

RELIABILITY AND AVAILABILITY ANALYSIS OF ASH HANDLING UNIT OF A STEAM THERMAL POWER PLANT: PART 1

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Abstract

The paper aims at assessing the reliability and availability of a critical ash handling unit of a steam thermal power plant using the concept of performance analysis and modeling. Reliability and availability analysis is carried out to predict steady state operational availability for a ash handling unit of thermal power plant. Mathematical formulation for reliability of ash handling unit of plant is carried out using probability theory and Markov Birth-Death process. After drawing transition diagram, differential equations have been generated. After that, steady state probabilities are determined. Besides, some decision matrices are also developed, which provide various performance/availability levels for different combinations of failure and repair rates of all subsystems. The behaviour analysis of reliability module reveals that availability figure decreases with increasing failure rates, while operational availability improves with initial increase in repair rates for different sub-systems. Based upon various availability values obtained in decision matrices and plots of failure rates/ repair rates of various subsystems, performance of each subsystem is analyzed and then maintenance decisions are made for all subsystems.

Keywords: Operational availability; Probability theory; Maintenance Decision.