

## Noise Level Reduction In Manufacturing Industry by Using an Engineering Controls

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**ABSTRACT** Noise level is considered as more important environmental problem, especially in the industrialized and developed countries. Industrial noise is an important source of noise pollution, which annoys and disrupts the daily activities of workers. Automobile industries are having several machineries that produce noise. This paper is based on to reduce the noise level of that machines. The noise levels are identified and monitored for several machines and compared with its actual acceptable limits. The noise levels are smoothed by an engineering control techniques. After the implementation, once again noise level is measured for the machines to get the result of acceptable noise. This report summarizes the noise and vibration measurement, prediction and assessment methodologies for noise reduction in the machine shop.

**Keywords:** Engineering controls, acceptable noise limit

### 1 Introduction

Noise is one of the factors, which is the result of almost any production process and substantially characterizes its quality. Noise impact reduces the ability to focus attention, as well as precision of work based on the reception and analysis of information and production effectiveness. Functioning of engineering industries shows the increased requirements in organization of processing technologies and safety of technological processes. Minimizing the emergence and impact of industrial wastes enables environmental quality. Excessive noise adversely affects not only the hearing, but also can cause hypertension, fatigue, heart trouble.

#### 1.1 Causes of noise in foundry

In a foundry environment there are many factors that contribute to the creation of noise. Noise is rated as A-weighted decibels or dBA as perceived by the human ear. To list a few:

-Shot Blast (100-110 dBA)

-Casting and sprue handling via conveyors and feeders (95-115 dBA)

-Cast Grinding (92-115 dBA)

-Fettling (95-115 dBA)

Metal is an extremely effective noise transmitter so it should come as no surprise that the moving and transporting of this material is going to create noise. When working in a foundry environment it is important to remember these factors.

### 2 Literature survey

Gvozdkova and Shvartsburg, (2008) - has presents a methods for reducing noise by minimizing vibrations of engineering technological processes. They considered Noise is one of the factors, which is the result of almost any production process and substantially characterizes its quality. One of the noise sources is the mechanical system elements vibration. The results of the experimental research analysis allow for the

determination of the direct proportionality between parameters characterizing industrial noise and vibration. Researching the methods for reducing industrial noise is conducted by minimizing vibrations of technological processes of engineering production.

Mayowa Jacob Owoyemi (2008), recommends that industrial noise pollution can present health and social problems to the workers in the utilities industries. Concerns about reducing noise pollution in the industry are multiple and directed to problems aimed at the noise in the three directions: at source, on the propagation paths and at receiver. Noise control methods are effective when all the factors related to the nature of noise, the device which produces noise, the propagation pathways and the environment in which it propagates are studied. In order to reduce the noise, acoustic barriers, overhang baffles and acoustic foam on the side walls may be installed.

Tirtharaj Sen, and Pijush Kanti Bhattacharjee (2010) –proposed that, from personal conversations with individual workers, it is found that the workers feel very much pain in their ear and migraine in duty hours as well as after duty hours. Some workers face temporary hearing loss and some workers face permanent hearing loss who are working 5 years to 8 years in this plant. It is also observed that due to lack of proper maintenance in some machines, some low capacity machines emitted more noise than the higher capacity machines. This study suggests that noise induced hearing loss is a great challenge in environmental pollution.

Sukanta Chakraborty and Amarendra Jamatia (2010), assessed that from the present study about the current status of the noise pollution level in Bodhjungnagar Industrial Complex is assessed. The noise level in the area indicate a less intensity of noise pollution. However there exists a strong chance of enhanced noise pollution in the near future with gradual expansion of the industrial complex. The study also pointed out some measures to cope with the noise pollution in the area. The development of green belt around the study area is

one of such effective tools to mitigate noise pollution not only in the current situation but also in future.

Berivan and Al-Dosky (2010), has discussed Industrial noise exposure has been identified as a very obvious danger especially in small and hand tool industries which are still not mechanized. During our measurements it has been determined that the noise levels in the majority industries are exceeds the maximum (OSHA) exposure limits. Majority of workers in the industries are annoyance from the noise in their workplaces. Mostly workers are of little education even under primary, primary and intermediate therefore they are not fully aware of the hazardous effects of noise. Almost all the workers are highly exposed to high noise levels compared to (OSHA) limits without proper ear protection, and the majority of them are suffering hearing problems.

Bauer and Babich, (2011) –proposed that Noise-induced hearing loss (NIHL) continues to be a concern of the manufacturing industry. A new noise standard (30 CFR, Part 62) is aimed at reducing NIHL in manufacturing industry through engineering and administrative noise controls. A description of the approach for selecting, implementing and evaluating administrative controls and a list of possible administrative controls are reported.

Javid Manzoor, Mamta, Rayavarapu Jaganadha Rao & Khursheed Ahmad Wani, (2011) assessed that high prevalence of symptoms associated with noise pollution has been observed among workers in the cricket bat industry. Comprehensive hearing conservation programs should be introduced in this industry to protect the workers. It is very important to provide suitable personal protective equipment with regular training on their use to the workers who will work in noisy environments, and hearing tests should be performed periodically each year in noisy workplaces.

