten years in Italy speaks for itself. And now I wish you a lot of fun reading this issue!

With very best wishes



The wastewater treatment plant in Isny provides the activator basins with a turbo blower from AERZEN.

If the air requirement is beyond this value or the working range of the AERZEN turbo machine, a positive displacement blower of AERZEN type Delta Blower takes over the work at low load, or switches on at peak loads.

## Phosphate-free into Lake Constance

Isny wastewater treatment plant cleans in four stages with blower technology made by AERZEN

Thanks to a fourth treatment stage, the Isny wastewater treatment plant achieves a phosphate content of 0.1 milligrams per litre, and is thus two thirds below the permitted limit value on an annual average. Very good wastewater treatment is necessary in southern Germany. The 50,000 PE plant discharges the purified water via the 'Untere Argen' river directly into a drinking water reservoir, called Lake Constance. Blower technology, made by AERZEN, takes over important processes in the fourth cleaning stage, the activator basins and other cleaning areas.

It is a full state treaty, which has regulated things in the border region between Baden-Württemberg and Bavaria since 1986. The signatures of Lothar Späth and Franz-Josef Strauß are still today a visible sign for a clean sweep. After all, the two prime ministers laid the foundations for the Isny wastewater treatment plant, and thus also for economic and state-of-the-art wastewater technology across two national borders. The catchment area of the wastewater association Isny-Weitnau in the Allgäu region measures 160 square kilometres. "About two thirds of our wastewater

come from the municipality of Isny, with the remainder coming from the Bavarian municipality of Weitnau. Accordingly, the investments are also distributed according to the causation principle," says Ulrich Schneider, Wastewater Master.

### Strict requirements due to proximity to Lake Constance

Another special feature of Isny is its immediate proximity to the Lake Constance drinking water reservoir, with correspondingly low discharge limits. The company managed by Schneider achieves an annual average COD value of 12 milligrams per li-

tre. The nitrogen content is 7 milligrams. For phosphorus it is 0.12 milligrams at the outlet to the receiving water. In the fourth treatment stage, the wastewater is treated with trivalent iron salt to precipitate the dissolved phosphate. This reaction produces flakes of poorly soluble iron phosphate ( $\text{FePO}_4$ ), which can be eliminated with a two-stage filter, made of quartz sand and anthracite. Depending on the freight volume, the filter must be flushed with a water-air combination at least every 24 hours. The wastewater treatment plant uses for cleaning two older positive displacement blowers of AERZEN type Delta Blower. The two assemblies supply air into the basin by means of the filter cartridges at the bottom of the sand filter and, together with the pumped water, swirl the filter material with the iron phosphate enriched in it. Due to the different specific weight of quartz sand and anthracite, both filter materials are sorted again exactly in their specified layer after rinsing. The iron phosphate rinsed out leaves the basin via a drain and is returned to the wastewater treatment plant. >



At the underside of the digestion tower: Markus Leidinger (left) from AERZEN and Ulrich Schneider, Wastewater Master, agree that self-generated energy supply is becoming increasingly important.

From the AERZEN blower station, the activator basins, as well as the grit chamber and the fourth cleaning stage are centrally supplied with air.



“Ultimately, we enrich the sewage sludge with it,” explains Ulrich Schneider.

The sewage sludge must be dried before it can go into combustion. The heat required for this procedure can be obtained from modern wastewater treatment plants, with technology already available today from the company's own treatment process. AERZEN now offers system solutions for effectively recovering the heat inevitably generated by compressed air with tube bundle heat exchangers. Thermal energy is already used in many wastewater treatment plants for heating the operating buildings, including hot water preparation. With a view to sewage sludge recycling,

thermal energy will play an even greater role in the drying procedure in future.

#### Self-sufficient energy supply

Wastewater Master Ulrich Schneider and Markus Leidinger, Sector Manager at AERZEN, agree that self-generated energy supply of wastewater treatment plants will continue to gain further importance in the future. For good reason, a photovoltaic system is installed on the roof of Isny, generating green electricity together with the block-type thermal power station. Amongst others, the heat from the block-type thermal power station goes into the digestion tower and creates optimum fermentation temperatures. With a view

to achieving the best possible energy efficiency right from the start, Isny also uses a combination of turbo blowers and positive displacement blowers for aeration of the activator basins. AERZEN turbo blower, type AT 50-0.6 S with 40 kW motor rating, delivers a volume flow of up to 35 standard cubic metres per minute. The compact, speed-controlled machine is thus able to cover the base load range of the wastewater treatment plant completely, with high energy efficiency. For operating conditions below this level, this turbo blower is automatically disconnected from the mains, and a Delta Blower, positive displacement blower, type GM25 S (maximum volume flow 20 m<sup>3</sup>/min with 30 kW) takes over

the work. At peak loads, the two assemblies form a compound operation. The interaction of different blower technologies is called AERZEN Performance<sup>3</sup>. The bespoke system takes into account every type of machine and its special technical features, in order to be able to regulate the sometimes fluctuating pollutants with maximum energy efficiency.

