

# Occupational Noise Management in Small and Large Scale Industries in North Cyprus

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**Abstract** - The purpose of this research is to determine the level of noise exposure to workers and to recommend how to manage the occupational high level of noise by the usage of engineering method of controlling noise in workplace knowing that noise can not be fully eliminated, the use of engineering control(control from the source) is always a better means of managing occupational noise, this involves identifying the source and its adequate control, it has to do with the fundamentals and its practical application on machines and equipments that constitute noise at the workplace, in recent time no research of such has been conducted in north Cyprus. A basic problem is been analyzed in this paper using a plastic scrap grinder from an industry manufacturing plastics in north Cyprus.

**Keywords**, Noise Exposure, Small and large Scale, Industries, North Cyprus, Engineering, Occupational Noise, Management, Manufacturing

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## 1 INTRODUCTION

Health and safety are interdependent and complementing to one another. Generally consideration given to health and safety has consistently increased. Developments started from the times of the old Babylonians. Around then, the ruler created rules, Some part of this was the viewpoint of health and safety which were viewed on managing injuries, suitable charges for doctors. This improvement proceeded in later Egyptian civilisation when an industrial medicinal administration was created. As the progress created so did thoughtfulness regarding matters of health and safety with the industrial revolution, there was an interminable change in the systems for production. These progressions in the commercial enterprises prompted more thoughtfulness regarding the health and strength of the workers. The industrialization with utilization of steam force expanded the risk of presentation to hazards and risks for occupational wounds and illnesses. Throughout the industrial revolution staffs usually

worked in the processing plants with long working hours, in a very noisy and unsafely conditions. With these circumstances the workers began to ask for enhancement of the work

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environment thereby launching the first adjustment in the health and security layout. With the development of the

industrial area, the distinctive health and safety boards and associations were created. At the same time, different laws and regulations were enforced. Particular health issues that were attached to work environment hazards have had noteworthy influence in the improvement of the advanced safety and health movement.[5]

## 2 Occupational Noise

With the development of industrial sector, committees and association addressing wellbeing and safety were established in distinctive countries. One of the most well-known organizations is the Occupational Safety and Health Administration (OSHA) which is an agency of the United States Department of Work. OSHA has around 40 years history in health and safety [11]. Since its establishment, OSHA has helped to reduce the hazard rate. In spite of the fact that exact records are not found, it is estimated that in 1970 around 1400 workers lost their lives in the United State of America [11]

In 1971 OSHA was established and started to work almost immediately. Following its formation, a training institute was established to teach private and public government safety precautions. Over 210,000 safety professionals have gained a lot at the training institute since its inception. In 1992, OSHA Training Institute started collaborating with colleges and universities to enforce work environment safety law. In 1972 OSHA state plans regulations was affirmed in South Carolina and reached out to the administrative workers. That same year OSHA various laws for diverse workplaces and sectors. In 1975 OSHA established On-site Consultation programs keeping in mind the end goal to help small sizes businesses. On the 16th

of January 1981 OSHA issue the listening to conservation standard which requires that listening to defensive supplies be given to workers who are exposed to noise levels over 85 decibels. In 2007 OSHA confirms through a decide that employers must pay for personal protective equipment. [11]

A common threat to health and safety is excessive exposure to noise which can result in perpetual hearing loss. Excessive noise exposure can occur in small and large industrial and manufacturing environments, as well as in farms and other exposable areas, with the advancement of industries undesired noise levels are created in plants. Noise has been a threat since the inception of the industrial revolution [10]. Noise can influence the ears as a short term issue which usually resolves in the wake of clearing out the nature's turf. Such transient problems include groping stuffed in ears or provisional tinnitus. Nonetheless, monotonous exposure to permanent high noise levels can lead to serious hearing loss or long time tinnitus.

A most common occupational related illnesses from excessive exposure to noise is lost of hearing, which regularly goes unrecognized because these are non-visible effects. Other health effects might be [13]

An increase in heart rate which leads to high blood pressure, stress which can prompt irritability and cebral pains, annoyance and speech interference, lack of sleep, fatigue, reduction in white blood cell and immune response, uler (gastric), development which can lead to stroke.

Noise level must be controlled to reduce occupational injuries, the best way to reduce noise is from the source because in the transmission mode noise is transmitted from the source through the transmission path to the receiver, there are certain cases were the soure cannot be controlled probably due to the old nature of the machine personal protective equipment such as ear mugs and ear plugs are used.

