Think Twice – Think Sealless

Managing and improving existing plants is essential to maximising process efficiency and productivity. In addition, building in flexibility is important in today's fast-changing business environment. Fundamental to the fluid handling process are pumps. They are a key component, with the latest developments offering a way to cut costs and to build in more 'lean' processes. For specific applications magnetic drive sealless pumps offer a number of cost savings and safety benefits to optimise fluid handling.

By Darren Martin, Global Product Line Manager, HMD Kontro Sealless Pumps

Enhanced Safety

According to a report by the UK Health and Safety Executive, mechanical seals are widely regarded as the weakest point in any mechanical system using them. A magnetic drive sealless pump provides total liquid containment, eliminating potentially dangerous and costly leaks from the outset. This ensures the integrity of the pumping system, even at high temperatures and pressures, protecting and extending equipment as well as component life.

Smoother Upgrade Path

Sealless pumps are not a new option, yet many specifiers remain unaware of how the technology works and the benefits available.

Over the years, magnetic drive sealless pumps have been updated and adapted to conform to changing ASME and ISO standards to accommodate new applications. However, the increase in options has led to the proliferation of a range of highly customized and non-standardized products. While desirable in some respects, this situation has the potential to reduce parts interchangeability and restrict upgrade choices, resulting in additional costs and/or delivery times.

The latest systems seek to address these issues. HMD Kontro, for example, has developed a CSA/CSI range of pumps which are based on a completely new approach. A new modular design has simplified the systems designs, streamlining the selection process, and standardising the range.

Thanks to the complete containment of liquids, sealless pumps are suitable for most liquid types. This includes a wide range of more complex fluids which are volatile, hazardous, toxic or corrosive, as well as for liquid transfer under pressure. Having a range of hydraulic sizes simplifies upgrade processes while covering the requirements of a wide duty and application base for chemical, pharmaceutical, fine chemical, agrichemical, and oil and gas applications, among others.

Cutting the Cost of Implementation

Initial upfront purchase and installation costs can be a barrier to modernization and replacement programs. Magnetic drive sealless pumps help reduce the financial outlay, allowing existing pumps to be upgraded when improving plants and enabling faster design times with a quicker implementation.

With no need for seal support systems and reduced instrument wiring and configuration requirements, lead times are substantially reduced and project build costs minimized. Associated system costs in the form of utility installations and water – or air – cooling systems can also be bypassed; this can include many of the Hazop studies.

Lifecycle Efficiencies

Another key benefit delivered by the latest sealless pump designs is the simplification of the maintenance process. With greater interchangeability of parts, production downtime for servicing is minimized and on-site replacement of components can be accomplished without the need for hot working. Improving inventory management for spare parts also results in ongoing cost savings and increased plant profitability, making magnetic drive sealless pumps an attractive option when measured in whole life terms.

Pump Specification

Having decided on magnetic drive sealless pumps as the preferred option, what do you need to consider in choosing the right pump? Check the following when seeking advice from your supplier:

• **Fluid properties** – Magnetic Drive Sealless Pumps are suitable for:

- Acids/Solvents
- Fluids Under Pressure
- Heat Transfer Fluids
- Volatile Liquids – LPG, Processed Hydrocarbons, Crude Oil

SEALLESS PUMPS TERMINOLOGY EXPLAINED

To help specifiers, HMD Kontro has produced a directory of sealless pump terminology. The extract below is a list of some of the most common terms. A full glossary is available online.

Axial Thrust
The net axial load on the pump shaft caused by hydraulic forces acting on the impeller containment shells and rotor or inner magnet ring.

Containment Shell
The pressure containing boundary located within the drive end that separates the inner and outer magnet rings of a magnetic drive pump.

Fluid Cooling
A design of pump whereby a proportion of the pumped liquid is used to cool the drive assembly.

Glandless
A sealless pump design, which does not utilize gland packing or mechanical seals and so the pumped liquid is completely contained.

Hydraulic Thrust Balance
Axial thrust equalization achieved by means of an impeller design, by impeller balance holes or by thrust balancing through variable orifices in the drive end.

Hydrodynamic Bearings
Bearings that use the principles of hydrodynamic lubrication. Their surfaces are oriented so that relative motion forms a lubricant wedge to support the load without journal-to-bearing contact.

Primary Pressure Casing
The composite of all stationery pressure-containing parts of the unit, including the containment shell.

Secondary Containment System
A combination of devices that, in the event of leakage from the primary containment shell, confines the pumped liquid within a secondary pressure casing that includes provisions to indicate a failure of the primary containment shell.

Synchronous Drive
A drive consisting of an inner and outer magnet ring, whereby the RPM (revolutions per minute) of both components is identical.

Torque Ring Drive
Also known as an Eddy Current Drive. A magnetic coupling consisting of a permanent outer magnet ring and an inner torque ring containing a network of copper rods supported on a mild steel core. The rotating outer magnet ring generates eddy currents in the copper rods, which converts the core to an electromagnet. The electromagnet follows the rotating outer magnet ring, but at a slightly slower speed due to slip, i.e. asynchronous drive.

- Hazardous Liquids including toxic, pungent, corrosive or radioactive fluids
- Crystallising Liquids
- And many more

• **Temperature** – magnetic drive sealless pumps can withstand temperatures from minus 100°C +450°C.

• **Solids vs Liquids** – Pumps can handle up to 5% wt/wt with a particle size of 150 microns. By fitting a self-cleaning in line filter, this can be increased to 250 microns. For larger concentrations use alternative solutions such as: cartridge filters, clean flush systems, etc.

• **Viscosity** – Magnetic Drive pumps can operate with liquid viscosity from 0.1 cSt and up to a maximum of 200 cSt.

• **Entrained Gas** – A 2% limit is typically applied to sealless centrifugal pumps.

• **System monitoring** – installation of a power control monitor is recommended as a minimum but the inclusion of an RTD will then effectively monitor most failure modes.

About the Author

Darren Martin is the Global Product Line Manager at HMD Kontro. Working closely with the Sundyne global sales team, Darren is responsible for the identification of new market and product opportunities, based on feedback from territory customers and channels. He is then involved in the development of new and upgraded products right through to their release and ongoing promotion.