

MEASURING NOISE LEVEL IN THE TEXTILE INDUSTRY

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Abstract: The Company SC Sonoma Trading currently owns a production area, the activity being carried out on a placement has a built area of 275 m².

The monitoring of the noise level within the company Sonoma Trading SRL was carried out for three weeks, between 18.05.2015 - 5.06.2015; for the noisiest equipments. Result of noise level was in the range 82.41 dB – 63.73 dB. The background noise was 38.59 dB.

Based on the results of the measurements made, the noise map for both tailoring rooms was prepared: the tailor room and the ironing - stapled - packing section. According to the obtained results, the noise level values within the company Sonoma Trading SRL do not exceed the maximum allowed imposed by the legislation in force.

Keywords: noise level, noise control, tailoring, noisy machines

1. INTRODUCTION

In the textile industry, the issue of combating noise and vibration is very important as the number of workers affected is high. The use of large halls for tailorings allows the placement of a large number of machines, favoring a higher noise level than in the usual halls [1, 2].

The noise exposure of workers in industrial halls is mainly caused by noisy machines whose acoustic characteristics are specified, known. The most exposed to the noise are the workers close to the machine, also it's important their position towards the machine [3-14].

Also, a direct relationship is between industrial noise and the percentage of affected workers, disturbed by noise. Increasing the noise level in the industrial environment also leads to an increase in the number of accidents among workers [4, 5, 15, 16].

Nowadays, high level of noise are considered the most common cause of discomfort and permanent loss of hearing. This is a common and serious problem of the modern industrial world, which can cause high costs and serious health problems [4, 5, 15].

Many countries have instituted laws that limit noise exposure of workers in industry [4-6, 8]. Different noise control techniques are available and it is advisable to consider the noise control methods at the design stage. In many situations, these methods can also be applied at the development stage or even later to control the noise level [9, 14].

Noise control is of great importance in people's lives. In this sense, noise mapping is required to ensure noise control. Noise maps are useful for noise reduction planning. For this purpose, the noise levels in the zone of interest are determined and the areas affected by excessive noise are identified [4, 6, 14].

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2. EXPERIMENTAL SETUP

SC SONOMA TRADING SRL has as main activity the manufacture of articles made of textile, in lohn system [17]. The company currently owns a production area, the activity being carried out on a place with a built-up area of 275 m² [17]. The maximum limit imposed by the legislation in force for industrial environments is 87 dB [18].

The main phases of the technology process are [17]: receipt of raw materials; cutting the pieces; preparing the accessories; manufacturing: sewing the parts, accessories application; finishing and quality check - cleaning of thread, ironing; packaging of finished products in nylon foil; storage and delivery of products only on export.

The monitoring of the noise level generated by the activity at SC Sonoma Trading SRL was carried out for three weeks, between 18.05.2015 - 5.06.2015, on Mondays; Wednesday and Friday. The measurements were made on the noisiest equipment: sewing machines (Figure 1), embroidery machines (Figure 2), automatic cutting machine, cutting machine, winding machine, thermolipite presses and ironing stations.

The noise level measurements were performed with a Brüel&Kjær 2250 sonometer, and a telemeter Bosch was used to determine the distances.



Fig. 1. Sewing machines.



Fig. 2. Embroidery machines.

The tailoring consists of tailor room where there are automatic tailor machines, tailor machines, embroidery machines and over 100 sewing machines; and ironing-stapled-packed section, where the winding machine, the ironing stations, the thermolipite presses is located.

