



*Magnetel has patented solutions for unique passive technology for Homopolar Electrodynamic Bearings that enables- and improves high speed operation*

## Technology Presentation

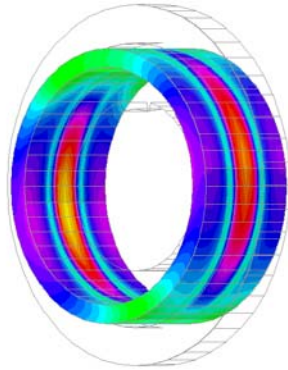
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# Technology Introduction

- Magnetal solutions have been developed in cooperation with the Royal Institute of Technology in Stockholm (KTH) and are inspired by the 1987 Nobel price in Physics.
- Solutions based on Doctoral Thesis by Dr Torbjörn Lembke – right – (KTH 2005)
- The technology is based on permanent magnets and electrodynamic properties thus it does not incorporate any advanced control electronics
- Solutions have been patented by Magnetal



# Technology Advantages



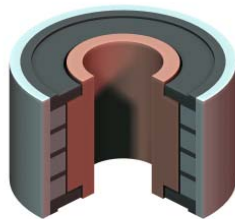
- Extremely low friction - no abrasion
- Simplistic design – no controller
- Small footprint – weight & volume
- Noise & vibration free
- Less alignment sensitive
- Maintenance free – no lubricants
- Cost effective
  - in production as well as in service
- Ultra high performance
- Generally more stable in higher RPM



