بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــســـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

Ain Shams University

Applications of Genetic Algorithm to Production Scheduling

A Thesis

By

Tawfik Brekaa Mohamed Deifalla

B.Sc. Mechanical Design and Production Engineering

Submitted in partial fulfillment of the requirements of the degree of

M.Sc. in Mechanical Engineering

Supervised By

Prof. Dr. A. El-Kharbotly

2001

Examiners Committee

The undersigned certify that they have read and recommend to the Faculty of Engineering – Ain Shams University for acceptance a thesis entitled "Applications of Genetic Algorithm to Production Scheduling", submitted by Tawfik Brekaa Mohamed Deifalla, in partial fulfillment of requirement for the degree of Master of Science in Mechanical Engineering.

Signature

Prof Dr. Sherif Sabry
Professor of Production Engineering
Faculty of Engineering - Alexandria University

Prof Dr. Salah Z. Abd El-Barr
Professor of Production Engineering
Faculty of Engineering - Ain Shams University

Prof Dr. Amin K. El-Kharbotly
Professor of Production Engineering
Faculty of Engineering - Ain Shams University

Statement

This thesis is submitted in the partial fulfillment of Master degree in Mechanical Engineering, to Ain Shams University.

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

Signature

Tawfik Brekaa Mohamed Deifalla

Acknowledgement

I would like to express my gratitude to Dr. Amin K. ELKHARBOUTLY who directed me towards this interesting point and supported me by his experience throughout the whole work. His supervision played an essential role for this work to be completed. Not only do I owe him a lot in my research work, but in many things in my life as well.

I am also grateful to my family for their continuous support in this work and all over my whole life.

"Our friends are the family we choose" and without my friends and their support I would never completed this work special thanks to Ahemd Moneeb, Adel Moneeb, Mohamed El-Beheiry and Wael Akl .

Applications of Genetic Algorithm to Production Scheduling

By

Tawfik Brekaa Mohamed Deifalla

Ain Shams University

Abstract

Job shop system is a one of the common cases in manufacturing systems and one of the most complicated problems to tackle. That is why more attention has been given to heuristics to solve a problem reaching acceptable solution in reasonable time. Recently genetic algorithm has become one of the key search techniques that are widely used to tackle complex combinatorial problems.

The objective of this work is to present genetic algorithm model for the job shop systems and to investigate the differences between different crossover arrangements, test a new developed crossover technique (Multi-crossover genetic algorithm) and study the impact of varying the population size on solution.

The results showed promising results of the new Multi Crossover Genetic Algorithm (MXGA) technique specially the combination of Precedence Preservative Crossover (PPX)/ Linear Order Crossover (LOX) that out performed both PPX and LOX separately and even edged the performance of Partially Mapped Crossover (PMX) that maintained superiority over other single operators and combinations including PMX. The developed model reached optimum solution for the solved benchmark problem. Increasing population size has a positive impact on solution quality on the expense of increasing computation time, though the improvement in solution is relatively small compared to the increase in computational time.

Key Words: Genetic algorithm, Job shop scheduling, Crossover, population size.