

Application of Genetic Algorithm on Scheduling Problem in Roll to Roll Processing : A Case Study

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ABSTRACT

In recent year, the application of display panels has become more and more popular. Under the rapid development of wearable devices, largescale billboards and electronic technology of automobiles, demand for panels increases year by year. Polarizers are one of the key components of panels. The increasing demand of panels drives the demand of polarizer. In this study, the front-end process of the polarizer is taken as the research object. The front-end process is of a continuous roll-to-roll manufacturing process type and sequence-dependent setup times are involved. In the roll-to-roll scheduling problem, proper setups are required when switching rolls of material, depending on the sequence of jobs to be processed. In this study, the genetic algorithm is used to develop a scheduling method with the goal of maximizing the fulfillment rate. Fulfillment rate is defined as the percentage of job completion in terms of length. Based on the actual data, 3 groups of test instances are generated: small, medium and large scale cases. Firstly, experiment is conducted to determine the best parameter setting for the algorithm. Next, the performance of the developed algorithm is evaluated. It is shown the developed algorithm is able to improve initial solutions by 16%~25%. The research model also has good stability, which can greatly improve the scheduling effectiveness.