ABSTRACT

PT.Central Texindo is a textile company that focuses on dyeing and improving knitted textile materials. In carrying out orders from consumers, the company applies a make-to-order or pull system, so that the company will produce products according to the number of requests from customers. From November 2021 to March 2022 the company experienced delays in the production of the knitted fabric. This delay is caused by several factors, one of which is the method factor, namely the production scheduling carried out by the company initially First Come First Serve (FCFS). Still, now it has changed to random scheduling which causes a shift in production for several customers. The shift in the production process resulted in 12 jobs out of a total of 34 jobs experiencing delays with total tardiness of 1448 hours which caused unfulfilled demand. There are 8 types of heterogeneous parallel machines, totaling 28 machines for production.

In dealing with these problems in this Final Project using the Genetic algorithm method, this method was chosen because this case is designing a machine scheduling that can reduce the total tardiness in knitted fabric production, in this Final Project the object used is an identical parallel machine, the genetic algorithm method is the most effective because it has a short computation time, starting with initializing the population, then the value of fitness, selection, crossover, and mutation. The genetic algorithm requires input, namely population size, number of iterations, crossover probability, and mutation probability. The probability values for crossover and mutation are between 0 to 1. This final project, 50 population sizes are used, 25 iterations, 0.9 probability crossover, and 0.1 probability mutation. At the initialization stage, the population will produce a

random population of n chromosomes, the initial population will be formed randomly. There are two chromosomes in the genetic algorithm, namely MachineSelection (MS), and Operation Selection (OS). MS shows the jobs that will be done on the number of available alternative machines, while the OS shows the jobs that will be done first sequentially. In addition, the random number value obtained in the mutation probability is 0.1 for chromosome one, which is 0.05108,and for chromosome two, it is 0.804. Furthermore, after the mutation, the best fitness value will be sorted from the total population, namely the individual who has the smallest number of tardy, then the other population will be removed and the output will be issued in the form of a new job sequence and machine.

After designing the scheduling using a genetic algorithm, 7 tardy jobs were obtained with total tardiness of 1104 hours, while in the initial conditions there were 12 tardy jobs with total tardiness of 1448 hours. This happens because the scheduling using a genetic algorithm is ordered based on random results that allowthe production of the smallest tardy so that it can help maximize production to meet demand.

Keywords - ***Scheduling, Tardiness, Genetic Algorithm, Heterogeneous Parallel Machine, Pull System***