شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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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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تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

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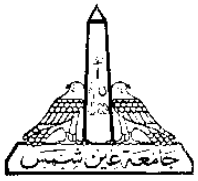

AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Design and Production Engineering

Inspection Allocation Problem at Multi-stage Manufacturing System

A Thesis submitted in partial fulfilment of the requirements of the degree of

Master of Science in Mechanical Engineering

(Design and Production Engineering)

by

Doaa Mohamed Ahmed Hassan

Bachelor degree in Mechanical Engineering

(Design and Production Engineering)

Faculty of Engineering, Ain Shams University, 2015

Supervised By

Prof.Dr. Nahid Hussein Afia Abdelhalim

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Cairo - (2020)

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Date: / /2020

Statement

This thesis is submitted as a partial fulfilment of Master of Science in mechanical Engineering, Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Thesis Summary

The quality of products in different manufacturing systems has received extensive studying and attention. The aim of this study is how to reach the required quality level on the way to meet customer requirements by using available resources. Nowadays, in the highly competitive market, many organizations realized that their survival in the market depends mainly on producing high quality products and services. Applying a proper quality plan in industries is vital to cope with competitive markets and services.

The aim of the present research is to introduce a new model for optimizing inspection allocation problem (IAP) at different multistage manufacturing systems and to study all the factors that affect the IAP using different performance total cost, line efficiency and smoothness index. Therefore, the objective here is to allocate an economical number of inspection stations, which accomplish a certain level of quality and generate the correct balance among different cost components.

Many researches have studied during the past decade to enhance the quality inspection system and many mathematical models have been applied to industrial systems to improve their efficiency and productivity.

The modeling approaches used included genetic algorithms, simulated annealing, and integer liner programming ….etc.

Most of the researchers dealt with the IAP in serial and non-serial manufacturing system, studying inspection allocation problem at assembly lines was rarely considered despite it is the importance.

In this thesis, A genetic algorithm is developed to solve IAP at serial lines and assembly lines manufacturing systems that produce a single product with the objective of achieving the optimal number and locations of the quality inspection points to minimize the total cost of the manufacturing line . Design of experiment is categorized to many experiments each experiment studies some factors with performance measurements to analyze Inspection allocation problem IAP as it may be affected by many factors, the concern is to study the effect of these factors on IAP, as well as the effect of possible interactions between all factors using Minitab statistical software as more than eight factors are considered and each factor has different levels to be studied.

An analysis is obtained for different factors affecting the efficiency of the inspection allocation problem at serial manufacturing line and non-serial assembly line such as inspection errors, different costs and different times

affecting the manufacturing line at two different inspection plans with 100% inspection .

The influence of the factors affecting the output of the IAP are studied using design of experiments. Several experiments are designed and conducted to investigate the effect of the input factors on the performance of the manufacturing systems both individually and interactively. The most important factors are inspection time, cycle time, inspection costs and rework costs. The designed experiments are executed on a serial manufacturing line and non-serial assembly line for both 100% inspection.

Results have shown that the model can be adapted easily to solve any inspection allocation problem with no limitation in the number of stations. It can arrange any number of tasks in a considerably short computational time with high efficiency.

Keywords:- Inspection allocation, Quality control, Assembly line, Optimization , GA , Design of experiment, ANOVA

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