#### Résumé

The wastewater treatment sector is currently facing a number of challenges. These are the topics: energy efficiency, phosphate recovery and the purification of water from plastic compounds. In addition, solutions must be found to effectively reduce the excreted drug residues of painkillers and the contraceptive pill, e.g. by means of ozone systems. “There are also initial analytical results, which show that food additives, such as the sweetener aspartame, are present in water - with unknown consequences,” reports Schneider.

Turbo blowers – for the reliable and efficient air supply of aeration tanks

## The AERZEN principle: Air as bearing

The air supply of modern wastewater treatment plants is clearly designed for maximum availability, high energy efficiency and long maintenance cycles. Therefore, AERZEN does not use oil or other lubricants for the demanding bearings within the turbo blowers of the current series AERZEN Turbo G5<sup>plus</sup>, AERZEN uses simply air. Thanks to the new turbo generation, AERZEN has created a more robust and more efficient solution compared to highly complex magnetic bearings.

As an effective bearing without any mechanical friction at all, AERZEN uses compressed air in the two radial drive shaft bearings and the axial bearing for absorbing the axial forces. In doing so, in no case, air is pumped with high pressure externally into the bearing shell, but rather in a brilliantly simple way, the compressor principle is used. Due to natural unbalance, when starting the turbo blower, the rapidly rotating shaft generates an eccentric circular motion in the air gap of the bearing. With the minimal distance to the bearing wall, the shaft increases the pressure in this area, and counterforce

is generated in the form of an increase in pressure. This forces the shaft back in the opposite direction. Due to the rapidly increasing speed, the shaft centers in the bearing itself and increases the pressure in the air gap to more than 30 bar. The prevailing force couples are so high, that they keep the shaft permanently in the centre of the bearing, even in case of considerably varying and challenging operation conditions, and this takes place in free-floating manner without surface contact. The highlight of this AERZEN principle is that the air cushion forms itself during operation and - in contrast to magnetic bearing (see

information box) - without further energy input. Initially, the air foil bearing was developed by NASA and has now been further optimised by AERZEN for turbo blower technology.

Concerning the air foil bearing principle no electrical, mechanical or pneumatic regulations are necessary - not even in case of dynamic load changes. It is true that wear friction can develop during start-up of the turbo blower until the air cushion is formed. In order to face this theoretical possibility, AERZEN has developed an innovative air foil bearing system. AERZEN uses a 2-component coating as the maintenance-free friction partner, which serves as a reliable lubricating film on contact with the shaft. As the compressor compresses the air in the bearing so densely,

the layer between bearing ring and shaft is practically as hard as steel. Consequently, AERZEN has designed a damping layer specifically for this application - the spring foil. This is a millimetre thick plate which, when rolled into an undulating shape, supports the lubricating layer of the bearing and absorbs vibrations at the same time.

#### Air offers reserves for higher speeds

With the sophisticated conception of the air foil bearings, AERZEN succeeded in maintaining the simple construction of a turbo blower with the high-frequency permanent synchronous motor as energy-efficient drive. This bearing type still has reserves to support higher speeds than this is usually possible with magnetic bearings. As a consequence, the performance density of the turbo blowers can be further increased due to faster rotating blade wheels, if the appropriate motors are used.

Simple and effective: AERZEN relies on air bearings for its turbo blowers.



