

RELY ON EXCELLENCE

NMB magnetic coupling for hydrocarbon pumps

A reliable solution for extreme operating conditions.

As part of the TMC (total monomer concept) process, modifications were made recently to an ethylene cracker and a new olefin conversion unit (OCU) was built to boost ethylene and propylene productivity at a German refinery. During the course of this project, EagleBurgmann was awarded a contract to provide hermetic sealing for four multi-stage vertical can pumps. The pumps are used to circulate highly flammable liquid hydrocarbons (C₂ and C₄).



During start up, high torques resulted in a break-away of the magnetic coupling between the rotating outer rotor and the synchronous inner rotor. A solution had to be found.

Magnetic couplings have several advantages in this type of application. On the one hand, they seal hermetically and there is no need for an external supply system. On the other hand the couplings only require minimal maintenance, and they are extremely low wearing. However, the application represents a significant challenge from the engineering and materials point of view (e.g. the can on the coupling). The requirements profile includes high pressure, extremely high torque, high power rating and a highly flammable medium.

Customer orientation and quality awareness

Initially, an NMB 22P-8R-65-ND2 was used, but it became apparent after only a few starts that a coupling with a higher power rating was needed. The sealing function did however remain intact at all times.

The reason was high torque which resulted in a break-away of the magnetic coupling between the rotating outer rotor (connection to the motor) and the synchronous inner rotor (connection of the impeller).

Strong vibration and elevated temperatures were evident in the can.

An identical magnetic coupling which started gently with the aid of a frequency converter was provided as an interim solution, and it worked satisfactorily (startup profile: 0 to 2,980 min⁻¹ in 60 s).

Materials

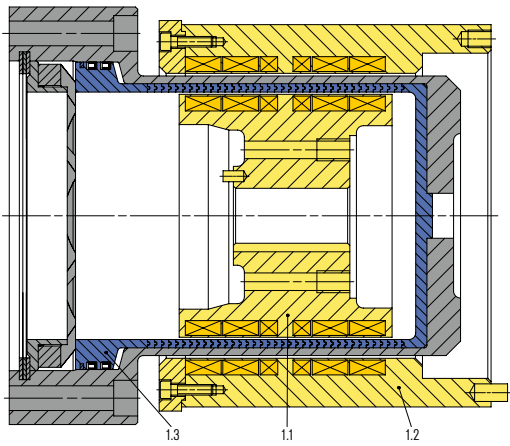
- Can: Hastelloy®, 1.4571, PTFE
- Inner rotor: 1.4571, neodymium iron boron
- Outer rotor: carbon steel, neodymium iron boron

Operating conditions

- Medium: hydrocarbons C₂ and C₄
- Temperature: -32° C and +40° C
- Pressure: 65 bar
- Speed: 2,980 min⁻¹
- Drive power: 315 kW direct start
- Design torque: up to 1,700 Nm
- Seal type: NMB 22P-8R-65-ND2 magnetic coupling

CASE STUDY

- **Reference:** Hermetic sealing of multi-stage vertical can pumps
- **Client:** Refinery, Germany
- **Industry:** Oil & Gas
- **Challenge:** Extremely high torque during start-up which resulted in a break-away of the magnetic coupling
- **EagleBurgmann services:** Consulting, engineering, design of a customized solution
- **Technical solution:** NMB magnetic coupling, which easily meets the challenge of extremely torque, high rotating power and high pressure



NMB Magnetic coupling: 1.1 Inner rotor, 1.2 Outer rotor, 1.3 Can

A reliable solution was designed.

EagleBurgmann Nova Magnetics designed a new magnetic coupling with a significantly higher power rating, which supports direct start and provides a more efficient and reliable solution. The coupling withstands high pressure at high rotational speeds and high torque without problems. Hastelloy® (which has high strength and low electrical conductivity) was used for the can in place of 1.4571 to minimize eddy current losses and increase the efficiency and safety of the coupling. With this design, torque was increased by 63 % and eddy current losses were reduced by 35 %.

Even large pumps can be sealed safely and economically.

Magnetic couplings offer distinct advantages compared to other sealing systems: they are hermetically sealed, require little maintenance and help suppress vibration.

Advantages of NMB High Efficiency®

This high-efficiency model combines many features into a single product: maximum efficiency at high pressure together with a wide range of applications.

- Broad range of industrial applications, including compliance with API 685
- Hermetically sealed
- No contact of torque transmitting elements
- No maintenance necessary
- High-performance can with segmented design for minimal eddy current losses (approx. 2% of the drive power)
- Transmits a wide range of torque values



Result

Torque was increased by 63 % and eddy current losses were reduced by 35 %. The customer was more than convinced by the new sealing solution.

For high drive power applications (>75 kW), EagleBurgmann Nova Magnetics developed a special can which continues to operate extremely efficiently at high pressure and speed (only around 2 % eddy current losses compared to 10 % on a conventional can). Lamination and electrical insulation between the layers reduce the generation of eddy currents, increasing efficiency. Engineers can provide solutions which ensure safe and cost-effective sealing and operation on large pumps.



Further information on magnetic couplings

EagleBurgmann – at the leading edge of industrial sealing technology

Our products are used wherever safety and reliability count: in the industries of oil & gas, refineries, petrochemicals, chemicals, pharmaceuticals, food, energy, water and many more. About 6,000 employees contribute their ideas, solutions and dedication every day to ensure that customers around the globe can rely on our seals. With our modular TotalSealCare Service, we emphasize our strong customer orientation and offer custom-tailored services for every need. [Rely on excellence.](#)

eagleburgmann.com
info@eagleburgmann.com

