



Research Article

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NOISE EVALUATION IN TERMS OF OCCUPATIONAL HEALTH AND SAFETY ON THE RING SPINNING MACHINE

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ABSTRACT: People are in noisy environments in different environments of life. Noise significantly affects human health and quality of life in many countries where industrialization is intense. The effects of noise on people are very diverse; it is accepted by all countries that it negatively affects human health in physiological and psychological aspects. It is important that noise causes employees to complain about their work, negatively affects their work performance and, accordingly, causes loss of workforce. Within the scope of this study, which aims to examine the noise exposure of people working in noisy environments, noise level measurements were made in the ring spinning machine section of the Suleyman Demirel University (SDU) Textile Engineering combed spinning mill. The noise values emitted by the ring spinning machine to the environment were measured. The noise level was measured at the combed yarn factory and the effects on the student were examined.

Keywords: Noise, Yarn, Ring Machine, Dosimetry, Exposure

1. INTRODUCTION

Noise can cause significant inconvenience to students using the machines in ambient conditions where more than one machine is operated together. In such environments, high noise levels adversely affect the health and productivity of employees. SDU Textile Engineering, in order to examine the negative effects of the noise generated by the ring spinning machines used in the combed cotton spinning mill on student health, it is necessary to determine the noise level emitted by these machines to the environment. Noise level measurement was made in the combed yarn mill and its effects on the students were examined [1].

Sound is an objective concept that can be measured and whose existence does not change depending on the person. Noise is a subjective concept. Noise can be defined as “unpleasant, disturbing sound”. As can be understood from the definition, the evaluation of a sound as noise may vary depending on the individuals, and it is clear that many types of noise will be accepted as noise by everyone.

A person whose hearing is damaged has a decrease in hearing ability, which is called hearing loss. Hearing loss can be temporary or permanent. The hearing loss is permanent or temporary and the degree of hearing loss; It depends on the level of the noise, the frequency of the noise, and the time the worker is exposed to the noise [2].

The duration of exposure to noise covers the time that the person is under the influence of the noise continuously and the years that the person is under the influence of the noise intermittently. Being under the influence of a certain level of sound for a while causes hearing loss. The noise limit values used in industrialized countries are the longest period of exposure to a certain level of noise in a day or a week.

Conditions such as the frequency of the noise, the duration of its presence in the environment, whether the noise originates from a point, planar or linear source, the age, physical and mental state of the person exposed to the noise, the distribution of the noise according to the time in the environment are the factors that are important for the receiver to perceive the noise as an inconvenience. The negative effects of noise on people are generally physiological and psychological [2] .

Among the physiological effects, the most common is hearing loss. It is possible to collect the hearing effects of noise in the ear in three groups as acoustic trauma, temporary and permanent hearing loss. Noise-induced hearing loss is one of the factors that is very common in industrialized societies and negatively affects the quality of life. Other physiological effects include increased blood pressure, increased heart rate, muscle reflexes, and sleep disturbances. Prolonged exposure to noise; It may cause disruption in the regulation of blood pressure through the increase of circulatory stress hormones such as adrenaline, noradrenaline and cortisol. The psychological effects of noise are more common than the physiological effects and appear in the form of distress, tension, anger, anger, concentration disorder, resting and perception difficulties.

Various protective measures are taken in order to eliminate the effects of noise on human health. The first of the measures is to identify the sources that cause noise and to reduce their effects on human health. In addition, different legal arrangements are made in many countries in order to prevent noise and reduce its effects.

2. NOISE

Noise; It is an important environmental pollutant consisting of undesirable sounds with a random spectrum that negatively affect people's hearing health and sense, disrupt the physiological and psychological balance, reduce work performance, change the quality of the environment by reducing or destroying the pleasantness and calmness of the environment [3].

2.1. Technical Abbreviations

dB : decibels

dBA : A Weighted Decibels

Leq : Equivalent Noise Level

Lmax : Maximum Noise level

Lmin : Minimum Noise Level

m : Meter

mm : Millimeter

m² : Square meter

kg : Kilogram
 % : Percent
 μ Pa : Micro Pascal

2.2. Effects of Noise on Human Health

Noise is a problem that affects everyone. It has been determined by many researchers that there are permanent hearing threshold changes in people who are in high noise environments for a long time. Although it is not easy to detect a significant damage to the hearing at lower levels or short-term exposures, the negative effects of noise on human health, behavior and happiness can be determined.

2.3. Physical Effects of Noise

It is the negative effects of noise on hearing. It can be examined in two parts as temporary and permanent. The most common temporary effects are temporary hearing threshold shift and temporary loss of hearing sensitivity known as hearing fatigue. Hearing loss becomes permanent in cases where the exposure is too much and the hearing system is affected by noise again in regaining its old features.

2.4. Physiological Effects of Noise

These are changes that occur in the human body. Major physiological effects; muscle tensions, stress, increase in blood pressure, changes in heart rate and blood circulation, pupil dilation, respiratory acceleration, circulatory disorders and sudden reflexes.

2.5. Psychological Effects of Noise

In the press of the psychological effects of noise; nervous disorder, fear, discomfort, uneasiness, fatigue and mental effects slow down. The sudden increase in noise level can cause fear in people.

