

Measurement of Noise Level in Enumeration Station in Rubber Industry

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Abstract. This research was conducted in companies engaged in the production of crumb rubber. In the rubber industry, the potential noise occurs in the enumeration station. Stations enumeration use machine and equipment that potentially generated noise. Noise can be defined as an unwanted sound because it does not fit the context of space and time so that may interfere with the comfort and human health. The noise level measured at random during the initial observation station enumeration is 101.8 dB. This value has exceeded the Threshold Limit Value (TLV) Kep-51 / MEN / 1999 and SNI No. 16-7063-2004 so research must be done to measure the level of noise in the enumeration station. Quantitative methods used in the study. Observations made with the calculation method of equivalent noise level. Observations were made on six measurement points for one shift for three days. The results showed the noise level over the Threshold Limit Value is equal to 85 dBA/8 hours. Based on the measurement results, the whole point of observation was far above the threshold Limit Value (TLV). The highest noise level equivalent is in the observation point 6 with a value of 102, 21 dB.

1. Introduction

Noise means, "unwanted sound in the wrong place at the wrong time", and the fact that the noise is a potential health hazards due to impact damage human hearing [1]. Every environmental pollution problem has roots in the past be it water , air or noise pollution and all these problems are becoming critical in the recent years due to rise in the use of modern technologies [2].

Noise pollution has two sources, one is industrial and other one is non-industrial sources. Industrial noises are usually produced by rotating, reciprocating or any other types of machinery, or by high pressure high velocity gases, liquids or vapour involved in the industrial processes [3]. One of the important problems of noise sources is industrial noise. The effect of industrial noise on the health of workers has been a topic of debate among scientists for a number of years. So many studies that discuss about the noise level in many industries.

The noise level permitted in several industries including the textile industry around 75-99 dBA, iron and steel industries 77-100 dBA, cement industry around 70-106 dBA, Concrete Travese Industry around 80-107 dBA [5]. Many studies have been conducted to assess the noise level coming from industrial activities [4,6], the services industry [9], and non-industrial activities [7,8,9]. However until there is currently no studies that tested the noise levels at plantation industries especially rubber industry. The purpose of this research is to perform of the noise level in the rubber industry.



2. Methodology

This research was conducted in order to investigate the noise level in the rubber industry in North Sumatra. Around the chosen as research samples are counting station. Noise levels were measured using a Sound Level Meter which had been calibrated. Measurements were taken at six measurement points during one shift.

According to ISO 11690-1/1996, maximum values tolerated for the A-weighted equivalent sound pressure level for the 8 hour work shift at industrial Workplaces in the range of 75 to 85dB. For routine work in the office ranges 45-55dB. The range of noise levels at a meeting room or task that involves a concentration of about 35 - 45dB [4].

Monitoring noise level measurements performed within 1 hour. In the first shift documenting work done as much as 8 times the measurement results for each measurement point. Recording the results of measurements of noise levels conducted for 10 consecutive working days. Noise is described as L_e yang calculated using the formula:

$$L_e = 10 \log \sum_{i=1}^n f_i (10^{L_i/10}) \quad (A)$$

Where, f_i = fraction of time for which the constant sound level persist (SPL), i = time intervals, n = number of observations, L_i = sound intensity level at a time interval.

3. Result

This research conduct measurements at six points of measurement in the rubber industry enumeration station. Noise level measurement point can be seen in Figure 1.

