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Evaluation of Implementation of an Acoustic Barrier in aWood Branch Company

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ABSTRACT :*Noise is a problem faced by companies in various segments, directly affecting occupational health and also the acoustic comfort of the neighborhood. In order to try to solve the noise problem in a logging company, this article aims to evaluate the implementation of a low cost acoustic barrier by means of measurements using a sounde level meter. The measurements were taken at 2 points of the company, before and after the barrier implementation. The results indicated a significant reduction in the sound pressure level values measured after the barrier implantation, but not enough to solve the company's problems.*
KEYWORDS: *Noise; Acoustic Barriers; Sound level meter.*
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I. INTRODUCTION

Noise is a problem that plagues companies in various industries, affecting not only their workers, but also their surroundings. Much research has been done on the impact of noise on workers' health, but there are few studies on this conflict involving: the productive routine of companies and the acoustic well-being of the surrounding population.

Many companies have an interest in resolving such a conflict, and in fact reducing the negative impact generated in the neighborhood where they are located. However, the financial health of the company and issues related to profitability often overlap the solution of this problem, observing that in practice solving them would lead to extra costs for the organization. The recurring solution, used by many professionals, is to use / reuse materials that the company already has, in order to solve the problem by spending as little expenses as possible.

Thus, in an attempt to solve a noise problem in a logging organization in the city of Criciúma, the following question was asked: would it be possible to solve the noise problem of the company using only available materials? In this context, this article aims to perform and verify the efficiency of the implantation of a low cost acoustic barrier by means of measurements with a decibel meter. In addition, frame the project area in accordance with NBR 10.151 and verify that the measured sound pressure levels would meet the evaluation criteria levels before and after the sound barrier implementation.

II. RESEARCH METHOD

The study was carried out in a logging company located in Criciúma - Santa Catarina. The company in question develops trade in raw wood, as well as benefited, to be used in various purposes such as: planks, walls, frameworks, pergolas, decks, floors, among others. Among the machinery used in the lumber stands the chopper, which is used to transform the wood chips into chips, which is a byproduct of the process. Such machinery is used sporadically and operates by manual feeding of wood scraps.

The mincer is the main source of noise in the enterprise, although its operation is not continuous, is the main reason for complaint from the neighborhood. The main function of the barrier will be to isolate the noise generated by the mincer, in order to improve the acoustic comfort of the directly affected neighborhood.

According to Law No. 3900, of October 28, 1999, which establishes the land use zoning law of the municipality of Criciúma, the area of the enterprise is classified as Industrial Zone 2 (ZI 2) and can be classified by similarity as NBR 10.151 as: Predominantly industrial area, so levels should not exceed 70 db (daytime) and 60 db (nighttime).

Four measurements were performed with a properly calibrated Instrutherm Model Dec 490 Sound Pressure Level Meter (decibel meter), following the guidelines and criteria established by NBR ABNT 10.151 referenced by CONAMA 001/1990, using the simplified method. These measurements occurred during the daytime, during the mincer operation, and were performed at 2 points before and after the use of the barrier. The points in question were named Point 01 (P01) and Point 02 (P02). P01 is at a distance of approximately 9 meters from the source, while P02 is at a distance of about 50 meters from the source, both located towards the nearest homes where there have been complaints about noise from the mincer It is noteworthy that due to difficulty of access and location of points, both measured points were within the property of the company.

Each of the measurements lasted 2.5 minutes (150 seconds), this time interval was adopted because it allowed to cover some mincer feed cycles without external interference. At the time of the measurements the weather conditions were stable and there was no direct wind interference.

The barrier used in the test consisted of two boards made of wood (eucalyptus) with a thickness of 1.4 cm, paired side by side. These were placed next to the mincer to obstruct the passage of sound waves in the direction of the measurements.

III. RESULTS

As a result of the measurements made, the average sound pressure level values were obtained before and after the sound barrier implantation. These can be evidenced in Table 1:

Table 1 - Quantitative Assessment of Daytime Sound Pressure Levels.

