Using the Monte Carlo simulation in the predictive-preventive maintenance system of an engine test bed

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Abstract

In this paper, we show how easy the maintenance problems of an engine test bed can be solved by means of applying the Monte Carlo method for two real case studies. Among different facilities in an engine test bed, we choose a dynamometer and a highly flexible coupling and display the close connection of the two maintenance systems "Predictive maintenance" and "Preventive maintenance" with a bootstrap simulation that is a type of the Monte Carlo method.

Keywords: Monte Carlo method, Bootstrap simulation, Engine test bed, Dynamometer,

Coupling

Introduction

Engine test beds are assuredly one of the principal columns of powertrain industries worldwide. This sector like other industrial units, appeals for an apposite maintenance system which increases the efficiency of unit by reducing the downtimes, and raising the quality and reliability of equipment in addition to reducing unexpected imposed expenses.

Failure of any component may even put the entire system in improper functioning. This is enough for the employment of a cost-effective and optimum condition monitoring system. On the other hand, although the predictive maintenance systems are generally more efficient than preventive maintenance systems, in some cases applying an optimized preventive maintenance system is inevitably the only approach or is necessarily the supplementary of a condition monitoring system e.g. when the machine to be monitored is out of reach and/or none of predictive maintenance techniques is easily applicable, or the personnel should be well trained to cope the problems.

The Monte Carlo methods are frequently used to solve complex problems. Monte Carlo approaches are a type of numerical method that relies on recurring random sampling for approximating the results.

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