



REAL CONDITIONS.  
REAL SOLUTIONS.





## SKF is recognized as a world leader in rotating equipment.

Contributing to this "World of Motion", SKF is focused on developing real solutions for real conditions.

SKF's understanding of bearing performance requires extensive knowledge of machines and processes. It is this understanding that enables SKF to provide real solutions for optimum machine performance.

Through product innovation and application experience, SKF continues to set new standards in the world of rotating equipment. SKF is located in 70 countries around the globe, supported by 40,000 employees.



# The Evolution of Magnetic Bearings.

Enhanced electronics and software systems have enabled opportunities for better monitoring and control of motion - higher performance and reliability. SKF has responded with an expansion of commercialized mechatronic solutions - magnetic bearings.

Innovation in magnetic bearings has redefined magnetic levitation technology. SKF has raised the standards of performance for rotating equipment providing robust, cost effective, easy to implement solutions — adding measurable value to the bottom line.



**"Creating Value through proven magnetic bearing technology."**

## CUSTOMER FOCUSED

Original equipment manufacturers (OEM) are raising the standards of performance in rotating equipment. To take your products to the next level, you require innovative thinking and a partner that understands your challenges – from product development to industrial application.

With magnetic bearings SKF provides faster, more efficient and cleaner rotating equipment. Equipment that operates reliably in harsh environments: corrosive fluids; refrigerants; extreme temperatures - even cryogenics.

### Magnetic bearings perform

- Lubrication free
- Clean, contamination free
- Reliability
- Low vibration
- High surface speed
- Low energy consumption
- Submerged operation
- Built-in condition monitoring
- Non-contacting

## SOLUTIONS ORIENTED

An essential product in industry, magnetic bearings are a true enabling technology. Our engineering and products ensure higher productivity, reduced maintenance and environmentally responsible solutions.

We focus on solving the business challenges of our customers across a wide range of industrial applications and industries. In order to deliver magnetic bearings, OEMs require product innovation together with the support of a global partner.

### SKF can help

- Machine concept/design
- Product development
- System integration

**"From custom solution to serial production."**



SKF  
ISO 14001

SKF  
ISO 9001





## Real Conditions.

### Petrochemicals, Oil & Gas

Critical service, continuous or intermittent operation, minimum life-cycle cost, maximum reliability, environmental responsibility.



### Semiconductor equipment

Contamination sensitive processes, corrosive gases, 300mm wafer rotation, vibration sensitive, ever increasing focus on yield and reliability.



### Cryogenic Equipment

Long overhung shafts for effective thermal barrier, cryogenic temperatures, hermetically sealed, high speed, critical service.



### HVACR

Oil free operation, increased efficiency, higher speed machines for new refrigerants, compact packaging, environmental responsibility.



### Compressed Gases

Oil free solutions (contamination free gas, for example clean air), low vibration and noise, longer life, compact packaging.