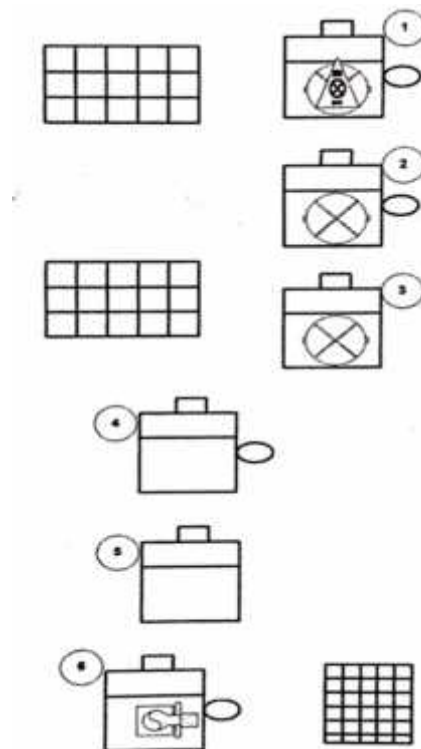


Figure 1. Point of Noise Measurement in Enumeration Station in The Rubber Industry

Figure 1 shows the first measurement point is at prebreaker machine. The second measurement point on the machine Hummer Mill. The third measurement point on the machine Creper and fourth measuring point on the Creper Fisher machine. The measurement point is performed on the Schreder machine, fifth and sixth measurement point on the Dryer. The results of the measurements made during the 10 days of work during one shift at 6 measurement point can be seen in Table 1.

Table 1. Summary of Measurements For 10 Business Days

Measuring Days	Point 1 (dB)	Point 2 (dB)	Point 3 (dB)	Point 4 (dB)	Point 5 (dB)	Point 6 (dB)
Day 1	101,4	101,4	101,5	102,3	102,3	102,4
Day 2	102,2	100,6	101,8	102,3	99,7	100,6
Day 3	103,6	102,3	102,6	99,8	102,5	102,5
Day 4	103,8	103,6	103,4	102,5	103,4	103,6
Day 5	102,4	100,6	101,7	103,6	101,7	101,7
Day 6	102,3	102,7	102,4	101,5	102,3	103,5
Day 7	101,4	101,4	102,8	101,4	102,5	102,3
Day 8	100,8	102,2	102,3	102,6	99,7	99,8
Day 9	102,6	103,6	100,8	102,8	102,8	102,5
Day 10	101,6	102,8	102,6	102,5	102,9	102,7
Leq	102,21	102,12	102,19	102,13	101,98	102,16

Table 1 shows the value Leq (equivalent noise level) on the production floor which is made in 6 point measurement. The noise level at the counting station average is above 100 dB. Based on the decree of the minister of health no. 26 l / Menkes / SK / II / 1998 states that the standard threshold value of noise is 85 dB for 8 hours. Comparison of the noise level equivalent actual conditions and thresholds set out in the Minister of Health of the Republic of Indonesia that can be seen in Figure 2.

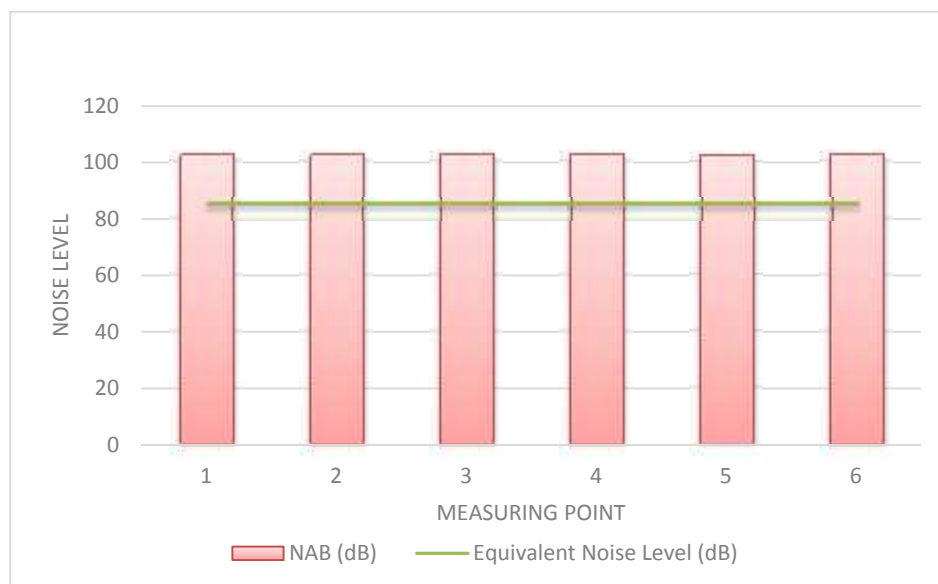


Figure 2. Graph of Actual Condition and Noise Standards Conditions Level in Enumeration Stations in The Rubber Industry