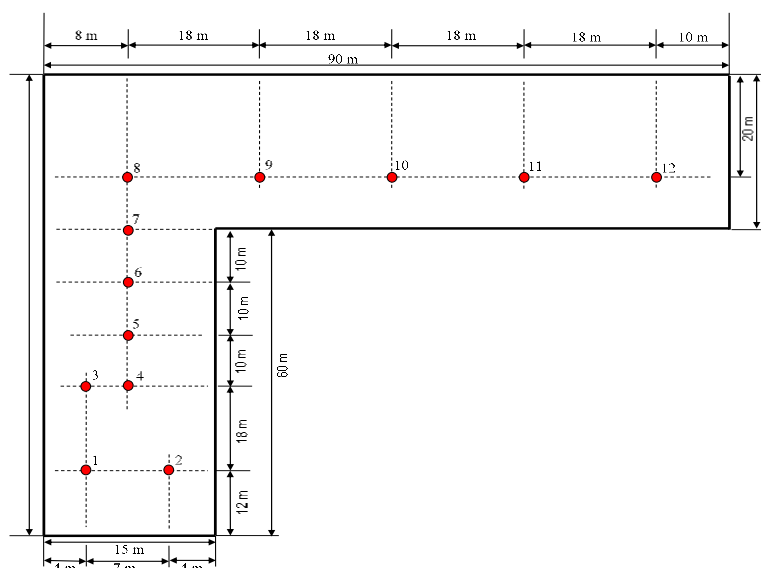


Fig. 3. Representation graphs of the measurements points in the tailoring precincts, top view:

● - recording points.

The determination of the noise level was made by measurements made in the two rooms, in 15 points: 12 points in the tailor room (Figure 3), and next to the automatic tailor machine, the tailor machine and the embroidery machines in the ironing - stapling - packing section. According to the measurements, background noise is 38.59 dB.

The results of the noise level measurements are shown in Table 1.

Table 1. Results of noise measurements in the section with sewing machines.

Day	Measurements	Noise level values (dB)					
		1	2	3	4	5	6
Monday	M1	77.35	64.95	76.41	77.8	72.66	70.26
	M2	77.58	63.73	77.52	78.41	72.43	69.88
	M3	77.26	64.56	76.87	77.92	71.97	69.34
	Average	80.19	64.41	76.93	78.04	72.53	69.82
Wednesday	M1	81.68	64.87	78.51	78.53	73.21	68.49
	M2	81.2	65.53	78.65	77.75	73.18	68.57
	M3	80.57	64.92	77.98	78.33	72.9	68.92
	Average	81.15	65.1	78.38	78.2	73.09	68.66
Friday	M1	76.32	65.18	78.74	77.89	72.41	67.32
	M2	77.05	67.01	77.56	78.66	73.24	68.12
	M3	76.47	66.32	78.42	78.92	72.55	67.43
	Average	79.89	66.17	78.24	78.49	72.73	67.62
		7	8	9	10	11	12
Monday	M1	77.49	72.1	70.62	74.71	76.42	80.57
	M2	77.56	71.89	71.53	74.25	76.71	80.23
	M3	77.92	72.38	71.28	74.47	76.03	80.88
	Average	77.65	72.12	71.14	74.47	76.38	80.56
Wednesday	M1	77.46	71.63	73.88	72.22	75.82	81.12
	M2	76.31	71.4	74.57	72.56	75.16	80.78
	M3	76.9	71.04	74.11	71.79	75.48	80.94
	Average	76.89	71.38	74.18	72.19	75.48	80.94
Friday	M1	78.62	73.16	72.26	73.38	76.19	82.41
	M2	78.39	73.28	72.27	73.4	75.93	82.06
	M3	78.54	73.44	72.08	73.26	75.86	81.78
	Average	78.51	73.29	72.36	73.34	75.99	82.08

Table 2. Results of the noise level measurements in the section with the ironing - stapling - packing machines.

Equipment/Area	Noise level values (dB)			
	M1	M2	M3	Average
Automatic tailor machine	80.19	81.15	78.89	80.07
Tailor machine	64.41	65.1	66.17	65.22
Embroidery machines	78.04	78.2	78.49	78.24
Ironing - stapling - packing machines	72.25	72.28	71.87	72.13

According to the recorded results the maximum noise level was recorded in the tailor room, point 12, Friday (82.08 dB), and the lowest value in point 2, Monday (64.41 dB). Also, at points 9 and 10, Wednesday, the largest variation of the noise level occurred compared to the other days. At embroidery machines, a maximum noise level of 78.5 dB was recorded Friday, and a minimum noise value of 76.9 dB on Monday. According to the chart, the variation of the noise level for sewing machines recorded a minimum noise level of 67.6 dB on Friday at point 6 and a maximum noise level of 82 dB, point 12 on the same day. In the ironing - stapling - packing room the noise level does not show significant variations, with values between 70.7 dB - 73.8 dB. During the 3 weeks of the measurements, the greatest variation in the noise level was recorded in point 9, ranging from 71.1 dB to 74.1 dB.

