



Determination Of Workload And Number Of Optimal Workers For The Boiler Section Based On Pulse Rate And Working Sampling (Case Study : PT. Perkebunan Nusantara II PKS Pagar Merbau)

Dewi Paramita Sari

Faculty Of Engineering, University Of North Sumatra, Jl. Dr. Mansur No. 9 Padang Bulan, Kec. Medan Baru, Kota Medan 20222

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ABSTRACT

PT XYZ is the company used as the place of this research which is engaged in the production of Crude Palm Oil (CPO) and palm seeds (kernel). This company has a power plant station that uses a boiler that is useful for producing wet steam pressure which will be used for the production process of palm oil into CPO. The research was conducted on the boiler which has 4 workers. This research was conducted for 6 working days with a length of observation for 5 hours per day and the data taken was the pulse of workers before starting work and after finishing work as well as observation of work sampling with a total of 45 observations of data for each worker in one working day. The results of the calculation of cardiovascular load (%CVL) for all workers are in the interval 30% - < 60% with a physical workload category requires repair, and the productive percentage of all boiler workers is above 90%, and the one who has the largest productive percentage is worker 2, which is 97%. The optimal number of workers required by the boiler section at PT XYZ is 5 people so that the workload received by workers is reduced.

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Corresponding Author:

Dewi Paramita Sari,
Faculty Of Engineering,
University Of North Sumatra,
Jl. Dr. Mansur No. 9 Padang Bulan, Kec. Medan Baru, Kota Medan 20222.
Email : dewiparamita90@gmail.com

1. INTRODUCTION

The role of the workforce gives special attention to the company. All companies, whether they are developing companies or even advanced companies, will not be separated from the role of the workforce. Because the company is aware of this, the company must be able to determine the number of workers needed to achieve company goals.

According to Zeithaml et al., (1990) in Dessy Nurvitarini, et al (2014) stated that human resources or workers are one of the most important resources in an organization [1]. UU no. 13 of 2003 concerning employment in Jilly, et al. (2016) defines workforce as individuals who can produce a product to fulfill their lives or for others [2]. Therefore, without the intervention of labor, it will not produce even one product.

However, if the workforce is given a workload that endangers them, it will have a bad impact, not only for the workers concerned but can also cause losses for the company. Excessive workloads can harm workers and companies are obliged to spend funds for the care of workers and companies are less than optimal in producing the products that will be produced.

The optimal level of loading is very important for every worker and definitely has differences from one another (Meshkati in Tarwaka, 2010). In addition, the number of workers in the department concerned must also be considered in order to reduce the workload given but still maintain that there are no unemployed workers which consequently can harm the company.

PT. XYZ is engaged in processing Fresh Fruit Bunches (FFB) into Crude Palm Oil (CPO) and palm kernel (kernel seeds). PKS Pagar Merbau is located between the town of Lubuk Pakam and the village of Galang, Lubuk Pakam District, Deli Serdang Regency.

PT. XYZ requires a boiler as a source of energy and a source of steam that will be used to process palm oil. The fuel used for the boiler is in the form of shells and fibers from the rest of the palm oil processing.

The boiler section has 4 workers and 1 operator. The production process in the boiler section will produce a product in the form of a steam pressure of 19 kg/cm² which is used to boil palm oil for immediate production.

The four workers work to generate steam pressure from the boiler while 1 operator is tasked with monitoring the work of the boiler workers. Boiler workers must clean the ash (results from the combustion of shells and fibers) in the boiler which has 3 kitchens, flush the ash that has just been removed from the boiler kitchen, transfer the ash that has been removed to a non-heated ash reservoir, and put materials into the boiler. fuel for boilers.

Workers do physical work repeatedly and continuously and the tasks received by each worker are not balanced due to the workload that is too heavy for some workers, or vice versa. For example, worker 4 cleans the ash from two boiler kitchens by himself, because another worker puts fuel into a kitchen that has been cleaned previously by worker 2.

This is the background of the need to know the workload category of each worker by using the cardiovascular load (% CVL) approach and determining the optimal number of workers' needs for the boiler section based on the work sampling method.

2. RESEARCH METHOD

The type of research used is descriptive research. Descriptive research is one type of research that aims to describe a fact and the nature of an object of research (Sukaria Sinulingga 2013: 31). Agus Suswono (2012) stated that descriptive research is divided into several types, including case study descriptive research. This research is used to detail about a person or a unit during a certain period of time and data collection includes past experiences and the current state of the subject's environment.

3. RESULTS AND DISCUSSIONS

3.1 Workload Analysis and Discussion

The workload category is determined based on the cardiovascular load which is calculated using the pulse data of each worker.

Table 1. Worker Pulse Rate Calculation Results

No.	Worker	Age	Pulse (bpm)			%CVL	Category
			DNI	DNK	DN Max.		
1	1	51	73	111	169	39.24	Repair needed
2	2	50	66	116	170	47.76	Repair needed
3	3	48	66	108	172	40.22	Repair needed
4	4	47	68	118	173	47.71	Repair needed

Based on Table 1. it can be seen that all workers in the boiler section have %CVL between 30% to <60% with the category of need for repair.

3.2 Work Sampling Analysis and Discussion

Observations made for 6 days with 1 day of observation 45 times have obtained the results of observations and data calculations as follows.

Table 2. Work Sampling Calculation Results

Worker	Work	Idle	Total	%p	%(1-p)	Allowance (%)	Total Rating Factor	Amount Product
1	246	24	270	0.91	0.09	18.5	1.06	513
2	261	9	270	0.97	0.03	18.5	1.09	513
3	249	21	270	0.92	0.08	18.5	1.05	513
4	259	11	270	0.96	0.04	18.5	1.09	513

Based on Table 2. it can be seen that the productive percentage of all workers in the boiler section is above 90%, and the one who has the largest productive percentage is worker 2, which is 97%, which means more utilizing and maximizing time at work with the allowances given to workers.

3.3 Analysis and Discussion on Determining the Number of Optimal Worker Needs

Calculation of determining the number of optimal worker needs based on standard time for boiler workers is 4.25 minutes with a total of 5 hours of production 4 times, then the optimal number of workers needs is 5 people. Thus the improvement for the workload category of workers is the addition of workers, where the actual number of workers in the boiler section is 4 people. After the calculation, it turns out that the optimal number of workers needs is 5 people so that the workload received is more reduced and the workload category does not need improvement so that workers can improve their performance in doing their jobs and can increase production capacity at PT XYZ by more than 30 tons/day. Table 3 explain distribution work which optimal with using the Assignment Method for 5 workers.

Table 3. Job Description Proposal for Work in the Boiler Section

Worker	Job Description
1	Putting fuel into the boiler kitchen
2	Cleaning the ash in the boiler kitchen
3	Transferring ashes to a pile of unheated ashes
4	Cleaning the ash in the boiler kitchen
5	Watering the ashes that have just been removed from the inside kitchen boiler

4. CONCLUSION

The workload categories for the four workers in the boiler section are all in need of repair. The largest (97%) and the smallest (91%) productive percentages were obtained by worker 2 and worker 1, respectively. There is an increase in the number of workers by 1 person from 4 actual workers in the boiler section so that the optimal number of workers needs is 5 workers. The improvement given for the workload category is the addition of the number of workers.

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