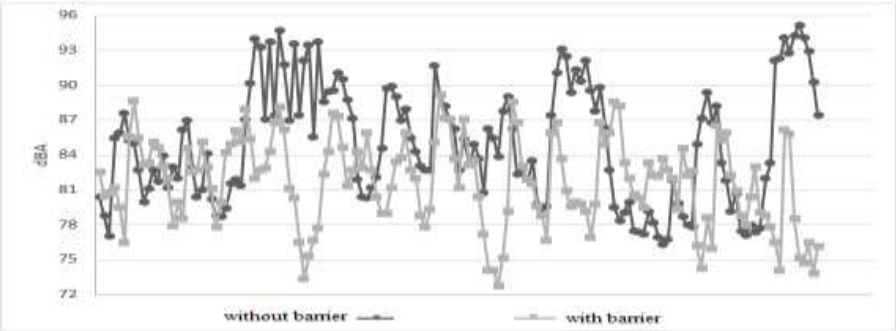
Measurement Location	**Description**	**Results dBa**	**Legislation**
			NBR 10.151 -Predominantly Industrial Area (Daytime)
P01	No use of sound barrier.	LAeq, 150s **85**	**70**
P01	With use of acoustic barrier.	LAeq, 150s **82**	**70**
P02	No use of sound barrier.	LAeq, 150s **71**	**70**
P02	With use of acoustic barrier.	LAeq, 150s **68**	**70**

Source: Authors, 2019.

From the instantaneous data collected by the sound pressure level meter (decibel meter) it was possible to make figures that allow us a better visualization of the difference between the measurements before and after the implementation of the acoustic barrier in the mincer.

Figure 1 graphs the values obtained at P01 within 150 seconds of measurement, measured before and after barrier implantation.

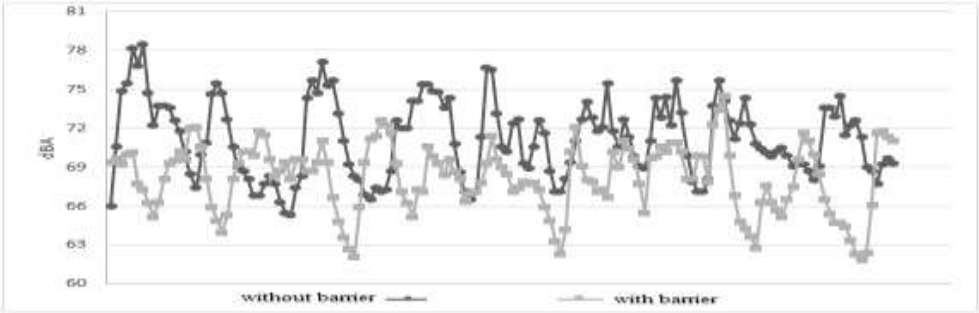
Figure 1 - SoundPressureLevelValuesmeasuredat P01.



Source: Authors, 2019.

Figure 2 presents the graph of the values obtained in P02 within 150 seconds of measurement, measured before and after barrier implantation.

Figure 2 - Sound Pressure Level Values measured at P02.



Source: Authors, 2019.

IV. CONCLUSION

This article aimed to evaluate the efficiency of the implementation of a low cost acoustic barrier in a logging company, using only materials available in the project. For this evaluation a properly calibrated sound pressure level meter (decibel meter) was used to quantify sound pressure levels at 2 measuring points before and after the barrier implantation.

The evaluation by means of the obtained average values, as well as the graphic demonstration, evidenced that there was a noticeable reduction in the measured values in both points. The averages indicate an approximate reduction of 3 dB in both points, but, although noticeable, the reduction was not satisfactory for the project due to the fact that the values after implantation still remain high, in order to interfere with the acoustic comfort of the surrounding population. and employees who work closely.

As for meeting the criteria levels established by NBR 10.151, both points would not meet the limits before the barrier implementation, both being above 70 dB established in the standard. After the implementation of the acoustic barrier, P02 started to meet the limit value of the standard (68 dB), but the value measured in P01 remained above it (71 dB).

It should be noted again, that the measured points were within the company's property, and NBR 10.151 stipulates that for measurements aiming at comfort of the surrounding population, measurements should be taken in the external area of the enterprise, close to its limits.

Thus, it was concluded with the owners of the company that the result obtained would not justify the implementation of the barrier. Therefore, the barrier generated problems in the logistic and in the handling of the chopper's feeding, making it difficult to access and handle the material to be processed, and did not fully solve the problem evidenced. However, the values obtained at the nearest point (P02) after the implementation of the barrier were within the limits established by the standard, the safety margin was very small and the noise disturbance still remained..

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