Application of Intelligence Based Genetic Algorithm for Job Sequencing Problem on Parallel Mixed-Model Assembly Line.

ABSTRACT

Problem statement: In the area of globalization the degree of competition in the market increased and many companies attempted to manufacture the products efficiently to overcome the challenges faced. Approach: Mixed model assembly line was able to provide continuous flow of material and flexibility with regard to model change. The problem under study attempted to describe the mathematical programming limitation for minimizing the overall make-span and balancing objective for set of parallel lines. Results: A proposed mixed-integer model only able to find the best job sequence in each line to meet the problem objectives for the given number of job allotted to each line. Hence using the proposed mathematical model for large size problem was time consuming and inefficient as so many job allocation values should be checked. This study presented an intelligence based genetic algorithm approach to optimize the considered problem objectives through reducing the problem complexity. A heuristic algorithm was introduced to generate the initial population for intelligence based genetic algorithm. Then, it started to find the best sequence of jobs for each line based on the generated population by heuristic algorithm. By this means, intelligence based genetic algorithm only concentrated on those initial populations that produce better solutions instead of probing the entire search space. Conclusion/Recommendations: The results obtained from intelligence based genetic algorithm were used as an initial point for fine-tuning by simulated annealing to increase the quality of solution. In order to check the capability of proposed algorithm, several experimentations on the set of problems were done. As the total objective values in most of problems could not be improved by simulated algorithm, it proved the well performing of proposed intelligence based genetic algorithm in reaching the near optimal solutions.

Keyword: Intelligent based genetic algorithm; Simulated annealing; Mixed model assembly line