Air gap bearing with spring foil



### Air foil bearing vs. Magnetic bearing

Turbo blowers from other manufacturers work with magnetic bearings, which also aim to overcome the high speeds without any mechanical bearing. However, with the older technology of magnetic bearings electrical current is needed, so that the coils, arranged circularly around the drive shaft, can develop their forces during operation and have the shaft rotating free from mechanical friction. Particularly changing operation conditions put the highly complex regulation system of the magnetic bearings to a test. Frequently it comes to safety shutdowns of the entire turbo blower due to technological reasons. To ensure, that in case of a malfunction, an emergency shutdown, or a power failure, the system remains active for a certain period of time, turbo blowers with magnetic bearings must always be equipped with an uninterruptible power supply (UPS). Consequently, the UPS inevitably increases the life-cycle costs. A similar expenditure is necessary for the magnetic bearing system, as - permanently in operation - it uses electrical energy continuously. Its complex regulation technology necessitates regular maintenance intervals. The innovative air foil bearing from AERZEN has been designed for a theoretical bearing life of 80,000 operating hours independent of start/stop cycles, and sets a new standard in the market.

Amount of air in the limestone production

# Size actually matters

David Salazar, Aerzen Americas Application Manager, Cement - Lime - Concrete, writes about selecting the right technology and machine size for fuel conveying, combustion air and air cooling systems to optimise fuel efficiency in the kiln for lime production plants.



AERZEN Delta Hybrid in a lime plant

look for the best fuel efficiency in the kiln process. The efficiency in the burning process is closely related to the availability of certain types of fuel and the proper selection of the fuel conveying, combustion air and cooling air technologies that includes low pressure oil free rotary lobe compressors and turbo blowers.

### Kiln technologies

Currently in the limestone production processes, there are two main kiln technologies used: vertical kilns and rotary kiln systems. Both technologies require a large amount of low pressure oil free air for fuel conveying and cooling processes to guarantee the proper quality of the calcium oxide, according to a specific research on lime production process in the USA from RTI (Research Triangle Institute). Vertical kilns are the preferred technology for lime producers as less capital investment is required, and the fuel efficiency is greater. However, in the U.S., vertical kilns have been largely replaced by rotary kiln systems, mainly because they require less labor and have the highest output by reducing the amount of spalls. A summarised analysis of the two technologies is shown in the table.

Technology comparison	Vertical kilns	Rotary kiln systems
Capital Investment	Lower	Greater
Size of the rock	Larger	Smaller
Amount of cooling air	Lower	Greater
Fuel Efficiency	Greater	Lower
Amount of spalls in the process	Higher	Lower
Predominant fuels (Depends on country availability)	Natural gas/Fuel oil	Coal/Petroleum coke
Labor demand	Higher	Lower

Vertical vs rotary kiln analysis, AERZEN

Source: Lime production industry profile, RTI research

### Application specialists

AERZEN has a rich history of devising low-pressure solutions that consider important and flexible performance parameters and requirements in various production processes. Contact your local application specialist. For the Americas, forward your requests to: david.salazar@aerzen.com

### Air supply for the kiln

As shown in table below, the amount of air required for both vertical and rotary kiln in the combustion process is large enough to consider it as critical application for the production process. AERZEN application specialists have identified some common improving opportunities at different plant locations that involve the following main aspects:

- Appropriate selection and design of the machine that provides the combustion air to efficiently burn the fuel. In total, AERZEN offers with positive displacement blowers, rotary lobe compressors, screw compressors and turbo blowers, an extensive range of products and technologies in order to be able to offer tailor-made process air solutions for the most diverse requirements.
- Design of the pipe diameter through which the air for the cooling lances (vertical kilns) flows. There is the danger that the air speed is too low, which can lead to clogging of the lances.
- Initial investment for the low pressure air compressors, without considering the TCO for the project, which in the medium term may lead to a reduction of MTBR and an increase of the total cost of ownership.

## AERZEN Technology at the L'Aquarium in Barcelona

The spectacular Oceanario de L'Aquarium in Barcelona is considered the largest and most species-rich aquarium in Europe. With a diameter of 36 metres and a depth of 5 metres, it holds approximately 4 million litres of water. A few months ago, an AERZEN Delta Blower package was put into operation in the L'Aquarium. A large team of highly qualified professionals and cutting-edge technology enables to guarantee the health and wellbeing of over 11,000 animals at the L'Aquarium.

Around 6 million litres of seawater is needed to fill the 21 aquariums. This water is supplied continuously by means of controlled extraction in wells arranged specifically for this purpose. A sophisticated water purification system enables operation in a semi-closed cycle. Purification and filtration are required for a number of reasons. When leftover food, along with the excrement of each organism (with a high ammonium content), is biologically degraded, secondary chemical compounds form (nitrites and nitrates), which are very harmful to the occupants of the aquarium and must be removed. Final sterilisation of the water is required as a biological prevention measure towards the exterior of L'Aquarium.

