World Academy of Science, Engineering and Technology
International Journal of Structural and Construction Engineering
Vol:13, No:08, 2019

Analyzing the Performance of Different Cost-Based Methods for the Corrective Maintenance of a System in Thermal Power Plants

Authors : Demet Ozgur-Unluakin, Busenur Turkali, S. Caglar Aksezer

Abstract : Since the age of industrialization, maintenance has always been a very crucial element for all kinds of factories and plants. With today's increasingly developing technology, the system structure of such facilities has become more complicated, and even a small operational disruption may return huge losses in profits for the companies. In order to reduce these costs, effective maintenance planning is crucial, but at the same time, it is a difficult task because of the complexity of systems. The most important aspect of correct maintenance planning is to understand the structure of the system, not to ignore the dependencies among the components and as a result, to model the system correctly. In this way, it will be better to understand which component improves the system more when it is maintained. Undoubtedly, proactive maintenance at a scheduled time reduces costs because the scheduled maintenance prohibits high losses in profits. But the necessity of corrective maintenance, which directly affects the situation of the system and provides direct intervention when the system fails, should not be ignored. When a fault occurs in the system, if the problem is not solved immediately and proactive maintenance time is awaited, this may result in increased costs. This study proposes various maintenance methods with different efficiency measures under corrective maintenance strategy on a subsystem of a thermal power plant. To model the dependencies between the components, dynamic Bayesian Network approach is employed. The proposed maintenance methods aim to minimize the total maintenance cost in a planning horizon, as well as to find the most appropriate component to be attacked on, which improves the system reliability utmost. Performances of the methods are compared under corrective maintenance strategy. Furthermore, sensitivity analysis is also applied under different cost values. Results show that all fault effect methods perform better than the replacement effect methods and this conclusion is also valid under different downtime cost values.

Keywords : dynamic Bayesian networks, maintenance, multi-component systems, reliability
Conference Title : ICSSR 2019 : International Conference on Structural Safety and Reliability
Conference Location : Barcelona, Spain
Conference Dates : August 15-16, 2019