CASE STUDY

INDUSTRY:REFINERYPROCESS:STYRENE UNITPRODUCT:BENZENEAPPLICATION:BENZENE DRYING COLUMN OVERHEAD PUMPSOLUTION:VERTICAL INLINE CENTRIFUGAL PUMP (OH3-CC)LOCATION:FRANCE

The Job:

A large petrochemical plant had trouble with a "bad actor" pump. The bad actor in question was a vertical inline pump with a mechanical seal, rigid coupling and no bearing bracket (API 610 OH4). The OH4 design imparted significant loads on the driver. The original motor handled these demands fine. But after 25 years it had to be replaced with a new driver compliant with up to date standards. This new standard motor could not handle these loads and required unacceptable high maintenance efforts. As a result, continuous production was no longer guaranteed. In addition, high leackage rates of the mechanical seal worsened the service life even more.

Klaus Union supplied a sealless vertical inline centrifugal pump in close-coupled design as a refit (OH3-CC).

The Solution:

SLM APCI 03.0x02.0x10A-16E02 RTZG

- SLM: Sealless mag drive
- APCI: Vertical inline centrifugal pump in close-coupled design following API 685 (OH3-CC)
- 03.0: Nominal pipe size of suction flange; 3"
- 02.0: Nominal pipe size of discharge flange; 2"
- 10: Nominal size of impeller; 10"
- A: Type of hydraulic
- ► 16: Magnetic drive size
- E: Type of magnet
- ► 02: Length of magnetic drive
- RTZ: Dry run capable design
- ▶ G: Backup mechanical seal
 - as a secondary control device acc. API 685

In this design the hydraulic loads are absorbed by the robust, heavy duty journal bearing combination, while magnet drive acts as a coupling and protects the motor from any non-standard loads. These journal bearings together with an axial thrust optimized hydraulic allow a considerable extension of the allowable operating range, compared to the original pump, to between 10% and 120% of BEP. All this while keeping vibrations at around 0,5 mm/s peak velocity when in installed condition.

Operating Data:

| Fluid: | Benzene |
|----------------|----------------------|
| Flow Rate: | 10,5 m³/h (46,2 gpm) |
| Temperature: | 110 °C (230 °F) |
| Delivery Head: | 63 m (206,7 ft) |
| NPSH(R): | 0,9 m (2,95 ft) |

Klaus Union Magnet Drive

When Leackage is not an Option

The Thought Process:

The existing benzene pumps in the refinery were all mechanically sealed. Due to high leakage rates of carcinogenic fluid and especially because of the poor performance of the replaced motor, all pumps were classified as obsolete. Based on this existing experience with magnetic coupled pumps Klaus Union has been contacted by the refinery to make a proposal for a replacement.

Klaus Union proposed the following feature set:

- Magnetic coupled pumps acc. API 685 to achieve leak free, maintenance free operating capability.
- Utilizing a non-metallic isolation shell to avoid any eddy current losses and maximize pump efficiency.
- Dry run capable "RTZ" design to protect the pump from accidental dry running.
- Using of a secondary control system with liquid detector acc. API 685 with backup mechanical seal rated for full design pressure (40 bar / 580 psi).

The Result:

Two pumps were installed, successfully commissioned and have been in operation without any downtime for maintenance since more than one year. The satisfied customer has started a project to replace all his existing old pumps with Klaus Union magnet drive centrifugal pumps.





The Benefits:

- Eliminating "bad actor" No. 1: mechanical seal.
- Maintenance and Leak-free magnetic coupling, eliminating costs for maintenance.
- Robust API 685 compliant pump type OH3-CC.
- Only a single instrument signal (the leakage detector) is required for pump monitoring. No ATEX relevant safety signals are required at all.
- No fluid contamination by buffer liquids.
- No utility consumption for cooling, lubrication or seal supply.
- Utilizing standard Klaus Union components for hydraulic and magnetic coupling. The high standardization ensures fast availability of spares, many available directly from stock and interchangeability with spares for pumps already installed on site (horizontal or vertical type).



Old "bad actor" Pump



New Pump by Klaus Union

