

PFA/PTFE-LINED MAGNETIC DRIVE PUMP

WACKER CHEMIE EXPECTS COST SAVINGS UP TO 70%

Manfred Kluge, Richter Chemie-Technik

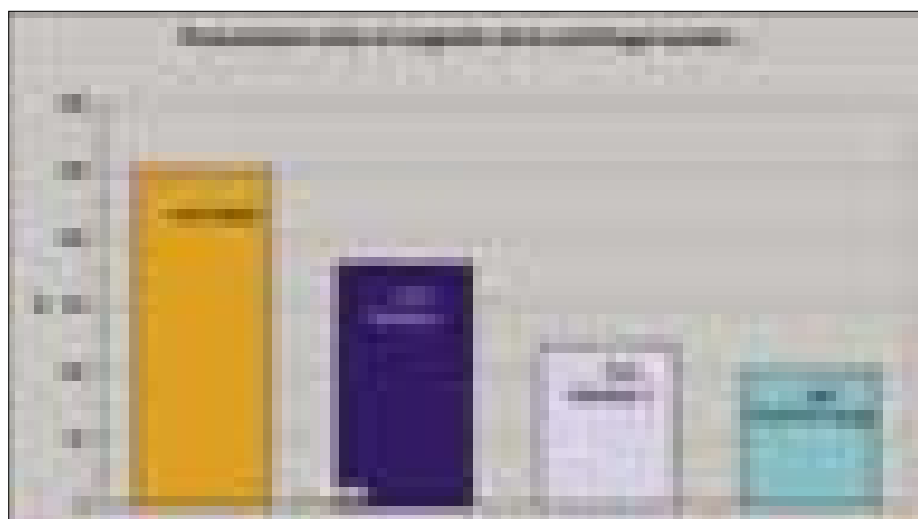
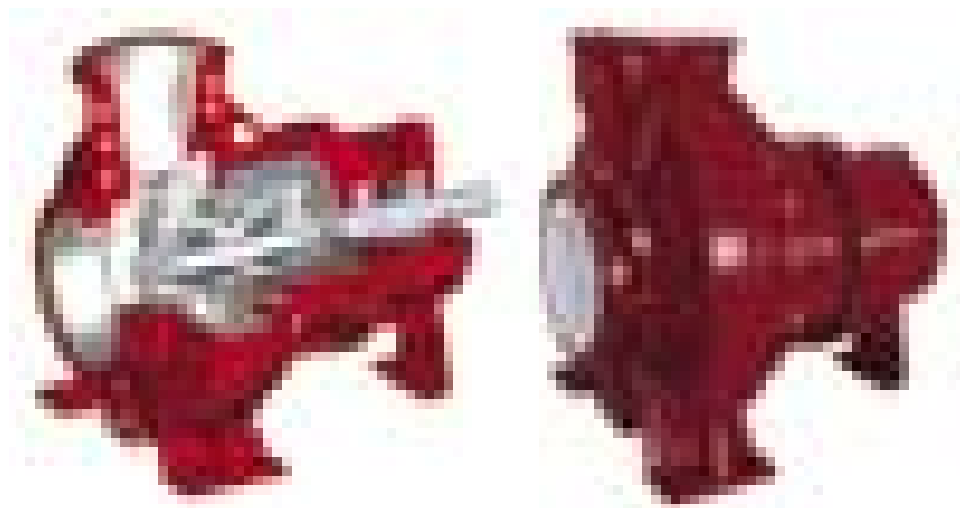
A mixture of acetic acid, formic acid and acetaldehyde, operating temperature 80°C. This is the environment in which all pumps have to keep functioning in the production unit 'Acetyls' of the German Wacker Chemie plant. By installing a PFA/PTFE-lined magnetic drive pump, the largest of its kind in the world, plant operations now expects cost savings of up to 70%.

The use of emission-free pumps is mandatory for many applications in the chemical industry (key word: German Clean Air Act "TA-Luft"). This implies that simple mechanical seal pumps will have to be replaced. This was also the case in a plant of the Production Unit 'Acetyls' at the Burghausen site of Wacker Chemie AG. But which leak-free alternative should be selected? The 41-strong team under Richard Losbichler, head of the service centre for machines/pump centre is best qualified to answer such questions. "In the pump centre five employees advise our works colleagues on the procurement of all kinds of continuous-flow machines – i.e. pumps, compressors and ventilators. In the service centre for machines we maintain these units." The workers can therefore best judge continuous-flow machines of any kind (some 16.000 of these machines are installed in Burghausen), they know the specific strengths and weaknesses of the products offered on the market. In this case the in-house contract-awarder was the engineering department of the 'Acetyls Supply Chain' division. "We look after the basic material plants of the 'Polymers' division in Burghausen, maintain the technical equipment and perform optimisation tasks so that the plants run for as long and as well as possible. And we ensure that the environmental protection requirements are observed," says plant maintenance, Gerhard Bauer, describing the work of his 15 colleagues and himself. The Production Unit 'Acetyls' is an important supplier of raw materials

question convey a very corrosive fluid consisting of acetic acid, formic acid and acetaldehyde in a temperature range of between 50 and 80°C.

