

# RELIABILITY MODELING AND ANALYSIS OF A REFINERY BASED CENTRIFUGAL PUMP

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## ABSTRACT

This research paper analyzes the reliability of centrifugal pumps in a petrochemical refinery complex in the Arabian Gulf region by analyzing its failure behavior and downtime patterns. The data collected from the refinery cover a twelve year operation period of the high capacity, continuous operation pumps (P8010/11/43). A specific reliability model incorporating the actual failure states and outages as observed in the data is developed and optimized measures of reliability such as the busy period of repairman for repairable and replacement failures, expected number of replacements are numerically obtained. The reliability modeling methodology discussed herein is a universally applicable technique and can be easily adaptable to renewable energy systems also. The pump fails due to any one of the two types of failure causes as seen in the data. Semi-Markov processes and regenerative point techniques are used in the reliability analysis of the pump. Related graphs are plotted to demonstrate the obtained results.

**KEY WORDS:** Centrifugal pump, reliability, availability, failures, repairs, Semi-Markov, regenerative processes.