ABSTRACT

PT Thursina Mediana Utama is a company engaged in the publishing and printing sectors. One of the products published by PT Thursina Mediana Utama is a textbook. The production system implemented by the company is make-to-order (MTO) with a flow-shop production process flow. In the process of printing textbooks, there are five processes, starting from the plate-making process, namely filling the book format to be printed onto a plate using a Computer to Plate (CTP) machine, then heating the plate that has been filled with the book format to be printed using a baking machine, then the heated plate is used in the process of printing the contents using a web machine and printing the cover using the KOMORI machine. After the process of printing the contents and printing the cover is complete, the output of the two processes will be bound using the TSK machine into a complete book form, and then the final process is the packing of the textbooks that have been manually bound. In the A4-sized textbook product, there is a problem that occurs, namely delays in completing production based on the due date set by the company, with one of the causes of the problem being the existence of a bottleneck at the web machine work station, which is caused by the accumulation of Work in Process (WIP) in the form of plates because the input received by the web machine exceeds the capacity of the machine. In one normal shift, or for seven hours, the capacity that can be used by the web machine is 56 plates, while the input received by the web machine from the baking machine is 112 plates, so there is a gap between the input received and the capacity owned by the web machine of as many as 56 plates. Another cause of delays is that the company does not have priority orders that are done first, causing makespan to be long and orders to exceed the set due date.

Based on the problems that occur, a flow shop scheduling design is needed to overcome the existing problems. The scheduling method used is the drum buffer rope (DBR) method in order to improve performance at constraint workstations, namely the web engine and the Nawaz, Enscore, and Ham (NEH) algorithm in determining the order of jobs to be done first. Based on the

concepts contained in the DBR method, it can be identified that a web machine is a drum because it is a resource that hinders production. After identifying the drums, lot splitting is carried out in operation before the web machine by considering the capacity of the web machine when performing backward scheduling and carrying out forward scheduling in operation after the web machine. Backward and forward scheduling is called a rope in the DBR method. After carrying out a scheduling simulation using the DBR method, it is determined that the buffer time is equal to 0 (zero) because the queue time is zero, or, in other words, there is no stacking of plates in front of the web machine. The results of the proposed scheduling design obtained a decrease in makespan for the March job period to 3012,51 minutes, a decrease of 4% from the actual condition of 3136,84 minutes, and for the April job period to 4246,60 minutes, a decrease of 14% from the actual condition, namely 4956,12 minutes. Then the Manufacturing Lead Time decreased for jobs for the March period to 364,86 minutes, a decrease of 68% from the actual conditions of 1139,04 minutes, and for jobs for the April period to 1192,89 minutes, a decrease of 57% from the actual conditions of 2768,19 minutes. Then the queue time decreased by 100% for all jobs in both periods.

Keywords: Printing, flow shop scheduling, bottleneck, drum buffer rope, NEH algorithm