

1. An integrated simulation-analysis of variance methodology for effective analysis of CBM alternatives

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Abstract: This study introduces an integrated simulation-analysis of variance methodology to analyse the cost-effectiveness of condition-based maintenance (CBM) alternatives with respect to different levels of influencing factors identified by a comprehensive survey of industrial practitioners. System cost is influenced by (i) the level of workforce knowledge, (ii) the quality of the computerised maintenance management system and (iii) the quality of the monitoring equipment. A factorial experiment design is then conducted to make inference about the effects of influencing factors and the effect of their interactions on system cost. Within the factorial experiment, a discrete event simulation is used to analyse each alternative and calculate the total system cost. As a useful aid for industrial managers, this research develops a step-by-step methodology to evaluate and analyse different CBM alternatives. The presented methodology is used for a real industrial case in which oil analysis is performed for diagnostics and prognostics of construction machinery. The results of this study can help managers determine which level of each factor should be used in their specific industrial environment in order to benefit from a CBM alternative which results in minimum overall system cost.

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