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Q&A with Kaeser: Selecting the right blower for your application

Blowers are a key component of a wastewater treatment plant and also a large energy consumer. Selecting the right blower is therefore paramount. Here Kaeser Compressors discusses the differences in blower design and what factors should be considered in order to select the most appropriate blower for any given plant or application.

From agitation to aeration, filter backwashing and capturing methane, blowers are used for many fundamental purposes within a wastewater treatment plant. This of course comes at a cost, with blowers estimated to consume 60 percent or more of the wastewater treatment plants (WWTP) power consumption.

Q: What common mistake can WWTP's make when selecting blowers?

A: WWTP's are generally designed to offer 20 to 30 years of service. As a growing community will likely have higher demands on the WWTP 30 years from now than it does on day 1, WWTP's are therefore designed and built for an expected future capacity. This means that the blowers specified are usually oversized for the first 10 to 15 years. This not only creates unnecessary cost to the operator, but it is also less than ideal for the blower itself. To avoid this a splitting solution would be beneficial, where you have multiple blowers that can do a varying flow load as the plant expands or decreases.

Q: What types of blowers are available and how do they differ?

A: Blowers can be divided into two groups - dynamic and positive displacement (PD).



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Dynamic machines work by accelerating air to high velocities and include centrifugal and high-speed turbo (HST). They are generally more complex, can produce large amounts of flow and can offer high efficiency ratings, but have limited control ranges.

PD machines work by trapping volumes of air at the inlet port and pushing it out of the discharge port and include lobe and screw blowers. They tend to be simpler devices, offering a proportionally wider control range, are less expensive to purchase and provide greater start/stop capabilities. Historically the lobe designs offer lower efficiency ratings and lower flow capacities than the larger centrifugal machines however, this is changing with the introduction of modern screw type designs.

Q: What are the characteristics and advantages of a lobe style package blower?

A: Lobe type blower packages are available with a wide range of options. A basic package would include a blower, inlet silencer, discharge silencer, motor and inlet filter. A more advanced package would have a sound enclosure, unloaded start valves and check valves. Premium versions would also include controllers, sensors, starters and have the option of a variable speed drive (frequency controlled drive).

Low investment cost, versatility in application types and adaptive pressure capabilities are some of the key advantages of lobe style blowers. A lobe type blower will only operate at the pressure the system requires and they can be turned on and off frequently.

Q: What application best suits the lobe style package blower?

A: Lobe style package blowers actually work well in most WWTP applications. The cost of energy will in many cases determine which of the technologies will deliver the best payback for the investment for one of the high efficient turbo and screw machines. This is especially the case for applications like filter backwashing and digesters, where minimal usage (filter

backwashing) and fluctuating fluid depths (digesters) will extend this payback period. Here lobe type machines provide sufficient performance at a reduced investment.

Q: What are the key differences with a screw blower package?

A: While the package component requirements of a screw blower will differ from manufacturer to manufacturer, in general they are the same as the lobe design. The main difference is the operating speeds of the screw. In the same airend size, a screw blower typically runs at twice the speed of a lobe design. This changes the design requirements for the drive system, posing an additional challenge for oil side seals. For the drives this means faster speed motors and greater drive ratios or a gear drive transmission system. As they are still splash lubricated, additional care is needed to cool, seal and capture the oil mist generated by such high speeds. This ultimately makes the machine more complex compared to the simplistic lobe type design.

Q: How does a screw blower package save on energy costs?

A: The process of internal compression characteristic of a screw design creates a 20 - 30 percent gain over PD designs. This number will depend on the operating pressures and control range speed. In addition to design point gains, screw machines also have a better performance at lower speeds. If you compare the specific performance curves of both designs, the screw blower offers nearly a flat line, whereas the lobe type has a severe 'ski-ramp' effect at the lower end. While turbos may offer a slightly better number at one design point, their turndown is limited and their curve is u-shaped.

Q: What is the ideal application for a screw blower?

A: These types of blowers are best suited for steady operating pressures with many running hours. They are therefore a good fit for aeration basins that require air all year long and where the fluid depth doesn't fluctuate a great deal. The ability to fully integrate these



blowers into the control system via IIoT further opens the door to advanced machine control and preventative maintenance efforts.

Learn more with Kaeser at OzWater'19

Visitors to Ozwater'19 are invited to join Kaeser on stand B13 where they can discover the latest low pressure compressed air solutions ideally suited to water / wastewater applications, as well as obtain expert advice from Kaeser's team of compressed air specialists. For more information from Kaeser visit www.kaeser.com.au or phone 1800 640 611.

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Editors Notes

From 2.2 to 500 kW, Kaeser Compressors manufactures a wide range of compressors and associated auxiliary equipment that meet the varying requirements of a diverse range of industries and applications.

One of the world's largest manufacturers of rotary screw compressors, Kaeser Compressors is represented globally in over 100 countries through a dedicated network of branches, subsidiary companies and authorised partners.

Kaeser Compressors Australia provides comprehensive sales and service from its 30,000 ft² purpose built factory in Dandenong, Victoria alongside an extensive network of sales and service centres and authorised partners that cover Australia, New Zealand and New Caledonia.

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((Captions)) :





002_Image 1_KAESER BB89COFC.png

Caption: BBC series rotary blower from Kaeser Compressors



002_Image 2_KAESER DBS220M.png

Caption: DBS series screw blower from Kaeser Compressors



002_Image 3_KAESER Station DBS 220L.png

Caption: Screw blower station from Kaeser Compressors

((Kaeser photo – free for publication))