Stephen Mbuligwe, (2011)- his study was carried out to determine levels and factors that influence

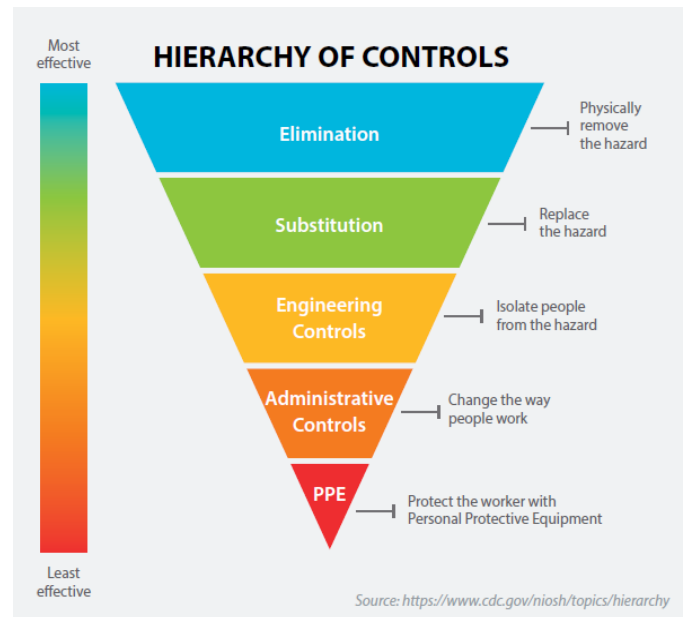
noise pollution from small-scale industries (SSIs). At a woodworks SSI, noise levels were found to correlate well with machine-use age, wood-feed speed, and wood-cut depth. His study concluded that SSIs present a serious source of environmental noise pollution in their neighborhoods. Noise pollution from SSIs is greatly influenced by the type of SSIs and the activities they carry out, the type and age of machines they use, their location relative to residential areas in their vicinity, and in-house noise control measures.

Amber Louie, Musarrat Nahid & Jean Shoveller, (2012), they used a qualitative study design to investigate barriers to the implementation of ENC. Many factors emerged as possible barriers to the implementation of engineered noise control, including: poor knowledge of relevant regulations, noise reduction options and the health impacts of noise; weak technical skills and experience; low ranking of noise as a hazard by stakeholders; issues around job insecurity, weak language skills; lack of 'quiet' machine options and information from equipment manufacturers; poor employer-regulator relationships; barriers to employee- employer reporting; informal valuation of ENC costs; and feasibility issues.

Dragan Djurdjanovic , Yibo Jiao , Vidosav Majstorovic, (2012), reported a method for robust control of quality errors in a multistage manufacturing process (MMP) is formulated, guaranteeing the product quality even under the worst-case scenario of uncertainties in the knowledge of noise characteristics. Simulations based on the error flow models in automotive cylinder head machining and lithography overlay processes show that the new robust control method increasingly outperforms the traditional stochastic control approach as uncertainties in the knowledge of process noise characteristics increase. It is also shown that controlling MMP quality, while ignoring inaccuracies in the noise model could make quality even worse than if no control is used.

### 3. Methodology

#### 3.1 Hierarchy of control



#### 3.2 Noise level measurement device

A sound level meter is used for acoustic (sound that travels through air) measurements. It is commonly a hand-held instrument with a microphone. The diaphragm of the microphone responds to changes in air pressure caused by sound waves. That is why the instrument is sometimes referred to as a Sound Pressure Level (SPL) Meter. This movement of the diaphragm, i.e. the sound pressure deviation (pascal Pa), is converted into an electrical signal (volts V).



Fig. 2 Noise level measurement device

#### 3.3 Noise Reduction in practice

A). Reducing noise at source

B). Screens and barriers

#### 4. Observation

MACHINE	DECIBEL
Chipping m/c	93
Shot blasting m/c	105
Fettling	98
Grinding m/c	94.5

Therefore the machine which may produced high noise level is Shot blasting machine(115 db ). So I will applied an engineering controls for reducing the noise level in that machine.

#### 5. Root cause

- A).An improper design of air exhaust
- B).Using 4 bar as a pressurized air.

#### 6. Solution

- A).Adding of Acoustic Silencer in an air exhaust.
- B).When compared to 4 bar pressurized air,3 bar compressed air will be used to reduce the noise level.

#### 7. Results and discussion

Machine	Before Implemen- Tation	After Implemen- Tation
Shot Blasting Machine	105	88.5

#### Conclusion

This project mainly presents to reduce the Noise hazards in the plant premises and to provide safe working environment for all the workers. Based on the Noise level identification, I will assess the noise level and its consequences then provide a suitable control measures. The control measure must be able to reduce the percentage of Noise level and provide safe working environment in the workplace.Thus the noise level is came into an acceptable noise limit after the implementation of an engineering controls.

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