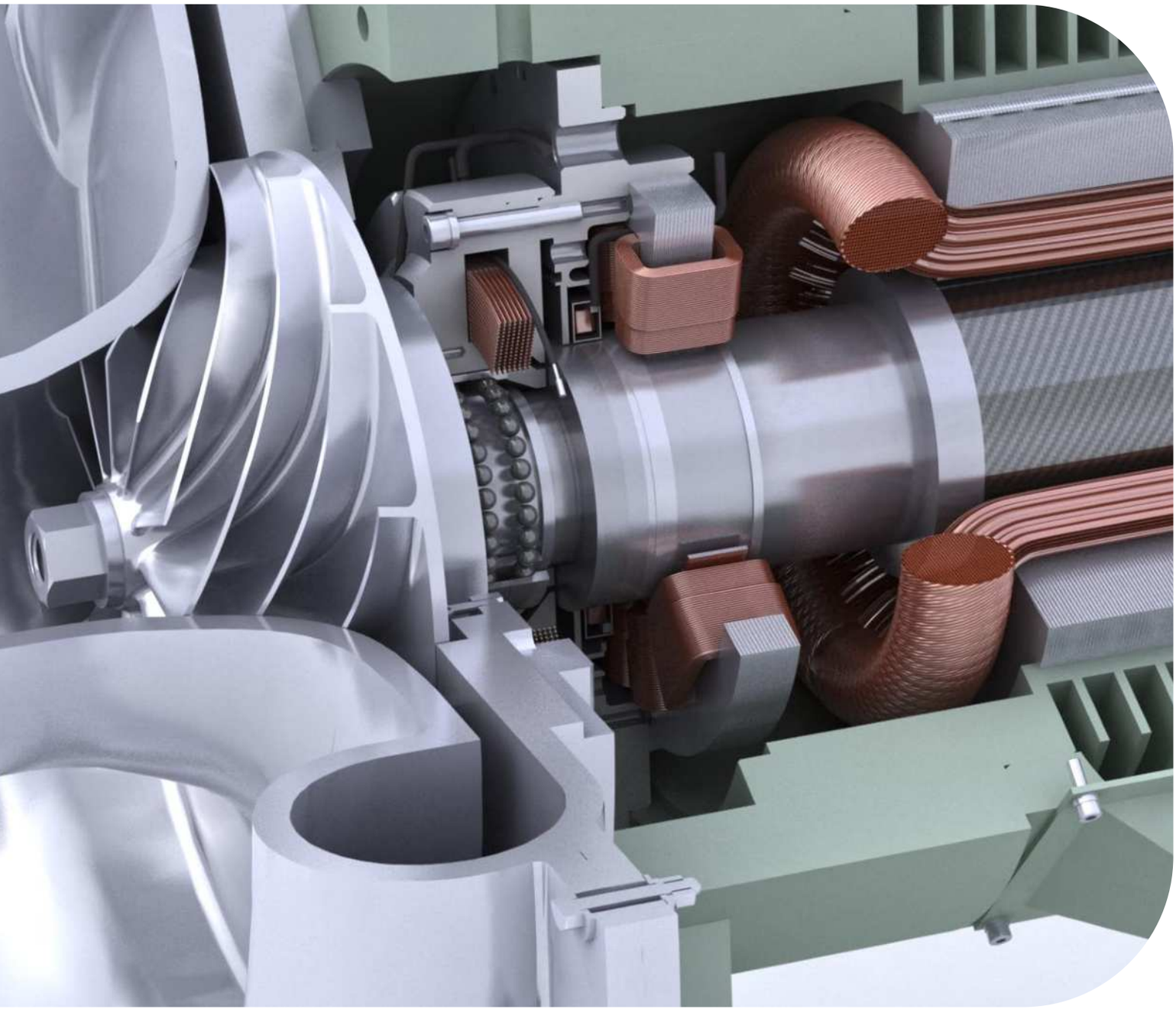
High-speed permanent magnet motor solutions from SKF

Optimizing energy efficiency and reliability at wastewater plants



The Power of Knowledge Engineering

Reducing energy use at wa

stewater plants

Aeration blower systems are the place to start

With world water consumption expected to rise around 50% by 2020*, biological wastewater plants are looking for more effective, energy-efficient water treatment technologies. Aeration blower systems present a prime opportunity for asset improvement.

In traditional wastewater facilities, the aeration blower system can represent 40 to 80% of the plant's total energy use. Used to blow air into tanks so bacteria can break down organic waste, a typical mid-size aeration system operates with two to five air blowers. For each blower, energy use accounts for up to 80% of its total lifecycle costs.

