Technical Paper

Pumping of special liquids

Session 13-1

Developments in Latex Pumping: a mechanical seal and pump design project

Author:

Mr Andrew Maxwell
Works Mechanical Engineer
Polimeri Europa
SO45 3YY Southampton, UK

Co-Author 1:

Mr Grant Kenworthy
Senior Mechanical Engineer
John Crane
Slough, UK

Co-Author 2:

Mr Ken Naylor
Consultant
Amarinth Pumps
Woodbridge, UK

1 Summary

1.1 This paper will describe developments to improve the performance of centrifugal pumps on latex duty, concentrating on the pumps mechanical seal, impeller and back-plate.

1.2 Design Philosophy
The design philosophy was to minimise coagulation, but to accept that it would occur and to develop mechanisms for ejecting such build ups in a controlled manner.

1.3 Mechanical Seal
When crossing the face of a conventional mechanical seal latex separates into its two parts, the water boils off and escapes as a vapour, the rubber coagulates into a solid and builds up around the outboard side of the mechanical seal. This conversion into solid causes problems for conventional mechanical seal faces which are forced apart by coagulating latex, leading to excessive leakage. Furthermore heat builds up between the faces degrading the surfaces and presenting a fire hazard to the rubber coagulate now outside the seal. A seal was developed to be effective under these conditions. It uses a combination of special narrow faces, breakers, quenching and a scroll to achieve this.

1.4 Impeller/Back-Plate
Latex is a shear sensitive fluid which can begin to coagulate under any shear stress, it is also a self-catalyst for this process, which once started will continue. This presents problems for the area between the impeller and the back-plate, which is under a lot of shear stress in any centrifugal pump. These were redesigned to minimise any areas where latex could begin to coagulate, and to eject any coagulate that did develop. Low friction surfaces were applied to the back-plate and an angled knife to cut off any coagulate building up behind the impeller, which would then be directed to discharge.

1.5 Outcome
The solution developed has delivered significant economies due to reduced energy usage, reduced maintenance requirements and improved reliability.