## 2.1 Occupational Noise control and Regulations in other Countries

Consistently, more or less 30 million individuals in the United States of America are occupationally affected with high noise level [11]. Over 1 million workers in Great Britain are at risk due to high levels of noise that puts their listening ability at danger [12]. A Canadian Hearing Social order Awareness study showed five years prior that 25% of individuals with hearing proplem were under 70 percent under 40 years of age. The normal period of those encountering listening risk was 51, and 16 percent of 6 to 19 year olds [12]

In the vast majority of the developing nations there has been no actual rules and regulations on occupational health. For the most part they don't give careful consideration to the impact of high commotion level and the employers don't provide safe environment. Along these lines developing nations ought to attempt to enact changes in the current law and change their guidelines dependant upon the word related health and safety circumstance in

their nation. In the greater part of these nations, the noise regulations are embraced from developing nations. however the high noise level of the developing nations are not suitable for them on the grounds that the working hours in the majority of the plants in developing nations are 8 hours for every day, six days a week. Working hours deciphering to about 20% all the more in developed nations [8].

## 2.2 Occupational Noise control and Regulations in North Cyprus

According to the new law prepared by northern Cyprus government in collaboration with the European Union, minimum requirements regarding noise exposure area as follows:

- a) Maximum exposure limit  
- daily noise level of 87dba with a high sound pressure of 200pa (or 140dbc)
- b) Lower exposure activity value  
- daily noise level 80dba with a high sound pressure of 112pa (or 135 dbc)
- c) Upper exposure activity value  
- daily noise level 85dba with a high sound pressure of 140pa (or 137 dbc)

d) On the situation that the noise level shows a daily variety, weekly sound levels might be utilized to focus on the exposure.

The employer is responsible for deciding noise related risks in the work environment. Noise exposure ought to be forestalled or rsduced by employer. This could be carried out by applying the following standards:

Choosing systems with less level noise, selecting equipment with most minimal possible noise for the work, reducing noise with specialized systems.

- e) Applying a great maintanace system to the strategies and equipment in the working environment
- f) Organizing work in a manner to minimize exposure  
Employers ought to recognize, designate with proper

signage and advise workers of noisy areas.

The Employers ought to give ear protection gear (EPE) to workers and supervise their use. In the event of high noise level the employers ought to identify the reason, reduce to worthy limits and take measures to prevent it from occurring. The employer is responsible for advising and preparing workers in regards to noise. This training includes: the risk of noise exposure, sharing sound level in the workplace, the proper utilization of EPE, how to understand loss of hearing , the reason of taking some physical examination, and safe work requisitions to minimize noise exposure.

## 2.3 Occupational Noise Level with its Effect

There are different published journals and research studies done in this particular field of study, the relationship of the noise in human health, the effect of the noise on the body, noise characteristics, hearing protection, noise emission level, noise exposure and threshold level, and measurement such as farms, trains, traffic, and different industries.

A significant study done in Nicosia included estimation on noise exposure measurement in 90 commercial industries found in south Cyprus, more than 200 laborers in this study were inspected. Audio metric examination of the concentration on laborers indicated that 2.78% endured some listening hearing damage while 7.7% suffered hearing loss [3] the significance of this article is the comparability of these two countries industrial sector.

The European Union nations and developed nations permit a maximum occupational noise exposure of 85dba leq for 8 hours for every day. However in developing nations the majority of the mechanical plant work for 8 hour for every day and 6 days for every week. An investigation of noise exposure of workers by Fernandez, et al [4] in the construction sector in Spain was conducted by the use of a sound level meter and a dosimeter. The measurement was compared to that of the current regulations. Between 60 percent and 70 percent of the laborers in these sectors are exposed to a high dosage which was higher than 100 percent along their working day, workers were uninformed of the harmful effect of exposure to the high noise levels, comparing their hearing threshold to those predicted by ISO-1999. Medical report of 29,644 workers were reviewed. The audiometric result was compared with ISO-1999 predictions, they analyzed the relationship between hearing loss when the daily noise exposure level rose from 80 dBA towards 96 dBA, and here the duration to the exposure was an important factor that was used for the investigation. Due to the level of noise in the work place by machines and other equipment, the workers have low auditory acuity in the left ear, about 62% of the workers have problem of hearing at high noise levels.