The new AERZEN Delta Blower starts up in case of emergency, such as an electrical breakdown, and thus makes sure that the water runs out of filtration, and the fishes are provided with oxygen. The circulation of water is what generates oxygen. In addition, in an emergency, porous, pumice-like stones are put in the water to oxygenate the water. The AERZEN Delta Blower provides absolutely oil-free air according to ISO class. For the Aquarium application, it is a must: If the blower was operated with oil it would be fatal for the fishes.

Link to the video of Aerzen Iberica:

<http://blog.aerzen.es/puesta-en-marcha-del-delta-blower-en-el-aquarium-de-barcelona/>

An AERZEN Delta Blower starts up in case of emergency in the Aquarium.



## AERaudit - Economic efficiency analysis in three steps

# How efficient is my wastewater treatment plant?

As part of AERwater's holistic approach, AERaudit represents a first step in a process chain to provide digitisation, automation and resource efficiency solutions in the field of wastewater treatment, which are precisely tailored to the individual customer process.

As one of the market leaders in wastewater technology, AERZEN accompanies its customers on their journey towards 'Water 4.0' by means of AERwater, a trend-setting process optimisation in water management.

AERaudit is an innovative service developed exclusively by AERZEN to improve the energy efficiency of wastewater treatment plants. Municipalities in particular must focus on cost savings because wastewater

treatment plants are their largest energy consumers. About 60 to 80 percent of the total energy requirement of a wastewater treatment plant is generated in the area of biological purification, in which the oxygen contained in the air is used to purify the wastewater. Only if it is known at which time which air requirement is needed, a meaningful energy analysis for the energetic optimisation of blower stations can be carried out.

As an analysis specialist, AERZEN is a competent partner for the analysis, as well as the design of suitable machines. In three steps, AERaudit then leads to the most economical and future-oriented plant configuration of the corresponding wastewater treatment plant.

- On-site measurement: The AERZEN service team creates transparency regarding the key performance indicators for your blower station. A mobile measuring station is used to record your relevant aeration data. Volume flow, system pressure, temperature and power consumption are measured in real time and recorded in the form of load profiles.
- Analysis: The evaluation of the recorded data is carried out carefully and exten-

sively at AERZEN headquarters, every low and peak load, no matter how small, is evaluated. Based on the results, our experts develop one or more concepts, tailored to your requirements, which are as efficient as possible for you.

- Report: All data of your blower station are displayed in detail and transparently. Temperatures, load profiles and energy costs are visualised in diagrams and explained in detail. We will also show you your customised Performance<sup>3</sup> solution with the ideal machine configuration. In addition, how large the saving potential of energy and CO<sub>2</sub> is, and which amortisation periods can be achieved.

New models AT75 and AT100 are now available

## Aerzen Turbo G5<sup>plus</sup>, now with 13 sizes

With the new generation Aerzen Turbo G5<sup>plus</sup>, AERZEN has designed the most compact and efficient turbo machine in its class. With the two new models AT75 and AT100, available immediately, the Aerzen Turbo G5<sup>plus</sup> portfolio has now been extended by another five to 13 sizes.

The Aerzen Turbo G5<sup>plus</sup> is available in all flow rates from 300 m<sup>3</sup>/h to 8,400 m<sup>3</sup>/h, and with a maximum pressure of 1,000 bar. The current selection of blower sizes ranges from the small AT 25-0.8 G5<sup>plus</sup> to the largest model AT 200-1.0 G5<sup>plus</sup>.

The series Aerzen Turbo G5<sup>plus</sup> lives up to its name, because it convinces through

numerous advantages. The five new turbo machines have an extremely compact design and require very little space. Further outstanding features are the innovative AERZEN air foil bearings with double coating and the new multilevel frequency converter technology, which reduces the heat loss in the motor to a minimum and, consequently, improves the total efficiency significantly. Another advantage: an additional motor throttle or a sine filter, which has to be used with conventional frequency converters, is no longer necessary. The

new air foil bearings represent a further decisive development thanks to double coating, consisting of Teflon and graphite. It impresses with increased temperature resistance and an increased service life of > 80,000 operating hours, regardless of start and stop cycles.