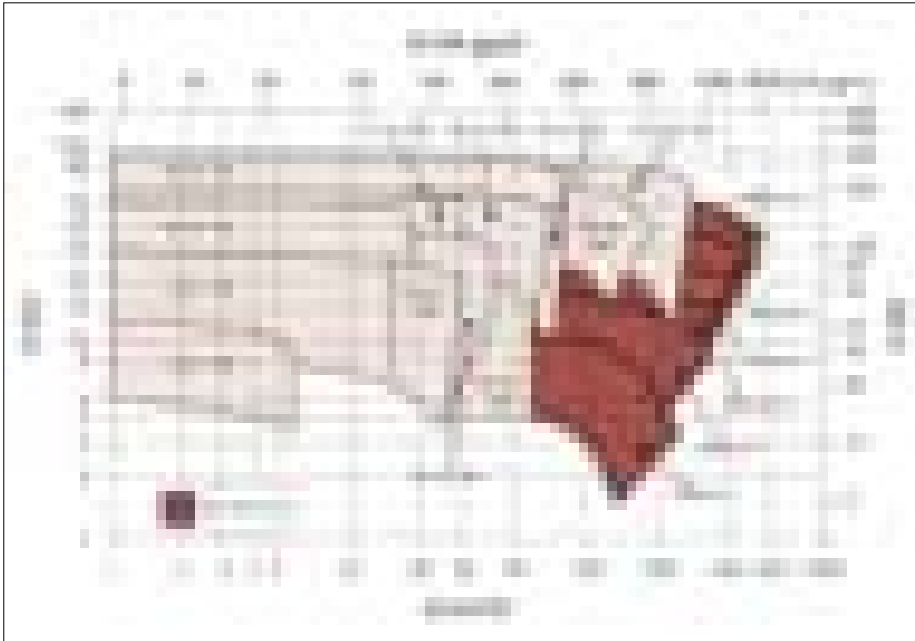
Emissions-free is not enough on its own

In principle, double-acting mechanical seal systems (back-to-back



within the Wacker Group with its complex network systems. Starting with ethylene, the division produces acetaldehyde according to the Wacker process and, in another oxidation stage, formic acid which is then further processed into vinyl acetate and ketene. The pumps in

arrangement), canned motor pumps and metallic or plastic-lined magnetic drive pumps are available as emission-free technologies. In this particular application the selection options are, however, limited, as Richard Losbichler explains: "Metallic pumps



to magnetic drive pumps made of special metals such as Hastelloy, Alloy20, tantalum, nickel etc. The reasons are self-evident: It is cheaper to procure, generates no eddy-current losses and the delivery time for the pump and spare parts can be estimated at only 4 to 8 weeks instead of 10 to over 20 weeks.

In December 2007, the PFA/PTFE-lined MNK 200–150–315 was then installed in Burghausen. It is designed as a single-stage, sealless chemical centrifugal pump of heavy-duty, horizontal design in accordance with EN 22858/ISO 2858/ISO 5199 and therefore qualified to operate in a series of processes, for example chlorine electrolysis and sulphuric acid production and treatment. And, of course, for conveying a

have problems with crevice corrosion when conveying acetic acid at elevated temperatures. In the case of double mechanical seals major problems arise on the shaft sleeve, with metallic magnetic drive pumps crevice corrosion can be expected on the separating can itself and in other areas of the pump.”

A magnetic drive pump lined with uoroplastic was seen as an obvious solution – but such a pump was not previously available on the market with the required ow rate above 300m³/h at 1450 rpm.

Therefore, metallic magnetic drive pumps were installed in spite of the known risks of corrosion – with relatively high running costs as well as maintenance and repair outlays at intervals of 6 and 12 months. And so it suited Richard Losbichler and his team down to the ground that the supplier - Richter - developed a suitably high-performance magnetic drive pump lined with uoroplastic last year. “We have gained good experience with PFA and PTFE-lined pumps with similarly aggressive media. We are therefore assuming that such a pump will have a considerably longer service life than the pumps previously used. We are therefore counting on a substantial reduction in the life-cycle costs.”

Series for highly corrosive media

Richter Chemie-Technik is a pioneer in this field and as far back as in 1983 presented the first magnetic drive centrifugal pump lined with uoroplastic. This developed into the present pumps:

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all components which come into contact with the medium either have a thick PFA fluoroplastic lining (housing, plain bearing pedestal, impeller, shaft and inner magnet assembly), are made of solid PTFE uoroplastic (separating can insert) or made of sintered silicon carbide SSiC (plain bearings). The double can system between the inner and outer magnet assemblies ensures freedom from leaks: the PTFE uoroplastic can insert is highly resistant to corrosion, the outer can made of carbon-fibre composite material bears the pressure load.

As the concept was convincing owing to its high reliability and dry-running capability and the low level of maintenance compared with mechanical seal pumps, and the life-cycle costs are comparatively low, the pump was rapidly accepted on the market after its launch.

This also applies to Wacker in Burghausen: 750 pumps from this manufacturer are now in operation there. In addition to the aspects of robustness and reliability, the exchangeability of components among the different sizes is also an important advantage of this series in practice. Today, the pump (type: MNK) is a recognised alternative

hot mixture of acetic acid, formic acid and acetaldehyde.

Ten more pumps of this size will be ut into operation over the next few months at various international chemical companies – with ow rates of up to 400 m³/h, also for conveying HCl and H₂SO₄ at temperatures over 150 °C.

Conclusions

The pump at Wacker Chemie is operating in an area which is regarded as particularly difficult. “Since its installation in early December, the pump has been operating without any problems as expected. It runs very quietly, that’s always a good sign,” says Bauer from plant maintenance. “If the pump proves successful here, it will certainly also master the other tasks in this circuit and we can count on considerable cost savings,” according to Richard Losbichler and Gerhard Bauer agreeing in full. The expectations stretch to life-cycle cost savings of 70%. <<

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