Canned motor pumps in refineries and the petrochemical industry

Crude oil is the basic product used by oil refineries and processing industries around the globe. While the share of hydrocarbon contained in the crude oil has a major impact on the volume, the quality and the value of the end products manufactured by the refineries, the share of sulphur contained in the crude oil plays a significant role in determining the structure and the operating costs of the oil processing facilities.

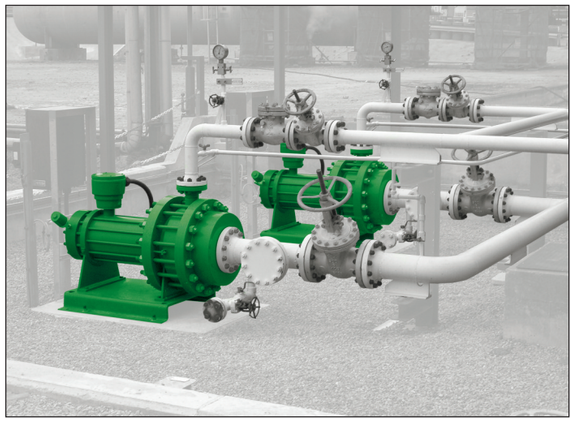
Malodorous and severely corrosive hydrogen sulphide (H_2S) is emitted during the production of fuels; another byproduct is the extremely aggressive sulphuric acid (H_2SO_4). These organic sulphur compounds have negative properties, which entail risks to the facilities or the environment during production or use.

During the combustion of fuel, toxic sulphur dioxide (SO_2) is produced, which impacts the environment. Europe-wide legislation therefore provides for a comprehensive switch to exclusively sulphur-free fuels throughout Europe by 2009. Apart from the EU directive on sulphur-free fuels, however, the Europe-wide IPPC environmental protection directive for the prevention and control of pollution is a further important legal component.

How is the sulphur removed from the fuel? The following procedures that are used in refineries and the petrochemical industry target the continual reduction of the share of sulphur. On the one hand, to meet with legal requirements, on the other, to reduce corrosion and material fatigue of facilities and machines.

- Amine Treatment: Gas sweetening is a procedure primarily used in gas production, after atmospheric distillation. Amine gas treating, as a so-called gas separation and removal unit, removes hydrogen sulphide (sour water) from the gas.
- Desulphurisation: The procedure known as hydro desulphurisation (HDS), targets an improvement of the feed stock by reducing sulphur, nitrogen and aromatic compounds by using hydrogen.
- Sweetening: In this process, the acid components of mercaptans and hydrogen sulphide are removed via oxidation with the assistance of oxygen. One of such procedure is therefore also known and licensed as Merox process (mercaptan + oxygen).
- Claus-Unit: The fourth procedure, the Claus process, is a well-known, downstream procedure, in which hydrogen sulphide is converted to elemental sulphur.

As the share of sulphurous water in the liquid being pumped increases the risk of so-called sulphur-induced stress corrosion cracking, special procedures are required in the production and testing of machines – from a certain threshold value upwards. The fulfilment of this requirement is standardised in the American standard NACE 0103 / 0175 (Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments) and in the European standard EN/ISO 15156 (Petroleum + Natural Gas Industries – Materials for use in H_2S-containing environments in oil and gas production). At Hermetic, the implementation of these standards is met by using corresponding tools and by executing corresponding production and testing procedures.



▲ Fig 1 Multistage canned motor pump type CAMT 52/2

▲ Fig 2 Single-stage canned motor pump type CNPFV 80x40x290 in vertical design

Any investments in respect of extensions or new installations in refineries and the petrochemical industry are, in particular, effected in accordance with the two aspects

- profit magrin and
- climate change.

As a result, an increasing number of pumps are being used that feature not only a sustained operator cost-benefit but also comprehensive protection of the environment, facilities and staff.

Large corporations such as Shell, BP, Total, Exxon and others have long realised that the use of reliable and long-lived pumps can result in a significant optimisation of process costs. In order to optimise costs, facilities and machines need to be increasingly reliable, i.e. long-lived. Repairs and standstills should be avoided altogether, where possible.

An example of such a combined and sustained fulfilment of operator requirements is the use of canned motor pumps without shaft seals. Due to their design, Hermetic canned motor pumps do not contain any components that are susceptible to faults, such as shaft seals or ball bearings. As a result, related failures and expensive repairs can be excluded from the start. Thus, the operator benefit is obvious: long operating hours, minimal spare parts requirements and few repairs. This has a positive effect on the total cost of ownership (TCO) of the operators. It is for good reason that the IPPC directive refers to these machines as the "best available pump technology" to meet legal requirements.

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