

# SKF magnetic bearings for electrically driven centrifugal compressors

## Benefits

- Increase operational flexibility
- Boost reliability and availability
- Eliminate “warm-up” periods
- Switch modes quickly
- Simplify design
- Function at varying capacity levels
- Reduce maintenance and noise
- Eliminate oil lubrication and emissions
- Lessen risk of gas leaks
- Smaller footprint, more efficient use of space

## Applications

- Gas storage compressors
- Gas treatment turboexpanders
- Gas lift or reinjection compressors
- Subsea compressors
- Gas transport compressors
- Ethylene / Polyethylene compressors
- Industrial air compressors
- Freon chillers
- Power generation turbogenerators
- Pressure let down turbogenerators

## Next-generation design enables natural gas storage facilities to respond to market demands, on-demand



Driven by fluctuating prices, today's natural gas suppliers are often forced to buy, sell and move product on a daily basis. The short lead times mean suppliers must inject and extract gas from underground reservoirs with great flexibility.

Unfortunately, conventional gas-turbine compressors are not designed for such rapid responses. They require significant warm-up times before reaching full load capacity, and they cannot easily adjust to the right operational speed. Gas-turbine compressors are also quite noisy – a growing concern in populated areas – and require specialized maintenance.

### SKF magnetic bearings enabling an “all electric” solution

With the acquisition of S2M, a major global manufacturer of specialized magnetic bearings and motors, SKF is now in a position to help compressor manufacturers replace gas-turbine compressors with an all-new generation of electrically driven compressors.

### Instant start-ups and quick mode switches

This all-electric system design relies on high-speed direct drives, coupling the compressor to the driveshaft, and using magnetic bearings as support bearings. The result? A compressor that can start instantly, function at varying levels of capacity, and adapt speed rapidly.

### Less maintenance and environmental impact

Because magnetic bearings operate with no metal-to-metal contact, there is virtually no bearing friction generated and no bearing wear. The simplified, hermetic design also eliminates the need for seals, and with them, the need for big-footprint lubrication systems. Combined, these features reduce maintenance demands and noise while eliminating emissions and lessening the risk of gas leaks.



For more information about SKF products and solutions for the oil and gas industry, contact your SKF representative.





## Applying SKF knowledge engineering to improve compressor performance

SKF has been working with leading compressor manufacturers for decades to supply advanced bearings and engineering solutions. Our R&D relationships have helped us design innovations that have improved compressor performance. The magnetic bearing solution described below offers a recent example of how we are helping compressor designers and end-users benefit from the power of SKF knowledge engineering.

### MAN Turbo and SKF take European gas storage facility to the next level

#### The challenge

Located on a major natural gas pipeline network, the gas storage facility includes three underground salt cavity storage caverns. While developing the first of the three caverns, the natural gas provider managing the site worked with MAN Turbo to install a hermetically sealed "HOFIM" type electric compressor.

For the second phase of the project, the provider sought to develop the two remaining caverns and to upgrade the facility's processing power by adding about 60 GWh/d of deliverability and 60 GWh/d of injectability.

The provider again looked to MAN Turbo for an electric compressor that would meet the increased power demands as well as the same operating demands as the first compressor. Due to the site's close proximity to towns and several market gardeners, the new compressor would have to operate with low noise, no emissions, and no possible risk of oil leaks.

#### The solution

The need for oil-free operation led MAN Turbo designers to an oil-free bearing solution – magnetic bearings from SKF. SKF worked closely with MAN Turbo as the company developed this next-generation compressor in pilot projects in the USA and Germany. With a maximum power of 14,5 MW, the final product – the RB45 version of the Tandem HOFIM sealed compressor – is MAN Turbo's most powerful sealed compressor produced to date.



#### The results

Since installation at the facility, the RB45 is delivering the additional power and flexibility the site required, as well as a range of benefits that conventional gas-driven compressors cannot:

- Short start-ups and more frequent starts expand operational possibilities
- Variable speed operation provides maximum flexibility and overall efficiency
- Hermetically sealed design eliminates the need for seals, reducing failure rates, gas leakages, and maintenance costs
- Magnetic SKF bearings enable wear-free operation and eliminate the need for a complex lube oil system
- The lack of an external motor allows a much smaller design footprint

© SKF and S2M are registered trademarks of the SKF Group.  
MAN Turbo and HOFIM are registered trademarks of AG Schweiz.

© SKF Group 2009

The contents of this publication are the copyright of the publisher and may not be reproduced (even extracts) unless prior written permission is granted. Every care has been taken to ensure the accuracy of the information contained in this publication but no liability can be accepted for any loss or damage whether direct, indirect or consequential arising out of the use of the information contained herein. Any cost savings and revenue increases in this publication are based on results experienced by SKF customers and do not constitute a guarantee that any future results will be the same.

PUB 75/P9 10043 EN · June 2009

Printed in Sweden on environmentally friendly paper.

Certain image(s) used under license from Shutterstock.com.

