



Technical Paper

Cleanability and careful conveying

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Investigation of the influence of impeller backvanes on the axial thrust of semi-open impellers for hygienic design pumps

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Summary

Due to the requirements of cleanability, very often semi-open impellers are used in hygienic and pharmaceutical applications. They have a substantially higher axial thrust than closed impellers, as the pressure in the impeller side gap without backvanes is basically higher than that inside the impeller. Due to the impeller backvane, the rotation of the fluid in the impeller side gap intensifies and thus reduces the axial thrust. Different forms of impeller backvanes and their effect on the axial thrust, discharge head, efficiency and net positive suction head were examined. This showed that the common radial impeller backvanes provide a higher discharge head and very good axial thrust compensation, but at the expense of efficiency. Curved impeller backvanes showed a better hydraulic efficiency, at least equal efficiency at heavily reduced axial thrust could be realised as compared to radial backvanes. Also the flow in the impeller side gap was modelled using CFD* (*Computational fluid dynamics). By analysing the flow velocities in comparison with the original hydraulics a first assessment of the changed cleanability could be made.