سامية محمد مصطفى

بسم اللّه الرحمن الرحيم

سامية محمد مصطفى

شبكة المعلومات الجامعية

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سامية محمد مصطفى

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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سامية محمد مصطفى

شبكة المعلومات الجامعية

بالرسالة صفحات
لم ترد بالأصل

CAIRO UNIVERSITY

FACULTY OF ENGINEERING

ANALYSIS OF SIMULATED PERFORMANCE OF SOME PREVENTIVE MAINTENANCE POLICIES IN A MANUFACTURING SYSTEM

Thesis Submitted for Partial Fulfillment
of the Requirements for the M.sc. Degree
In Mechanical Engineering

By

Tarek Younis Hassan Elmekkawy

B.Sc. Mechanical Engineering, Cairo University, 1990

Supervised By :

Dr.M.A.Shalaby

Associate Professor

Mech. Design and Production Dept.

Faculty of Engineering

Cairo University

1994

ACKNOWLEDGMENT

The author wishes to express his gratefulness and sincerest thanks to Dr.M.A.Shalby for his invaluable supervision , guidance, and encouragement throughout this research.

SUMMARY

This research is directed to analyze the simulated performance of some selected time-based maintenance policies as applied to a manufacturing system by using simulation.

A simulation model is constructed for a job shop type. This job shop contains a certain number of groups of similar machines(process layout). The modeled system can receive any number of different batches where each batch may have different processing routes. The simulation model is programmed using the SIMSCRIPT II.5 simulation language.

In this research four maintenance policies are selected to study their performance , and are compared by using some time-based measures of performance. The selected policies are no preventive maintenance(NOPM) policy(if a machine fails it is repaired) , CYCLE(t) policy(Schedule a PM task after t multiples of MTBF of the machine) , GROUP policy(if a machine failed it is repaired and PM tasks are performed on the remaining machines in its group) , and CRIT policy(if a critical machine failed it is repaired and PM tasks are performed in the remaining machines in its group).

Five factors were taken into consideration to study their effects on the maintenance policies performance. These factors are system complexity(COMP) , system loading(LOAD) , job scheduling rule(RULE) , service ratio(SR) , and PM interval(INT). Factorial experiments is used to design the simulation experiments of this research. The statistical results of each maintenance policy are

analyzed using the analysis of variance(ANOVA) method. Two measures are used in this analysis ; average flow time , and total downtime. After analyzing the results of each policy , a comparison between them was performed by using ANOVA method also.

The analysis of the maintenance policies results leads to the conclusion that Scheduling PM tasks after interval equal to the machine MTBF gives the best performance. Job scheduling rule factor has a significant effect on the average flow time while it has no effect on the total downtime. In most cases the SPT rule gives the best performance. Comparing the maintenance policies showed that the CYCLE(1.0) policy gives the best performance with respect to the other maintenance policies.

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