

Job Shop Scheduling Optimization Through Dispatching Rules and Genetic Algorithms

**Norah Aseri, Hawazin Alqhtani, Dareen Al-Ahmari, Ghadi Al-Asmari, Waad Al-Ahmari
and Abir Mouldi**

Department of Industrial Engineering
College of Engineering, King Khalid University, KSA
norahsaeed111@gmail.com, qhhawazin0@gmail.com, Eng.dareen1@gmail.com,
Engghadi2003@icloud.com, Waad1424.6@gmail.com, amouldi@kku.edu.sa

Abstract

Job Shop Scheduling Problem (JSSP) is a complex optimization challenge where multiple jobs, each consisting of several operations, with distinct routes, processing requirements, and priorities, must be scheduled on a set of machines. Previous research has yielded various methodologies to address these challenges, such as the development of dedicated software tools like LEKIN for creating and simulating production schedules. The goal is to optimize performance metrics such as the makespan (total completion time), Mean Flow Time, Mean Tardiness, Maximum Tardiness, Mean Lateness. The LEKIN software, develops the different schedules for given data using dispatching rules, such as First Come First Serve, Longest Processing Time, Shortest Processing Time, Earliest Due Date, Critical Ratio. Additionally, for more optimizing the scheduling, Meta-Heuristic methods are used such as a Genetic Algorithm (GA), which is an adaptive Meta-Heuristic search algorithm that mimics natural selection and genetics. Genetic algorithms offer a real possibility for solving this type of problem related to job shop scheduling. We aim in this study to address the complexities involved in this case by implementing the solving through simulating dispatching rules and modeling and simulating genetic algorithms. The purpose is to apply them in practical terms at the factory to find the best and most optimal combination and to get a better schedule optimizing different performance measures as prioritized by the case company.

Keywords

Scheduling, Optimization, Dispatching, Genetic Algorithms