### Vacuum and Analytical Equipment

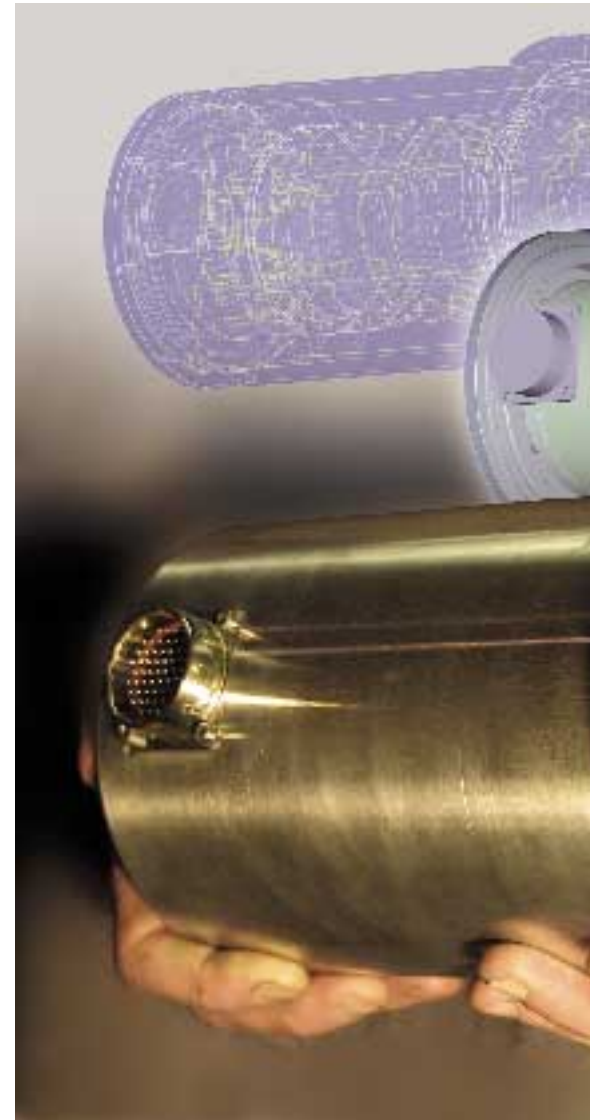
High speed rotation, high vacuum environments, stringent outgassing and contamination requirements.

### Food & Beverage

Non-contaminating, easy to clean, seals not required, isolate the process from surrounding environment.

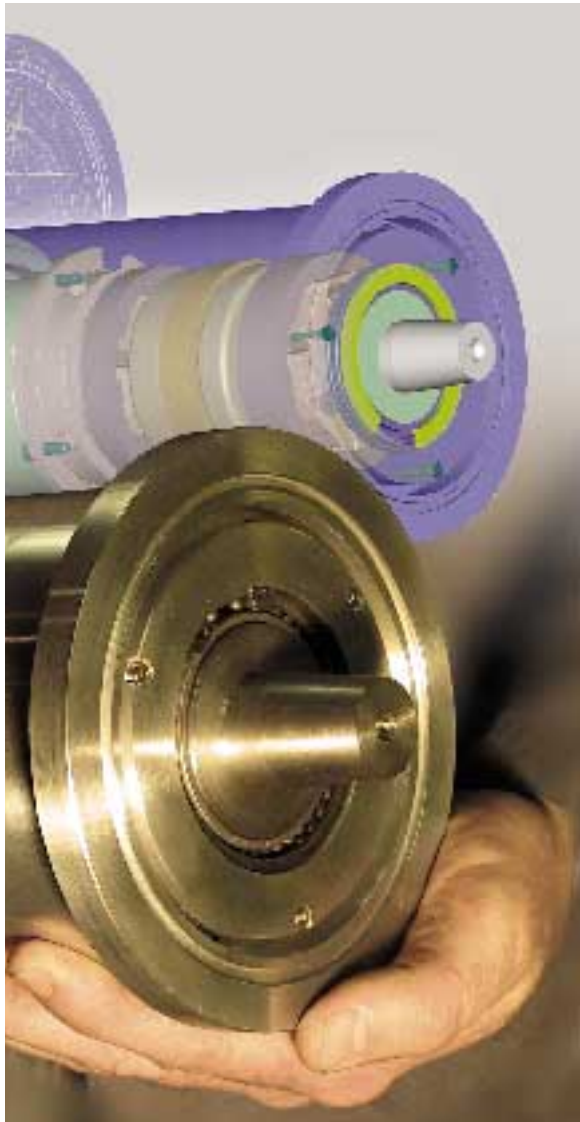
### Pharmaceutical & Biotech

Aseptic and non-lytic processing, contamination free, seals not required.



