UNIVERSITI TEKNOLOGI MARA

MIXED INTEGER GOAL PROGRAMMING MODEL FOR FLEXIBLE JOB SHOP SCHEDULING PROBLEM (FJSSP) WITH LOAD BALANCING

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This dissertation has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

In manufacturing-related industries, scheduling of resources and tasks play an important role in improving efficiency and productivity as well as reducing costs. Job shop scheduling problem (JSSP) concerns with the problem whereby there is only one machine that can process one type of operation. The flexible job shop scheduling problem (FJSSP) is an extension of the job shop scheduling problem. FJSSP allows an operation to be processed by any machine out of a set of alternative machines. Thus, the objectives of this study are to analyze the production schedules and operations of the machines in FJSSP, to construct a load balancing constraint function, to formulate a Mixed Integer Goal Programming (MIGP) model to solve FJSSP with load balancing; and to propose an optimal production job shop scheduling strategies based on the solution model. The MIGP model formulated is to solve FJSSP with three objective functions, which are to minimize the makespan, the total machining time and the mean absolute deviation of the total machining time to achieve machine's load balancing. The model was solved by implementing the pre-emptive goal programming approach and using the Microsoft Excel Solver Add-Ins. The novelties of this study are the introduction of the objective function that minimizes the mean absolute deviation of the total machining time and therefore producing balanced load (total machining time) among machines used in the FJSSP. Data from benchmark problem instances for the general FJSSP with total flexibility by Kacem, Hammadi and Borne has been used in the computational experiments. Optimal solutions were found for the FJSSP involved. The results obtained proved that the proposed solution approach gives competitive results as compared to the metaheuristics approaches.

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