A SIMULATION STUDY FOR DYNAMIC FLEXIBLE JOB SHOP SCHEDULING WITH SEQUENCE-DEPENDENT SETUP TIMES

by

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Summary

This thesis addresses the problem of scheduling a dynamic job shop in which there are alternative machines that can be used to process a given operation. The machine setup times are considered and assumed as sequence-dependent. Machines are prone to failure, and stochastic processing, setup and down times are assumed. The target of this study is to develop new routing rules which define the route of each part by selecting an appropriate machine for each operation. A simulation study is conducted to investigate the performance of job shop under the developed routing rules. The performance is evaluated using three performance measures, namely mean flow time, mean tardiness, and average utilization.

The developed new routing rules in this study are: Work in next queue with exclusion of the broken down machine (WINQ+BD), Modified Work in Next Queue (MWINQ) and Shortest Waiting and Setup Times (SWST). These new rules are compared via simulation with two well-known routing rules: Work in Next Queue (WINQ) and Balanced Load (BL), which are reported in the literature. A set of experimental problems are developed with considering four factors; shop load, flexibility ratio, setup time ratio and downtime ratio.

The simulation results show that the SWST rule outperforms the other rules for the mean flow time and mean tardiness performance measures. Furthermore, the performance of the SWST rule improves at higher levels of all factors. While, for the average utilization, the WINQ, WINQ+BD and MWINQ rules result in the best performance and the differences between them and the SWST rule, are minor.