Estimation of Standard Time in Production of Light Weight Brick Manufacturing Using Ball Mill

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ABSTRACT

One of the efforts that must be undertaken by companies in the field of production is the production process should be designed as efficiently and effectively as possible. For that in the implementation of the production process of the need for planning and monitoring good production so lightweight brick production process can run well, so that later can increase the number of qualified products. The aim of research analyzing the quality standard time lightweight brick production process, method of data collection directly to the worker / operator in the process I Ball Mill and Raw Material. The research result analysis cycle time, normal time and standard time, then the part I. Process Ball Mill and Raw Material 1 operator obtained a standard time 67.86 minutes, Operator 2 is obtained standard time standard time acquired 36.20 minutes , Operator 3 is a standard time 56.95 minutes. Standard time or standard time gained to the three operators in the process I. Ball Mill and Raw Materials takes one time settlement activities in the amount of 161.01 minutes.

***Key Word**: Time Cycle, Normal, Standard*

1. INTRODUCTION

Lightweight brick is widely used in Indonesia as the foundation of the building, such as bridges, buildings, factories or industrial buildings, towers, piers, etc. which are all constructions have and receive relatively heavy loads. The manufacturing cost is likely (to see the location and other locations), are cheaper when converted into the power that can be generated. Implementation easier and the equipment used is not

difficult to obtain. Workers in Indonesia already skilled enough to carry out the brick buildings that use light and relatively faster implementation time.

In the manual production systems, for example, although its production capacity has been determined based on the standard output operator, the application is still equate humans with machines. This can be seen from wearing a particular number to indicate production capabilities in all available working hours.

In the face of the problems the industry is increasingly uncertain and interconnected with the environment will require an approach model that can be used to solve these problems properly. Specifically the industrial system is a combination of production processes and management processes, the production function is responsible for creating and producing products to realize the need so that the production process has illustrated a technique or how to create an effective product.

The aim of research is analyzing the quality standard time lightweight brick production process. Therefore, this study will focus on the development of sectors of industrial production in the manufacture of lightweight brick which this production has a very important contribution in the construction of buildings, bridges and roads, but the production of lightweight brick has not been able to meet the market demand where production capacity is generated only able to produce as many as 140 m3 / day. This will certainly affect competition in the business world lightweight brick so that a company must develop a model of the production process in order to be able to increase production capacity.

2. RESEARCH METHOD

Data collection is done directly in the process I Ball Mill and Raw Material. Once the data is obtained and then continued with statistical testing

- In uniformity test is said to be uniform if the data where the data lies between Upper Control Limit and Lower Control Limits using a 95% confidence level and 5% level of accuracy.
- Adequacy test data to determine the data point fairly or not the condition N '<N, with a confidence level of 95% and 5% level of accuracy.
- Test percentile, 5-th percentile, percentile of 50-th and 95-th percentile.

Analysis Method

Testing the uniformity of the observed data as a control tool calculated the average (mean), the upper control limit (BKA), lower control limits (BKB).

BKA = $\bar{X}$ + 2 σ_x and BKA = $\bar{X}$ - 2 σ_x ..... **(1)**

Data sufficient if N '<N, By using the formula that is:

$$N' = \left[\frac{K / S \sqrt{N \sum X_i^{\,2} - \left(\sum X_i \right)^2}}{\sum X_i} \right]^2 \quad \text{..... (2)}$$

Test percentile of the normal distribution and calculation uses percentile (Stevenson, 1989), (Nurmianto, 1991) with the formula:

Cycle time $= WS = \frac{\Sigma Xi}{N}$ ..... **(3)**

Normal time = $Wn = Ws \; x \; p$ ..... **(4)**

Standard time = . $Wb = \mathrm{Wn} + (\mathrm{Wn} \; \mathrm{x} \; 1)$ ..... **(5)**

3. RESULTS AND DISCUSSION

Research on the process I Ball Mill and Raw Material that has been observed by three operators, while the activity or activities undertaken for each operator, namely:

Operator 1.

