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DEVELOPMENT OF A MAINTENANCE STRATEGY FOR A THERMAL POWER PLANT: A CASE STUDY.

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Declaration

This research thesis is my original work and has not been presented for a degree in any other university or for any other award.

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Abstract

Profitability of any industrial set up relies on both output and availability of the plant. Power plants availability is affected majorly by maintenance activities and efficiency. Plant maintenance involves dealing with failures related to various sub-systems by addressing them with the right maintenance policy or strategy. With most power plants relying on such classical maintenance policies as failure-based maintenance, failures recur, causing downtime, production losses, contractual penalties and high maintenance costs. These call for an efficient maintenance strategy. To have efficient maintenance strategies or policies, power plants require a systematic way of identifying critical failure modes and attendant causes of failure, after which a maintenance policy can accurately be selected. The main objective of the research was to develop a comprehensive maintenance strategy targeting critical failures that are engine related at the thermal power plant. The approach consisted of first developing a risk-based maintenance approach that systematically identifies and prioritizes failure modes. A root-cause analysis is applied to identify potential root cause for the prioritized failure modes, and finally developed a maintenance strategy to mitigate the failure modes at the power plant. Cost-based Failure Mode and Effect Analysis (FMEA) is utilized to prioritize the critical failure modes of the plant. From the critical failure modes, the research identified the root causes using the cause and effect diagrams, while the selection of the maintenance strategy was addressed by a modified decision tree. The research showed that a single maintenance policy or strategy cannot effectively address maintenance needs of a power plant. A combination of various maintenance policies as well as incorporation of skills, tools and procedures in maintenance proved appropriate. The developed modified decision tree can be used generally in industrial set ups to select the maintenance policies to address various failure modes.