2.6. Effects of Noise on Performance

These are the effects of noise, such as reducing work efficiency and not understanding the sounds heard. The inhibition of functions such as speech perception and understanding is largely related to the level of background noise. Studies on the effects of noise on work efficiency and productivity have shown that the environment where complex work is done requires a quiet environment, while the environment where simple work is done requires a bit of noise. In summary, if the background noise determined for a certain job or function in the environment is excessive, work efficiency decreases [4,5].

3. GENERAL PRINCIPLES

Principles of Personal Exposure Noise Measurement

- a- During the noise measurements, care is taken not to make any noise that would affect the measurements of the device.
- b- The measuring device should be positioned in such a way that it does not interfere with the work of the selected personnel while being mounted on it.

c-It should be noted that the measurement is made for eight hours during the working hours of the personnel [4].

4. METHOD AND DEVICE USED

Exposure noise measurements made at the facility are measured with a dosimetric noise measurement device, and the exposure to noise in the workplace within the scope of the Regulation on the Protection of Employees from Noise-Related Risks.

Determination of noise estimation of hearing loss caused by this noise was made according to TS 2607 ISO 1999 method. Measurements were made with CA110 A DoseBadge dosimetric noise meters with serial number CIRRUS 69033 / CA8185 / CA7384 / CA7084 / CA8200 / CA8183 / CA8189 / CA6941 / CA7392 / CA6967 / CA7083 / CA6957. The technical specifications of the devices are given below[5].

CIRRUS Brand 110 A DoseBadge Personal Noise Dosimeter

Compact, durable design weighs only 51 grams,

Critical sound levels 80dB, 85dB, 90 dB.

93 one-minute data records during the 8-hour measurement period,

It can make measurements of 8, 12, 16 and 18 hour time periods,

Thanks to infrared communication, it reduces the intervention of the personnel to the device,

Rechargeable battery,

There are ATEX, IECEx and FM certifications for hazardous environments.

In the experimental studies, noise measurements were made on the ring spinning machines used in the SDU. Personal exposure noise measurement was made according to TS 2607 ISO 1999 method. The exposure noise levels normalized to the 8-hour working day of the exposure measurement made according to the TS 2607 ISO 1999 method are given in Table.1

Figure 1. Ring spinning machine**Table 1.** Measurement result

N	ENVIRONMENTAL CONDITIONS			Measurement Result Leq, dBA
	Pressure (kPa)	Temperature (°C)	Humidity (%)	
1	101,03	22,3	50,3	80,3
2	101,03	22,5	47,8	85,99
3	101,03	22,1	48,9	83,32
4	101,03	22,3	49,3	91,36
5	101,03	22,4	49,7	84,92
6	101,03	22,4	49,7	92,64
7	101,03	22,5	49,8	90,25
8	101,03	22,4	49,8	87,29
9	101,03	22,5	49,9	88,5
10	101,03	22,4	50,0	83,56
11	101,03	21,3	50,3	82,36
12	101,03	22,3	50,2	85,58
13	101,03	23,0	50,1	82,61
14	101,03	22,0	50,2	88,69
15	101,03	23,0	50,2	90,95
16	101,03	23,0	50,1	90,12
17	101,03	23,2	50,3	83,87
18	101,03	22,8	50,1	80,75
19	101,03	22,7	50,3	80,47
20	101,03	22,8	50,3	83,97

In the study, when the measurement values obtained in the operating conditions where the knitting and raising machines are used for noise measurements are examined, the personal exposure contribution of the task emitted by the raising machines and the personal exposure values are higher than the knitting machines. The difference in the noise level in the measured work areas is due to the functional structure of the raising machines compared to the knitting machine. When evaluated together with the measurement uncertainty, the measurement uncertainty calculated in accordance with the TS EN ISO 9612 standard is ± 3 dB for the Raising section. [6-8].

6. CONCLUSIONS

It is a reality accepted by everyone that noise should be reduced, which disrupts the silence of the environment in which people live, negatively affects human health, and has a great impact on the emergence of results that cannot only be corrected. It is necessary to raise awareness of societies, especially young generations, about noise pollution and its dangers, the effects of which are gradually increasing on the health of the society. As with all pollution problems, the solution to the problem is through education and management.

Physiological effects of noise on humans gain importance depending on the duration of exposure to noise. Among them, the most important ones are permanent hearing loss due to noise, respiratory disorders, high blood pressure, cardiovascular diseases, and slowing of nervous reactions. It has been revealed by observations and studies that noise has important psychological effects besides its negative physiological effects on humans. The most prominent among them is the decrease in performance and reluctance due to noise observed in those working in noisy environments, which can be directly related to the level of noise. Among the negative effects of noise on human health and behavior, the health problem that most affects employees is; It is permanent hearing loss due to noise, as it is seen quite frequently among workers and can be directly associated with noise. Even if the hearing loss in question is not in the form of a complete loss of hearing, it can significantly affect the quality of life of the person. In the advanced stages of hearing loss due to noise, the intelligibility of speech is significantly affected, and accordingly, interpersonal communication and occupational safety in the working environment may be adversely affected.

Working at a high noise level in a combed spinning mill negatively affects health. In this study, the noise level values emitted by the ring spinning machine to the environment were determined. The highest exposure action value emitted by ring spinning machines is between 80.3 and 92.64 dB for 8 hours.

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