

## ABSTRACT

Mechanical seals are engineered for most pumps, mixer and agitator applications in maintenance. In addition, mechanical seals deliver a full range of rotary configurations and component materials to handle virtually any fluid moved by any equipment. Mechanical seals are the most versatile type of seal for rotating shafts. Hence, there are various types of mechanical seal widely used in the pump, especially for centrifugal pump in the industries. The main objective for this project is to carry out failure analysis for the failed seal used at the condensate booster pump. Due to the unresolved failure of the pump seals that are frequently occurred, this failure analysis is important in identifying the failures and causes of the failure. The scope of studies and research are focusing on the design, operation, type of materials and maintenance-wise of the pumps and mechanical seal used at the OSC terminal. The failure analysis of the project starts with collecting relevant data's that can be used for the analysis during project progression. Then, further study about the pump, mechanical seal, failure modes, problem solving approach and testing that can be carried out is being done in the early stages of the project. The next stages are visual inspection, Kepner-Tregoe Problem Analysis Approach and lab and experimentation analysis. The lab experiments that have been carried out were surface roughness testing and hardness testing while the visual examinations that have been carried out were via Optical Microscope and Scanning Electron Microscope (SEM). Paradoxically, overall inspection of failures on the mechanical seal cannot be done thoroughly through experimentation due to limited samples. However, visual inspection of them is still being carried out and the failures have been identified. The causes of failure of the samples which is the stationary face seal have been identified and discussed. The identified causes such as misalignment of the seal, dirt trap between the seals, dry running and others. All of the causes are due to the failures such as recorded groove, chipping and scratching. This project also provides some recommendation that can be used to counteract the causes of failures such as 5 point check at the pumps, check the alignments and others. As a conclusion, all of the results and recommendation can be beneficial in determining the failures and its causes. Plus, potential solutions have been identified that can be used in managing the failures of the mechanical seal at the condensate pumps at OSC.