Reducing the energy requirements of aeration blowers will help plants cut their energy costs and CO_2 emissions. High-speed permanent magnet motor solutions from SKF are already making it possible.

◀ *Shown here is an example of a centrifugal air blower application, featuring a high-speed permanent magnet motor solution from SKF with active magnetic bearings and a variable speed drive.*

System solutions from SKF are the way to get started

High-speed permanent magnet motor solutions from SKF are helping blower manufacturers design and develop the next generation of highly energy-efficient, highly reliable centrifugal air blower units. This SKF solution combines the cutting-edge technology of a high-speed permanent magnet motor, active magnetic bearings with an integrated control system and a variable speed drive.

By levitating the rotating components, SKF magnetic bearings enable a friction-free system that eliminates the need for lubrication. The result is a range of oil-free motor solutions that can deliver between 75 and 350 kW of power. As a leading global supplier of high-speed permanent motors, SKF can deliver complete standardised packages from a single source.

Compared to traditional lobe-type blowers, aeration blowers that utilize SKF high-speed permanent magnet motor solutions can offer:

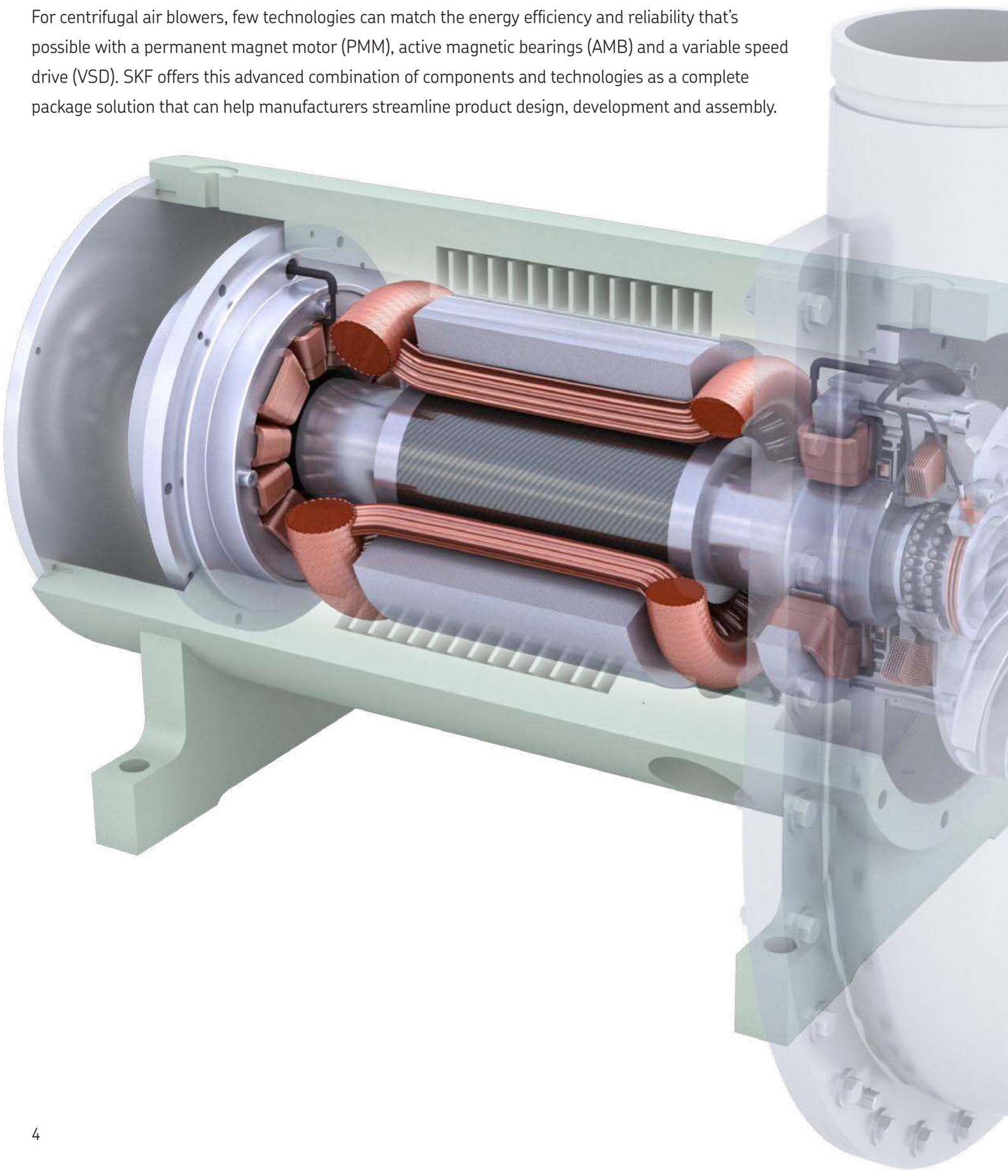
- Lower total cost of ownership (TCO)
- 10 to 40% lower energy use
- Improved service life and reliability
  - exceeds mean time between failure (MTBF) rates of 100 000 hours
- Reduced component wear and less maintenance
- An oil-free environment with no risk of contamination
- Up to 30% lower noise levels
- A smaller, more lightweight footprint
- Compliance with environmental regulations
- Worldwide SKF service network support