The values obtained from the measurements were used to achieve of noise maps. These were done with the CadnaR software for the interior noise. The noise map was made for both tailoring rooms, the tailor room (60 m long, 15 m wide and 4.36 m high) and the ironing-stapling-packing section. For each room was chosen the most noisy noise source (Figures 4 and 5):

- Automatic tailor machine, 80.1 dB (Figure 3, point 1), located at a distance of 12 m from the western wall and 4 m from the northern wall;
- Embroidery machine, 78.24 dB (Figure 3, point 4), located at a distance of 8 m from the northern wall and 30 m from the western wall.

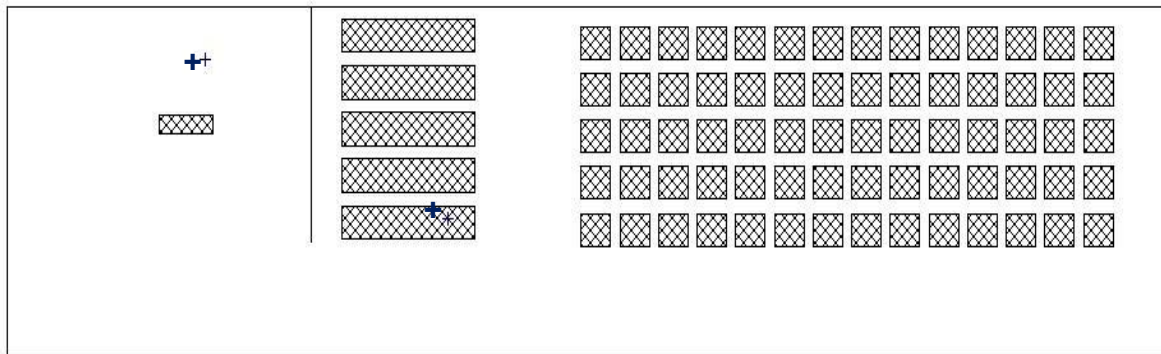


Fig. 4. Location of noise source in the tailor room, 2D view.

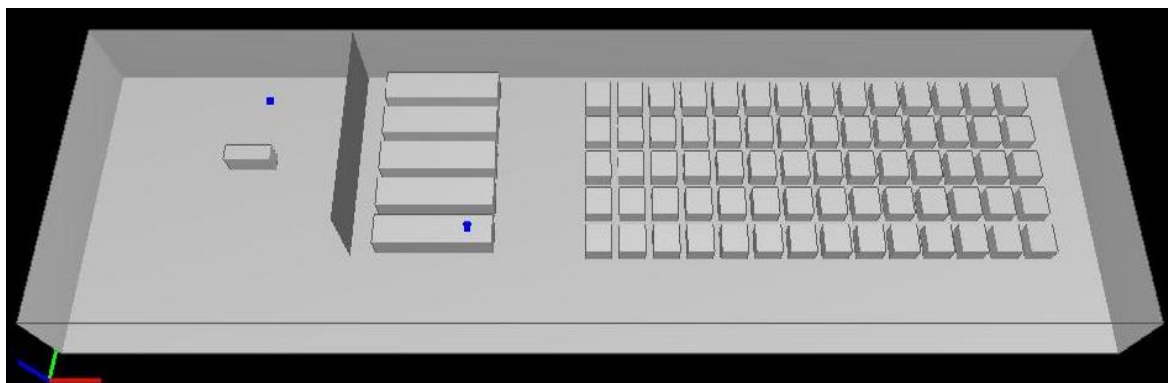


Fig. 5. Location of noise source in the tailor room, 3D view.

From the noise maps it can be seen that although the level of noise produced by the automatic tailor machine is high (80.1 dB), it decreases with the distance from the source, even if the hall does not have structural elements with a high level of absorption noise. Noise maps for this one section are given in Figures 6 and 7.

