

Chemical & abrasive handling

Magnetically coupled pumps prove their worth



If the pump's running, the factory's running. This has been true for Kronos, one of the world's biggest producers of titanium dioxide pigments, for many years now. Under hazardous operating conditions, Bungartz' MPCV-type magnetically coupled pumps have been shifting the titanium tetrachloride slurry for over a decade.

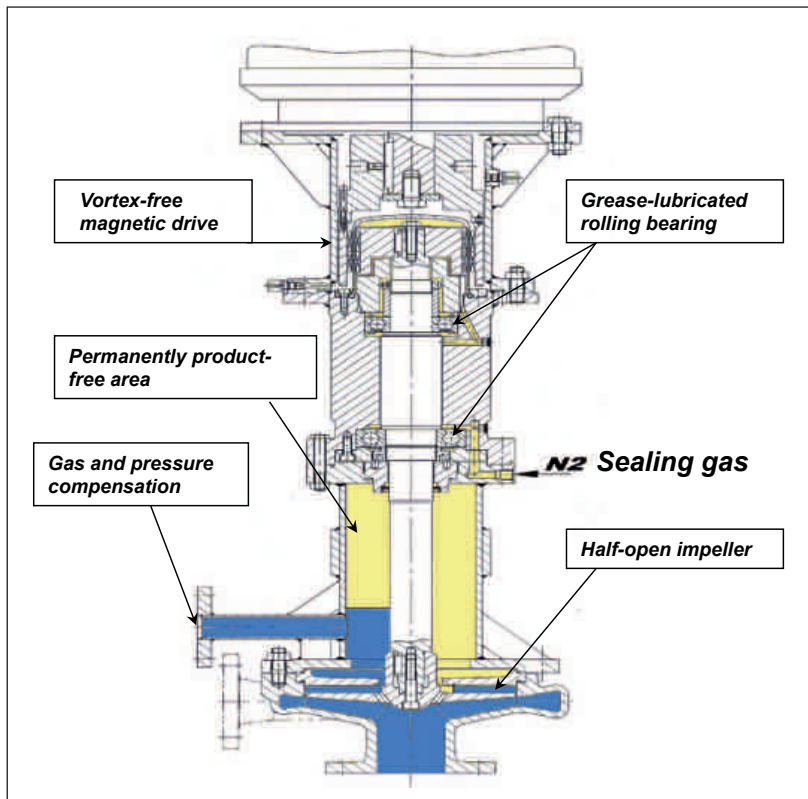
The Kronos factory in Langerbrugge close to Ghent, Belgium, produces more than 85,000T of titanium dioxide (TiO₂) a year. As part of an intermediate manufacturing stage, 200,000T titanium tetrachloride (TiCl₄) is also produced. At high temperatures (above 1000°C), titanium-containing ores mix with cokes

and chlorine gas, with raw TiCl₄ produced as a result of this reaction in the form of a hazardous slurry. It is absolutely essential that contact with water is avoided, since this would result in the formation of hydrogen chloride (HCl) vapours in combination with a white haze.

In the past, Bungartz-type UMOG centrifugal pumps fitted with a hydrodynamic seal were used for these applications combined with a double mechanical seal in a back-to-back API53 configuration. The safety aspect apart (the potential for TiCl₄ to be released if a pump failed), this configuration



One of the six production units operated by Kronos International, Inc. with headquarters in Dallas and main office in Leverkusen, is located in Langerbrugge in Ghent, Belgium.



Vertical and dry-running magnetically coupled MPCV(-AN) type pump.

achieved an average service life (MTBF) of two years. For a manufacturer like Bungartz, whose pumps have a strong reputation for their long service life; this was clearly not good enough. Bungartz now relies on its MPCV-type magnetically coupled pump, and has done so for more than ten years.

Postponed servicing

In Langerbrugge, the first MPCV was installed in the TiCl₄ slurry facility in October 2008. The pump produces a flow rate of 180 m³/h & 40 metres (d=1.7) with a 60kW motor running at 1450rpm. Considering the key role of the pump in its manufacturing process and without the option of a 'B' pump as stand-by, Kronos decided to acquire a spare pump to keep in stock.

In October 2010 – two years later – Filip Roelandt of Kronos Langerbrugge wrote to Bungartz to ask if there was any need to have the MPCV serviced: "The pump is still running perfectly, vibration measurements are carried on the bearing bracket every month and so far have come back with nothing." This pump continued to run for a further five years. With the magnetic coupling pumping a solid-liquid, hazardous fluid, the MPCV

was in service for more than 50,000 operating hours, without requiring any intervention and without a single fault.

Vertical pump with magnetic coupling, MPCV(-AN) type

None of the bearings on the robust, dry-running pump are in contact with the medium. The lubricated ball bearings are kept separate from the product by a buffer gas. Under these favourable conditions, times to failure of up to five years have become the norm. The global seal on the pump is made up of the following components:

1. The back vanes on the impeller and the pressure of the gas barrier that together prevent the product coming into contact with the coupling – even when stationary – mean there is no load whatsoever on the bearing system.
2. The eddy-current-free action of the magnetic coupling that hermetically seals the pump in order to protect the environment.

The vertical arrangement of the MPCV(-AN) type provides an additional benefit in that there is no risk of the pumped fluid coming into contact with the

bearing bracket, even if the barrier gas pressure is lost. Applications extend from toxic waste to hazardous & solid-liquid fluids such as slurries & sticky, crystallising and corrosive solutions. The option to connect an additional gas balance line (-AN) allows the pump to regulate the flow rate independently. The -AN version captures large gas volumes without the need to turn off the equipment.

Solid-liquid fluids, sticky solutions, production upsets with poor running conditions, with or without fluid in the volute casing, and boiling situations with limited feed heights are all unfavourable conditions for a standard centrifugal pump that can now be successfully tackled with a magnetically coupled MPCV(-AN). Its nominal service life (no contact = no wear) provides short pay-back times; less than three months in some cases.

Benefits of the MPCV(-AN):

- Hermetically sealed
- Self-bleeding
- Self-regulating
- Minimum feed height
- 3-phase compatible
- Low maintenance costs
- Safe, dry-running
- NPSH(r) <0.1m, without cavitation
- Minimal monitoring / peripheral devices
- No minimum flow rate required
- No alignment requirements
- Pulsation-free operation

Not a single fault

At Kronos in Langerbrugge, maintenance engineer Michel Floréal eventually decided along with the management to preventively replace the original MPCV with the spare pump at the beginning of 2015. They took the attitude that after more than six years in operation it would be instructive to be able to study this working pump more closely. Following a minor overhaul (precautionary replacement of lip seals & bearings), the spare pump was put into service, while the '2008' MPCV was sent to Bungartz in Euskirchen. When it was stripped down, the engineers were unable to find a single fault or flaw. ●

www.bungartz.de