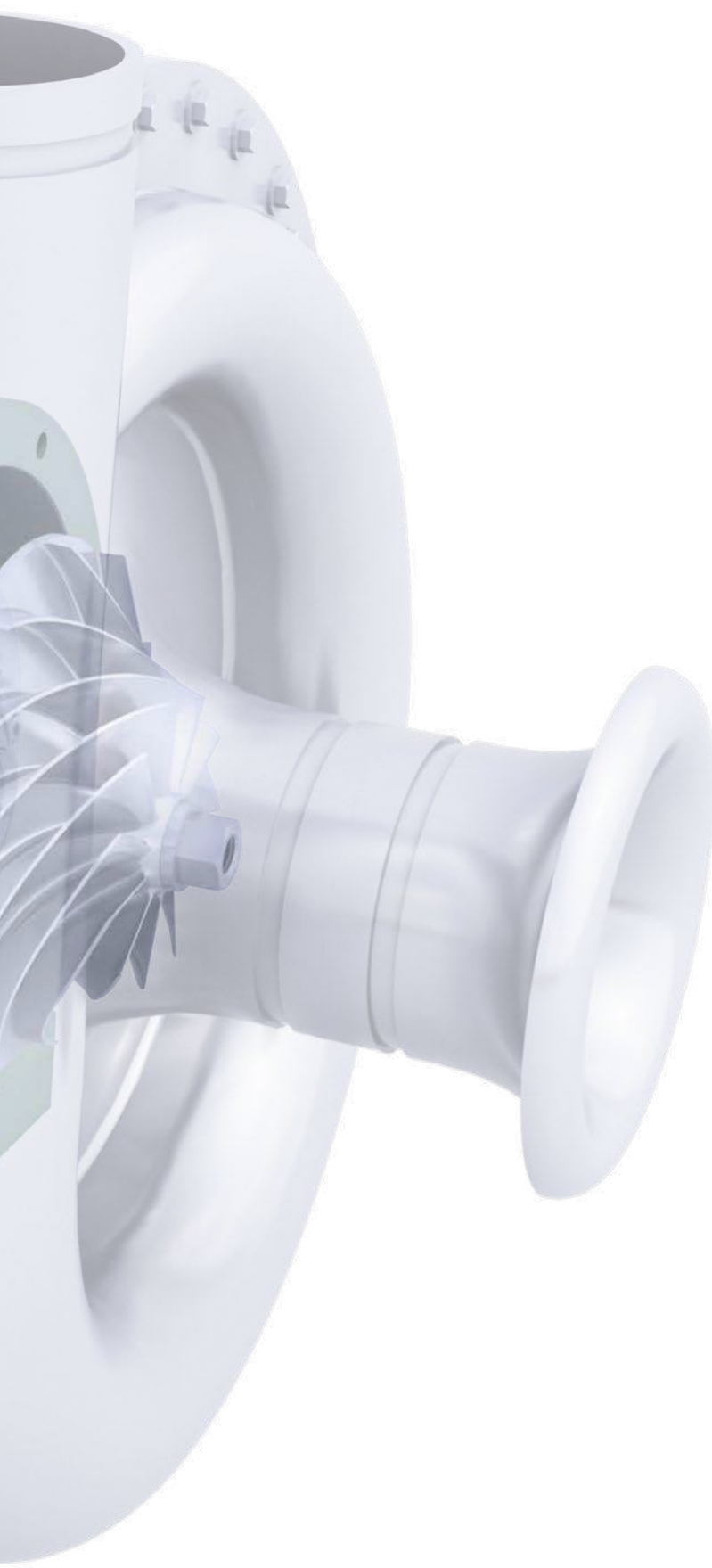
**Source: www.theworldwater.org*

This offer is part of the SKF BeyondZero portfolio of products, services and solutions designed to help our customers reduce environmental impact. To learn more, visit **www.beyondzero.com**

A complete magnetic system solution, only from SKF

For centrifugal air blowers, few technologies can match the energy efficiency and reliability that's possible with a permanent magnet motor (PMM), active magnetic bearings (AMB) and a variable speed drive (VSD). SKF offers this advanced combination of components and technologies as a complete package solution that can help manufacturers streamline product design, development and assembly.



