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Cavitation in reciprocating positive displacement pumps – not a mystery anymore

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Summary

The erosive potential and the risk of malfunction of cavitation in reciprocating positive displacement pumps are not sufficiently clarified. Because of this uncertainty pumps are often operated with high suction side pressure to ensure a certain safety margin to cavitation. But that is often an uneconomical way of operating pumps. Therefore the detail mechanism of formation and backformation of cavitation was investigated with a high-speed camera under real operating conditions. One of the outstanding conclusions is that the backformation of cavitation does mostly not occur close to the wall. Furthermore the velocity of the backformation – a strong indicator of the erosive potential - is limited by the flow from the manifold into the working chamber. Therefore the erosive aggressiveness is much lower compared to for example centrifugal pumps. With this knowledge the erosive potential of the different types of cavitation can be evaluated. Additionally, the occurrence of pressure surges can be predicted by calculating the suction side flow during the cavitation period and therefore the potential of malfunction can be evaluated for the different cavitation conditions.