Based on the graph in Figure 2 can be seen that all of the measuring points on the production floor has the actual conditions that are above the standard set of conditions. Equivalent noise level on the

production floor as compared to the maximum allowed in the industry. The maximum permissible exposure levels are shown in Table 2 [10].

Table 2. Maximum Permissible Exposure Levels	
Noise Level dB(A)	Description
< 74	Good Conditions
75 – 80	Tolerable Conditions
81 – 84	Noisy Conditions
85-87	Very Noisy Conditions
>88	Intolerable Conditions

Table 2. shows the value of noise above 85 dB indicates that the situation is very noisy. Conditions in enumeration station in the rubber industry as shown in Figure 2. shows that the noise value is above 100 dB. These values indicate an uncontrolled noise condition. Conditions uncontrolled noise can interfere workers' hearing.

Noise level equivalent in enumeration station can be described within noise contour map. Contour noise on the production floor can be seen in Figure 3.

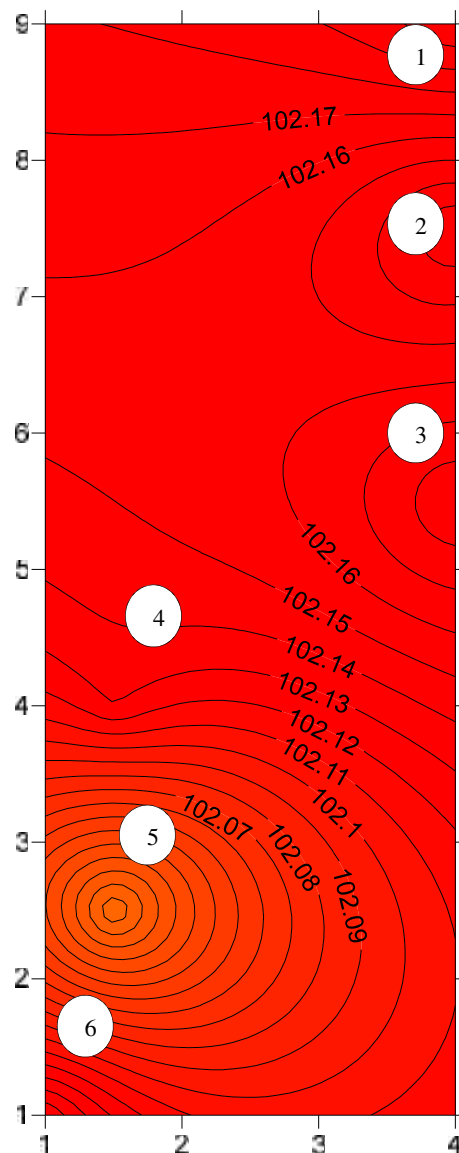


Figure 3. Contour Noise Mapping

Figure 3 shows the mapping of contour noise at 6 point of sources of noise using software suffer version 11. The mapping shows the picture of noise level in the rubber industry. Based on figure 3 can be seen that the whole point of measurement (1, 2, 3, 4, 5, and 6) being in the danger zone and uncontrollable condition of noise.

4. Conclusion

The conclusion obtained from the above results is the noise level in enumeration station in the rubber industry on the sixth point of measurement has exceeded standards Manpower Minister Decree no. 261/Menkes/SK/II/1998 of 85 dB and included in conditions with noise levels are not controlled. The noise level is sourced from prebreaker machine that works for 8 hours per day. Noise level in enumeration station affected by the location close to prebreaker machine. This study can be followed on controlling the noise source to reducing the impact of noise.

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