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Increased evaporation efficiency: hybrid ceramic bearing extends lifetime and reduces maintenance cost of fans for mechanical vapour recompression

Process industry, chemical and pharmaceutical applications require high amounts of process steam, resulting in high energy usage. Therefore mechanical vapour recompression is frequently used to minimise energy usage. A fan compresses the vapour, boosting it to a higher pressure and adds heat to it until the requested temperature has been reached. Finding the right components may in this case be critical for keeping maintenance costs low and for a long service life of the plant.

TLT-Turbo has developed a fan series with a hybrid ceramic bearing for this purpose. Since the bearing is permanently lubricated, it no longer requires external oil supply. The fan series will be showcased at this year's Achema exhibition.

Due to rising energy costs industrial companies put even more focus on how to optimise production processes. This includes the process industry where,

for instance, steam is required as the heating medium for the evaporation of aqueous solutions. Thus far steam was used only for evaporation and then discharged to the environment via condensers, which caused a great deal of energy to be lost. Now companies increasingly use mechanical vapour recompression where a fan compresses the vapour boosting it to a higher pressure and temperature so that it can be reused for evaporation. The resulting closed system rarely requires fresh steam supply.

FAN OPERATION POSSIBLE WITHOUT OIL SUPPLY

The energy requirements to operate the fans is considerably below those to generate steam. This is what renders mechanical vapour recompression highly efficient. When developing fans for mechanical vapour recompression (MVR fans), TLT-Turbo's experts uncovered even more potential for savings. The



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company transferred the bearing technology that so far was used mainly for wind power plants and machine tools to the fans. The result were fans with a hybrid ceramic bearing: the rings in the rolling bearing are made of steel, whereas the rolling elements are made of ceramic components. The bearing is already greased at the manufacturer's and requires neither regular oil changes nor time-consuming oil supply as most other fan bearings do. This is also an advantage regarding hygiene, as the products cannot be contaminated during manufacturing.

Since the plant is now made up of fewer components the maintenance and thus the operating cost could be reduced significantly. Though oil-free, the fans achieve high speeds and efficiencies. The plant is operated in the subcritical range allowing even above-average increase in temperature. TLT-Turbo offers fans in standard sizes that can be installed in series and combined in different ways to achieve the best possible efficiency. The fans are available both as basic version – fan on a base frame with monitoring sensors – and as full package with motor and frequency converter. Depending on the application users can choose from various special steel housings and impeller types. TLT-Turbo produces, for instance, bespoke models made of duplex or superduplex stainless steels and upon request, even titanium impellers. ■



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