ABSTRACT

Production scheduling is a crucial aspect of the ongoing operations of a jewelry factory, particularly in managing the sequence of product processing across ten production machines. These machines include Order Receipt and Material Counting, Material Receipt, Sanding, Polishing, Matte Finishing, Celebration, Stamping, Engraving, Laser Finishing, Polishing, and Chrome Finishing. The main problem identified is delayed product delivery due to the suboptimal, conventional manual scheduling system.

This study proposes a hybrid approach that integrates the Campbell Dudek Smith (CDS) algorithm and a Genetic Algorithm (GA) to generate an optimal production scheduling solution. The CDS algorithm is used to generate an initial solution using a heuristic approach for the flowshop system, while the genetic algorithm is used to refine the solution through an evolutionary mechanism. The process utilizes two crossover methods: Partially Mapped Crossover (PMX) and Order Crossover (OX), and two mutation methods: Swap Mutation and Inversion Mutation. These four method combinations are tested to assess the system's performance against makespan, an indicator of scheduling efficiency.

Testing was conducted with a population configuration of five individuals, a mutation probability of 0.3, and a maximum number of generations of 50. The results showed that all four method combinations consistently produced a makespan of 22 days, despite the expected target of 21 days. This indicates that the system is stable but still stuck in a local optimum.

Although not yet optimal, the hybrid CDS and GA approach implemented in this study has proven capable of producing a stable production schedule. This system has the potential to reduce the risk of delays and errors caused by manual scheduling.

Keywords: *flowshop scheduling*, CDS algorithm, genetic algorithm, deadline, *crossover*, *mutation*.