Single row  
intermediate  
bearing  
for hollow shafts

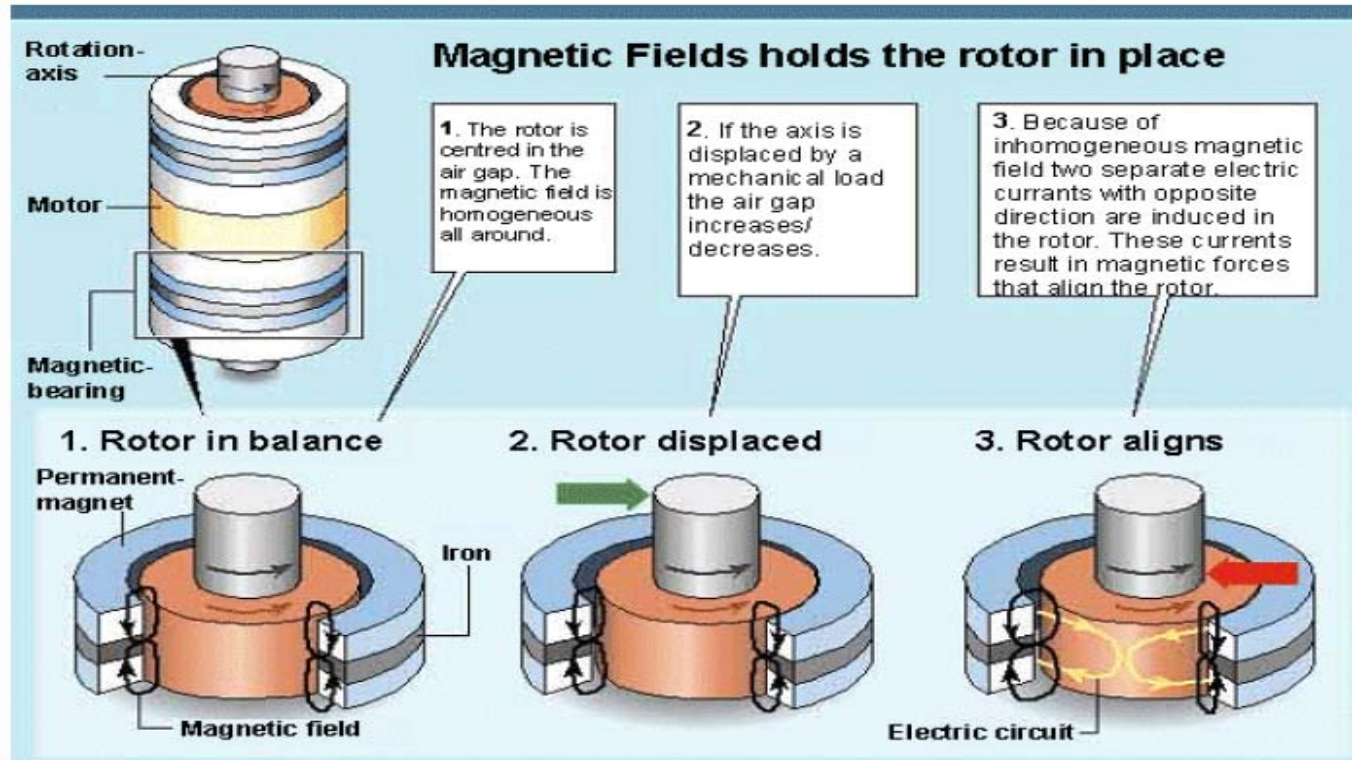


Double row  
intermediate  
bearing  
for hollow shafts



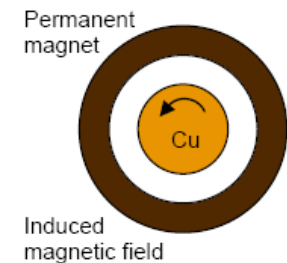
Quad row external  
magnet  
bearing for solid  
shafts

# Method of Operation



## Magnetral

Inductive Magnetic Bearing  
+ cheap  
+ simple  
+ all rotational speeds\*



Magnetral's induction bearings are **totally stable** without any control electronics thanks to stabilizing eddy currents induced by permanent magnets. This effect is normally referred to as the electrodynamic repulsion principle.

Eddy current losses are reduced to a minimum using advanced finite element analysis, whereby it is possible to combine good bearing data and still produce limited eddy currents.

In case of the homopolar bearing it has been possible to optimize the bearing design in such a way that virtually no eddy currents are induced during normal operation.

# Kinetic Energy Recovery System

## K.E.R.S , for automobiles and trains



Utilizing our technology,  
for K.E.R.S will:

- improve efficiency
- save volume and weight
- require less maintenance
- enable consumer targeted solutions





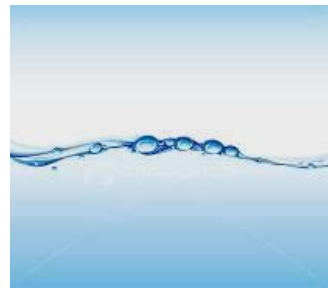
# Energy Solutions

Grid Stabilization, Power Quality & Energy Storage



Utilizing our technology,  
for Energy Solutions will:

- enable feed of power grids with renewable energy sources
- stabilize voltage and frequency
- store energy
- significantly reduce maintenance needs



# Medical-, Electronics- & Process industry



Utilizing our technology, will:

- reduce noise and vibration
- save volume and weight
- require less maintenance
- reduce cost and improve quality
- operate in environments demanding carbon-hydrogen free, and clean room environment



# Oil- and Gas Industry



- Utilizing our technology,  
in oil & gas industry will:
- require less maintenance
  - significantly improve reliability of operation
  - reduce life cycle cost
  - operate in gas environments
  - improve safety





# Space

## For Space Applications



- Using our technology, a space application will:
  - provide extreme reliability
  - save volume & weight
  - enable maintenance free operation
  - offer extremely weight-to-volume efficient solutions



# Turbo

For Automotive-, Marine- and Airplane Applications



- Retrofitted with our technology, a turbo will:
  - improve efficiency
  - save volume & weight
  - require less maintenance
  - reduce vibration and noise



# Vacuum

## For Turbo Vacuum Pump Applications

- Designed/Retrofitted with our technology, a turbo vacuum pump will:



- have a significantly reduced cost for manufacturing and maintenance
- improve efficiency and flows
- save volume & weight
- reduce vibration and noise
- not require any lubricants



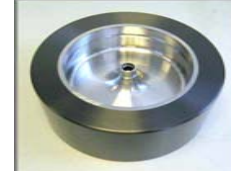
# The Technology Enabler

Magnetal patented solutions will provide a technology *paradigm* that enables *revolutionary* new ways in design of applications.

The technology provides significant *added value* both in retrofit applications as well as in new designs.

Our solutions offer your operation:  
very low friction, smaller form factors, less alignment requirements and ultra high speed with less vibration and noise.

All of the above to a significantly *lower cost* at all product phases.





# Possible Application Areas

Magnetal passive magnetic bearing solutions offers a base components to enable- and improve applications requiring and benefitting from high speed operation.





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# For more information

Visit our homepage:  
[www.magnetel.se](http://www.magnetel.se)

Or contact us at:  
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