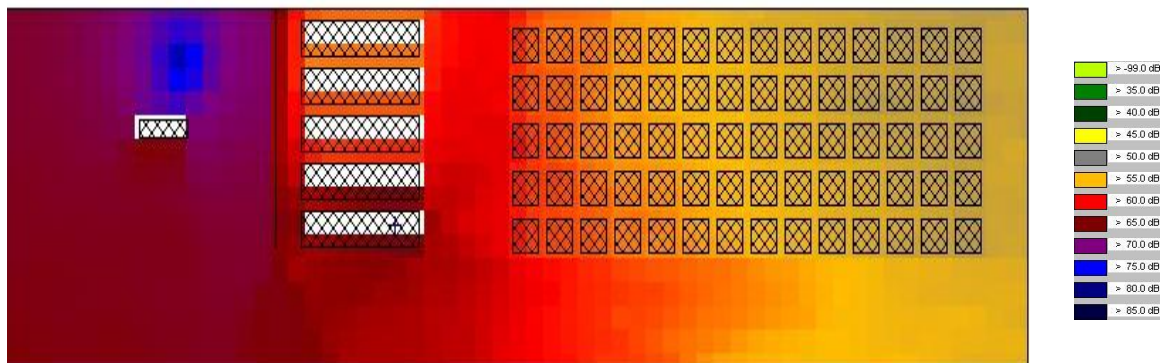


Fig. 6. Noise map for tailor room, 2D view.

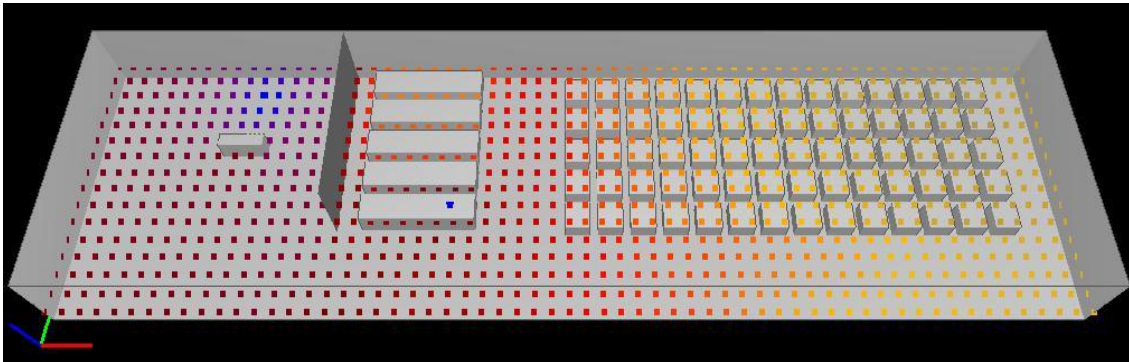


Fig. 7. Noise map for tailor room, 3D view.

The noise level in the area of the embroidery machine is 78.24 dB, but decreases with its propagation into the hall, reaching a minimum noise level of about 45 dB.

In the ironing - stapling - packing section (length 18 m, width 24 m and height 4.36 m) were two sources of noise. Noise maps for this one section are given in Figures 8- 11. This section has:

- Winding machine, 73.01 dB, located at a distance of 1 m from the western wall and 1 m from the southern wall;
- The stacking station, 72.25 dB, located at a distance of 13 m from the southern wall and 14 m from the eastern wall.

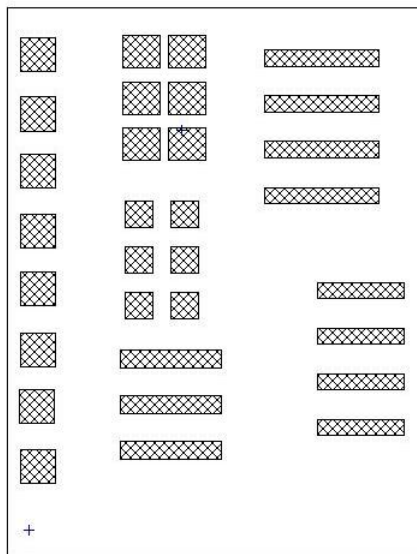


Fig. 8. Location of noise sources in the ironing - stapling - packing section, 2D view.