In industries, workers are exposed to impermissible noise of about 85 dBA, according to [1] the research was carried out with the use of direct interviews, audiogram and audiogrametric evaluation, the workers had at least 3 years of work experience. The result showed that 41.3 percent of employees had standard threshold shift in their ears, the relationship between risk realization and occupational noise is aimed at evaluating the relationship between individual factors and the use of hearing protective equipment. A study reveals that another way of reducing noise to workers is by constant use of noise protective equipment, the use of questionnaire also helps in predicting the risk perception and also the collaboration of workers. In small scale hand manufacturing industries like the hammer section, cutting presses, punching and grinding sections will be more than 90dBA, there by exceeding OSHA noise level standard. A study using questionnaire showed that about 68% of the workers were not wearing their ear protective equipment and out of these 50% said that they were not giving PPE by their employers. It was also found that some 20% of the workers were suffering from high noise level. It concluded that a very high noise exposure affected the workers in the industries that worked More than 8 hours per day for 6 days

per week and more than 90% of the workers were working 12 to 24 hours over time per week, which indeed leads to a very high risk of noise.

A research was carried out on the occupational noise exposure to adverse pregnancy outcomes, this study shows that the noise have direct effect on the fetus because it induces a stress on the mother there by leading to a reproduction disturbance, also this high level noise causes a negative effect on birth weight and length of gestation. [9] Later concluded that exposure to a high level noise causes a very high risk to reproduction.

### 3 COMPUTATIONAL PROCEDURE

Some procedures and steps was taking in solving the high level of noise in a plastic company in north Cyprus, this steps include,

Step 1; employee survey was distributed to all the employers in the industry in form of questionnaire, this was done to ascertain the level of noise and also employees that are exposed to the high level of noise,

Step 2; The sound level of the noise was measured using a cirrus sound level meter, the cirrus is the best instrument used in measuring industrial sound level which is also compliant with the international standard, the instrument was place where there was no vibration in other to obtain an absolute result it was also fixed near a busy machine and also close to the operators ear to get the amount of noise the operator is exposed to, measurement was taken from the machines at every point the environmental noise level was also measured for every five minutes in determining the level of noise attached to it.

Step 3; The machine with the highest noise level was used as a case study, the machine had a noise level of 125dba which can actually cause a permanent hearing loss, the machine was use on a daily basis and fixed close to the offices it was confirmed that the machine was an old machine that was used for long without proper maintenance

#### 3.1 CASE STUDY (PLASTIC SCRAP GRINGER)

Plastic grinder was primarily the source of the noise in the work place, the noise level which was about 125dba is due to the number of grinders and increasing toughness of the raw materials used, even as the optimum mechanical conditions of the plastic scrap grinders, the proper screen size, proper feeding procedure and blade-to- screen clearance have less impact on the range of the acceptable limits. In as much that the noise came from resonant excitation of metal panels, a soft and wet material was applied on the surface of the loopy interiors of pedestals, stands and covers to soften the surfaces.

### 4 RESULT AND DISCUSION

In the case of the plastic grinders, after loading 415 polycarbonate on the surface, the level of noise reduces from 125dba to a range of 88dba – 90dba thereby satisfying the OSHA crite-

tion on occupational noise, this clearly shows that noise should be controlled directly from the source and also advises the manufacturers on regularly upgrading of machines to reduce the high level of noise exposure. In maintaining the source, balancing moving part and also replacing the worn parts is very important because it prevent rattle and ringing which causes the noise. Reduction in other vibrating machines was achieved by making sure machines rotational speed do not collide with the resonance frequencies of the supporting equipment, in the case of one of the vibrating machines that could not be fixed, the stiffens and frequencies was altered to reduce the speed level.

## 5 Conclusion

This paper shows how a lot of workers are exposed to a high level noise in their work place which is very dangerous to their health this can even lead to permanent loss of hearing, it clearly proves the use of engineering method of controlling noise to be a better method in reducing the noise level before it gets to the receiver. Qualification of noise problem in existing machines requires identifying the noise from the source thus noise level must be determined at sensitive part of the work place where noise generates. When the noise level is known and in a situation where it exceeds the required standard possible reduction control is applied such as reduction from the source, in occupational noise the best method of controlling noise is directly from the source by mechanically applying wet moistures on the metal plates and servicing the machines like in the case study of plastic scrap grinder which due to the increasing toughness of the raw materials the machine became weak and generated a lot of unpleasant noise. Occupational noise is very dangerous and should not be neglected, a lot of workers have developed permanent hearing loss due to this high level noise exposure that was not controlled.

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