### Operating Requirements

- Lubrication Free
- Reliability
- Operation in vacuum
- Low vibration
- Force measurement
- Shaft position control
- Precision
- Contamination free
- Submerged operation
- Reduced energy consumption
- Condition monitoring
- Air gap
- High speed
- Extreme temperature



### Magnetic Bearing Performance

no oil, grease, air, water, or other fluids  
 no wear, no maintenance  
 UHV - XHV ( $10^{-12}$  mTorr)  
 0.01 micron vibration  
 5% accuracy on full scale  
 up to the limit of auxiliary bearing  
 ~ 1 micron  
 no particles, low outgassing  
 canned solutions, submerged operation  
 2-3 watts drag on small machines  
 savings to 100kW on large machines  
 MBScope - no accelerometers needed  
 up to 2 mm  
 up to 2.4M DN on radial bearings  
 17 kelvin to 400°C

## Real Solutions.

### Gas Pipeline Compressor

- Reduced life cycle cost – eliminating lube oil systems
- Environmentally friendly – no need for contaminated lube oil disposal
- Improved reliability – system complexity reduced through reduced parts count – reduced footprint
- Reduced bearing-related losses
- 12,000 rpm, 10 MW



### Large Bore Edge Rotation

- Cylinder is levitated by its outer edge
- Non contaminating rotation
- Access to process through top and bottom of cylinder
- Higher rotational speed than with conventional bearings
- Canned or uncanned



### Hydrogen Circulator

- Cryogenic hydrogen environment
- Hermetically sealed
- Overhung shaft for thermally effective barrier
- 60,000 rpm



### Refrigeration Compressor

- Cycle efficiency gains through oil free operation – no contaminated oil
- High speed operation for refrigerant R134A
- Quiet operation through vibration control
- Compact package design
- 24,000 rpm, 55 kW



### Analytical Instrument

- Vacuum environment
- Magnetic bearing control system provides levitation, rotation and phase lock – two shafts can synchronize rotation to within 0.05 degrees at full speed
- 36,000 rpm



### Other Applications

- Micro Turbines
- Vacuum Blowers
- Turbo Molecular Pumps
- Pulp Refiners
- Air Compressors
- Turbo Expanders
- Food Processing Equipment
- Machine Tool Spindles
- Test Stands & Exciters



## Product Platform

### Magnetic Bearings

Radial and thrust magnetic bearings range in capacity from 0.06 to 40 kN. The bearing includes actuators, sensors and rotor.



### Hyperspin

Hyperspin is a spindle range that includes magnetic bearings, motor (synchronous or asynchronous), housings, controller and cabling. Hyperspin is available in speeds up to 60,000 rpm and power rating from 0.3 to 55 kW. The shaft has a versatile interface for mounting different types of payload.



### Control Systems

The world's lowest cost, most capable, magnetic bearing digital control systems – with features adaptable to your specific needs. Controllers range in size and power to match the dynamic load requirements of your application.



### MBScope - Monitoring & Analysis Software Suite

MBScope is a suite of software tools that makes it possible to monitor machine conditions. It provides the user with tremendous amounts of diagnostic information, such as shaft balance condition and internal clearances.



### DC Brushless Motors

Custom motors designed for high speed, high power density or canned for harsh environments. Speeds to 60,000 rpm. Power from 0.3 to 4.5 kW and higher.



### Auxiliary Bearings

SKF has the most reliable auxiliary bearings - sizes range from 15 to 180 mm. Sputtered MoS<sub>2</sub> lubrication, special race and rolling material are also available to suit your application.





## Our People

No single company in the world offers the breadth of services available from SKF. Nor the depth of real-world application expertise we bring to the table – hands-on experience that spans virtually every industrial sector.

We see the big picture with an experienced eye for detail. We are strategic thinkers and natural problem solvers.

Our goal is to build long-term relationships with customers by providing outstanding customer service and forward thinking solutions.



## Global Supplier



Contact your local SKF application engineer at  
[magnetic.bearings@skf.com](mailto:magnetic.bearings@skf.com)

## Local Partner

SKF magnetic bearing products are designed, developed and engineered by:

Revolve Magnetic Bearings Inc.  
An SKF Company.

928 – 72nd Avenue NE  
Calgary AB Canada T2E 8V9  
Phone: +1 403 232 9292  
Fax: +1 403 232 9255



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