O-1 Silica Sand Filtration Conduct

O-2 Charging Into Silica Sand Bucket Ball Mill Loader

O-3 Charging Bucket Ball Mill Gypsum IntoLoader

O-4 Charging Lime Into Elevator Chute Dgn Loader

Operator 2

O-1 Waiting Filling Material Ball Mill

O-2 Operate Ball Mill

O-3 Controlling the water entering the Material Ball Mill

Operator 3

O-1 Waiting Material From Ball Mill

O-2 Operating the Bucket Elevator

O-3 Entering Into Chalk Bucket Elevator

O-34membersihkan Area Bucket Elevator

Based on the results of research on the process I Ball Mill and Raw Materials that have been observed as seemingly in the following, From the observation then followed by a statistical analysis using Upper Control Limit (BKA) and Lower Control Limit (BKB) obtained results of data , such as Table 1.1.

Table 1.1 Upper Control Limit and Lower Control Limit

Operator	N	BKA	BKB	KET.
Operator-1				
1	100	42.19	41.45	identical
2	100	5.20	4.83	Identical
3	100	3.43	2.74	Identical
4	100	3.63	2.86	Identical
Operator-2				
1	100	15.62	14.75	Identical
2	100	10.61	9.85	Identical
3	100	10.79	9.91	Identical
Operator-3				
1	100	10.43	9.94	Identical
2	100	10.21	9.48	Identical
3	100	4.71	2.58	Identical
4	100	22.81	19.97	Identical

Further analysis is to determine the adequacy of the data, which means that of the 40 samples taken can represent the data, using a confidence level of 95 % and 5 % level of accuracy .Results of the data obtained is sufficient, as shown in Table 1.2.

Table 1.2. Data Sufficiency

Operator	N	N'	KET.
Operator-1			
1	100	29.22	Enough
2	100	29.83	Enough
3	100	31.14	Enough
4	100	9.01	Enough
Operator-2			
1	100	29.33	Enough
2	100	6.41	Enough
3	100	29.34	Enough
Operator-3			
1	100	29.41	Enough
2	100	29.48	Enough
3	100	40.57	Enough
4	100	29.83	Enough

Furthermore, if the data uniformly and fairly , then the analysis cycle time of each worker, how much time it takes workers each activity without any looseness and adjustment factors , the cycle time can result in Table 1.3 .

Table 1.3. Results Cycle Time

Operator	**N**	**WS** (minutes)
Operator-1		
1	100	42.19
2	100	5.20
3	100	3.09
4	100	3.25
Operator-2		
1	100	15.19
2	100	10.23
3	100	10.35
Operator-3		
1	100	10.43
2	100	9.84
3	100	3.65
4	100	21.39

Analysis of normal time workers by using an adjustment factor Westinghouse covering skills, concystency , then the result can be obtained as shown in Table 1.4 .

Table 1.4. Results of Normal Time

Operator	**P**	**WN** (menutes)
Operator-1		
1	1.09	45.98
2	1.09	6.57
3	1.09	3.90
4	1.09	4.10
Operator-2		
1	1.09	19.18
2	1.09	12.92
3	1.09	13.07
Operator-3		
1	1.09	13.18
2	1.09	12.44
3	1.09	4.61
4	1.09	27.02

Analysis standard time or standard time of each worker by using parameters clearances obtained results , as shown in Table 1.5.

Table 1.5. Analysis Standard Time

Operator	**L**	**Wb** (minutes)
Operator-1		
1	15.90%	53.29
2	15.90%	6.57
3	15.90%	3.90
4	15.90%	4.10
Operator-2		
1	15.90%	19.18
2	15.90%	12.92
3	15.90%	4.10
Operator-3		
1	15.90%	13.18
2	15.90%	12.44
3	15.90%	4.61
4	15.90%	27.02

It can be concluded from the standard time in the Ball Mill and Raw Material by using three (3) operators with 11 activities, the operator 1 to 4 activities with the standard time of 67.86 minutes, then the operator 2 to perform three activities can finish 36.02 minutes, while the standard time operator 3 with activity / activities 56.96 minutes. Then the obtained standard time overall in the process I. Ball Mill and Raw Material which is standard time performed by the operator 1, 2 and 3 amounted to 161.01 minutes.

4. CONCLUSION

Based on the research that has been done using analysis cycle time, normal time and standard time, then Process Ball Mill and Raw Material 1 operator obtained a standard time 67.86 minutes, Operator 2 is obtained standard time 36.20 minutes, Operator 3 is a standard time 56.95 minutes. Based on the time taken to three operators in the process I. Ball Mill and Raw Materials takes one time settlement activities in the amount of 161.01 minutes.

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