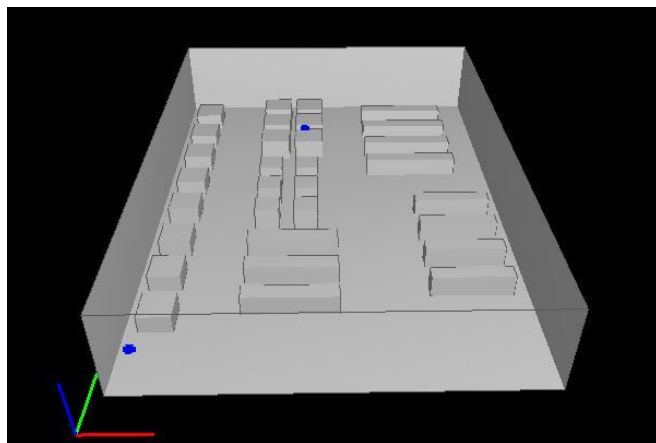


Fig. 9. Location of noise sources in the ironing - stapling - packing section, 3D view.

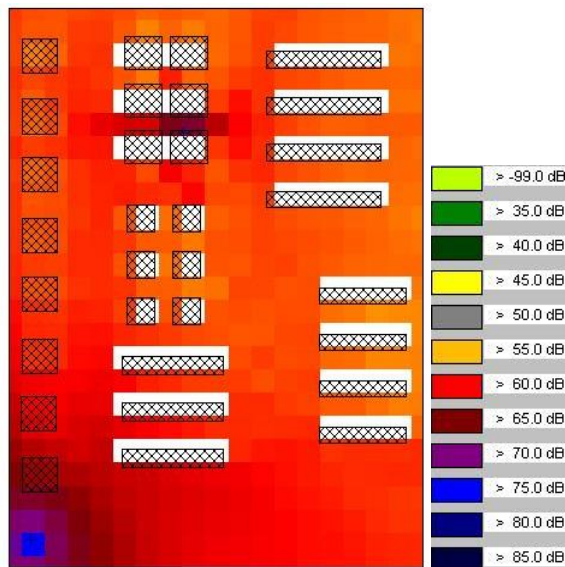


Fig. 10. Noise map for the ironing - stapling - packing section, 2D view.

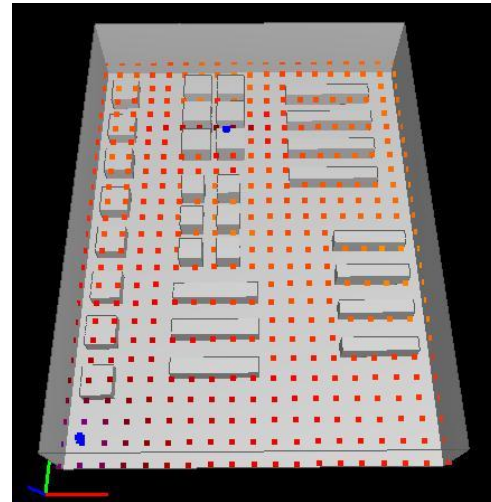


Fig. 11. Noise map for the ironing - stapling - packing section, 3D view.

From noise map analysis we can see that the noise level is higher only around the two sources, gradually decreasing with the distance from the source. Thus, although the maximum noise level generated by noise source is 73.7 dB, in the vicinity of the winding machine, it drops to about 55 dB in the distant areas of the hall.

4. CONCLUSIONS

On the basis of the results of the measurements made and the noise maps, it can be seen that the noise level in the two work-halls enclosures is quite high.

In the tailor hall, although the level of noise produced by the automatic tailor machine is high, 80.1 dB, level noise decreased with the distance from the source, reaching 78.2 dB in the area of the embroidery machine and continuing to fall to 45 dB with the propagation in hall. In the ironing - stapling - packing section, the noise level in the winding machine area is 73.7 dB and gradually decreases from the source to about 55 dB.

According to the obtained results, the values of the noise level within SC Sonoma Trading SRL do not exceed the maximum admissible limit imposed by the legislation in force (87 dB). Thus, the company is not obliged to take additional specific measures to protect human health. However, ear plugs can be used in areas where noise levels of about 80 dB are recorded, as human protection is a primary objective.

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