All advantages at a glance:

- Increase of energy efficiency by up to 10% compared to conventional turbo technology.
- Extended bearing life thanks to innovative AERZEN air foil bearings with double

### The new models at a glance

Sizes	Nominal width	Max. press. range	Volume flow
AT75-0.6	DN 200	600 mbar	3,900 m <sup>3</sup> /h
AT75-0.8	DN 200	800 mbar	2,900 m <sup>3</sup> /h
AT100-0.6	DN 250	600 mbar	5,100 m <sup>3</sup> /h
AT100-0.8	DN 200	800 mbar	3,900 m <sup>3</sup> /h
AT100-1.0	DN 200	1,000 mbar	3,000 m <sup>3</sup> /h



Aerzen Turbo G5<sup>plus</sup> is the most compact and efficient turbo machine of its class.

coating, maximum reliability, even under extreme operating conditions.

- 100% oil-free.
- Lowest maintenance effort, only regular filter change.
- Extended fields of application at ambient temperatures up to 50°C.
- Active surge protection by means of automatic speed increase.
- Space-saving design.

### News from AERZEN Product Managers

On June 1, 2019, **Ricardo Wehrbein** took over the activities of Product Manager Delta Hybrid at AERZEN. Ricardo Wehrbein can draw on experiences as Product Manager Accessories & IoT. He also worked as an electrician for Delta Hybrid machines before studying industrial engineering, and can, therefore, rely on extensive practical experience.



Ricardo Wehrbein

**Christian Reimann** took over the position of Product Manager for Delta Blower and Alpha Blower on June 1, 2019. Previously, Christian Reimann was exclusively responsible for AERZEN Alpha Blowers as Product Manager. His experience as a quotation engineer for standard and modified solutions regarding blowers and compressors provides him with sound product and application knowledge.



Christian Reimann

### IMPRINT

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# AERZEN

### New company headquarters north of Milan

## Aerzen Italia is growing

Aerzen Italia S.r.l. is expanding. Its 700 square metres building with offices and workshop, which was occupied in 2014, was no longer sufficient for the company's business needs. So, at the beginning of 2019, the Italian subsidiary of the AERZEN Group moved into a modern building which is more than three times larger than the old building.

The new company headquarters in the north of Milan is the right size to facilitate our professional and customer-oriented approach to our tasks in the future and to continue our steady growth," says Alessio Recli, CEO of Aerzen Italia. The 23 employees have 800 square metres of office space, a 1,000 square metres service workshop and a 600 square metres new equipment and spare parts warehouse at their disposal. The new location, which also has over 2,000 square metres of outdoor space, including parking, offers enough space for additional workplaces in a bright, friendly and fresh atmosphere that contributes to the motivation and productivity of the team.

Besides Alessio Recli, the management team of Aerzen Italia consists of Alessandro Sassi (Director Sales and After Sales), Luca Fasoli (Manager After Sales), Davide Viganò (Sales Manager) and Marco Anadotti (Technical Manager). The quintet



Pleased about the new location:  
Alessio Recli, CEO of  
Aerzen Italia

relies on five sales engineers and five after-sales engineers, six technicians, including an Aerzen Turbo expert, as well as two administrative employees. In order to guarantee the best possible customer service and loyalty, Aerzen Italia has established a distribution network with twelve external representatives throughout the country.

#### Strong in various applications

"The Italian market is highly competitive, especially in terms of price. Therefore, we rely on our know-how and the careful support of our customers throughout the entire life cycle of AERZEN products from the quotation phase to the service," emphasises Recli. Aerzen Italia is particularly strong in the field of wastewater treatment. "In the blower market, which was formerly dominated by a competitor, we will achieve a share of almost 50 percent of all new blower systems sold, including

exports, this year," according to the CEO. The company will also be pushing Aerzen Turbo-Technology further into the market in order to take the lead position in this sector in the future. For comprehensive system solutions, the customer is also well advised with Aerzen Italia, says Recli: "For example, we also take care of piping, sensors and electricians."

The growth and the success of Aerzen Italia is reflected in the number of employees, which has increased more than five-fold in the past years. Aerzen Italia S.r.l. started in 2008 with just four employees. The company emerged from the former Savoia branch, which had represented the AERZEN brand in Italy since 1936. After two relocations, in 2010 and 2014, in the centre of Milan, the company has now moved to Bollate in the northern outskirts of the city. All customers can easily reach the new company headquarters by car. The opening of a motorway exit in the immediate vicinity is planned for next year – then Aerzen Italia can be reached even faster. ○

Modern, generous and focused on further growth: The new location of Aerzen Italia.