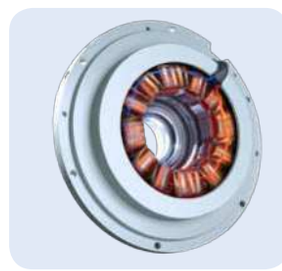


Key system components

Permanent magnet motor

- Low energy use and cooling requirements
- High-speed capabilities in a compact design
- 10%+ more energy efficient than conventional motors at full load and part load
- Direct drive configuration eliminates gearbox and oil
- Optimized shaft geometry accommodates large impellers with robust rotor dynamics

Active magnetic bearings



- Accommodate instant and frequent start-ups and transient surge forces
- Active control system provides vibration-free performance
- Capable of speeds in excess of 40 000 rpm
- Levitate rotating components for friction- and lubricant-free performance
- Unitized radial and axial bearing modules enable compact packaging and robust performance

Magnetic bearing controller

- Tracks and registers rotor position up to 15 000 times per second
- Controls rotor position to within a micron-sized orbit
- Continuously corrects rotor position by adjusting the power supplied to each electromagnet
- Instrumentation for integration into the blower control system

Variable speed drive

- Continuously adjusts to process changes for high energy efficiency
- Validated for perfect alignment with PMM and AMB
- Available from a range of industrial drive manufacturers

by courtesy of Betec

Real-world success with SKF

A wastewater treatment facility in France had been operating with four 80 kW lobe-type blowers with several issues, including frequent breakdowns, high energy consumption, high noise levels, and treatment process problems. After replacing the lobe blowers with two new centrifugal blowers that featured the SKF high-speed permanent magnet motor solution, the results were immediate – and dramatic.

The variable speed blowers incorporating the SKF solution simplified regulation of the flow rate, improving the treatment process significantly. Noise levels fell from 110 dBA to 70 dBA, and maintenance demands dropped considerably.

The bottom-line reductions in energy use were even more impressive. After only a year in operation, the blowers equipped with the SKF solution cut plant CO_2 emissions by 375 tonnes and operating costs by € 54 000.

One-year savings with the SKF solution:

- € 54 000 in energy costs
- 500 000 kWh
- 375 tonnes of CO_2

Why SKF for magnetic solutions?

Proven S2M technology

Now an SKF Group Brand, S2M is one of the world's leading producers of magnetic bearings and high-speed permanent magnet motors. Acquired by SKF in 2007, S2M has been refining contact-free, levitating bearing technology for more than 30 years.

S2M solutions are at work in some of today's heaviest industries, including gas and energy. S2M technology also supports high-tech sectors such as semiconductors. Insights gained across industrial extremes enable custom-designed systems like the aeration blower solution. Featuring precision, micron-orbit-level control in some of the world's toughest operating conditions, S2M technology is driving high-power range, industrial motor applications worldwide.

Single-source system support

Designing and developing a complete permanent magnet motor solution is by definition an engineering-intensive job. Variable speed drive (VSD) components must be perfectly aligned with the permanent magnet motor and the active magnetic bearing system. It's an exacting process that requires a good deal of testing and a thorough understanding of all of the components involved.

SKF can support your blower project with these capabilities and more. Our engineers will help you find the optimum magnetic system solution for your application and combine it with a VSD from a variety of industrial drive manufacturers. When your application demands the highest performing solution, consider SKF your technology partner of choice.

See inserts for more details about SKF solutions for the wastewater treatment industry.

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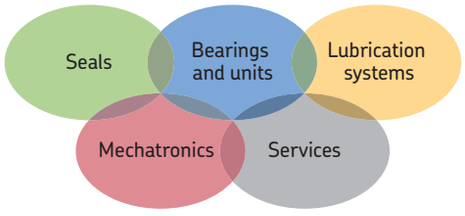
The PM Motors App from SKF

Download the **PM Motors App from SKF** from the Apple® App Store, scan the "trigger" image at left, and explore the complete SKF portfolio of high-speed permanent magnet motor solutions!

Get more details at **skf.com/PMmotors**



The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

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