



USING GENETIC ALGORITHM FOR PRODUCTION SCHEDULING IN FISHNET PRODUCTION

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Abstract

As the manufacturing industry becomes increasingly competitive, sophisticated technology has been used to improve the productivity. Most common and significant problems faced by the manufacturing industry are optimizing the production schedule and reducing the production delay. This project is focused on one of the unique problems in Fishnet manufacturing in Cey-Nor Foundation Ltd Company. In this problem, domain, each fishnet has Ply, Mesh, Depth, Length and colour. Production capacity is dependent on Depth size of the Fishnet and size of the machine's capacity. Different types of Fishnets, which have different sizes of depth values, are received as orders. In order to gain high profit, manager must schedule the production order to maximize the production. For instance, if manager can decide to manufacture a new Fishnet in addition to received order by using unutilized resources, it may lead to earn additional profit to the company.

This project has designed and developed a Genetic Algorithm solution for the Fishnet production schedule. It is undisputed that Genetic Algorithms is the best approach to model optimization problems. The proposed GA solution consists of two components. The first component is designed for optimization of the production schedule while the second component is for maximizing the productivity. The first component follows the cycle: Generation (setting the population), defining the fitness value calculation, Selection and Regeneration. The Generation module defines chromosomes. The size of genes of the chromosome is decided by inspecting number of received orders. Values at genes are encoded as binary numbers. Highest Fitness value is used to select suitable chromosomes from the pool. Total value of the Depth sizes of the selected orders have been defined as the Fitness value of the each chromosome. Suitable chromosomes are selected by comparing the fitness value and the production capacity of the machine. The regeneration module has been developed to generate new population by using the genetic operations of cross-over and mutation. Second component of the system, Selection of new Fishnet has been decided to generate maximum production schedule according to the above selected



solutions. By considering the above optimum solutions, system calculates the unutilized machine resources. Then it will decide to manufacture new Net comparing with the current demand. If all the conditions are satisfied, then system gives optimized production schedule with maximum productivity as an output.

The system has been tested by using numbers of samples orders which contains different type of Fishnets. For generate ten numbers of chromosomes as setting population, has been run more than 100 times of trials. Each chromosome has 10 numbers of genes. Cross over and mutation operations have been applied to increase the population up to 30 numbers. Proportion of using cross-over and mutation operations are 99: 1. It has shown 90% level of optimization and 60% accuracy level in maximizing productivity. Previous records database sized is effect to the productivity of the solution. If system has large number of previous records in the database, then productivity level of the solution can be increased up to more than 90%.

Keywords: Genetic Algorithms (GA), Generation, Crossover, Mutation, Fitness value, Selection and Chromosomes.