Noise Reducing in Glass Manufacturing Industry

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K.S.R College of Engineering

ABSTRACT

This studies aims at characteristic work things, during which workers be full of noise and improvement got to create to manage the noise and to scale back the exposure to noise within the geographic point thus it'll shield from the deafness. thanks to noise exposure within the trade noise it will produce physical and psychological stress, communication and concentration draw back within the geographic point. Over exposure to noise result in Noise elicited deafness (NIHL) and is one among the activity health sickness (Daniel Autenrieth). A main impact is Acoustic Trauma, Tinnitus, Temporary deafness, Permanent deafness. type of factors has been thought of as potential contributors to increasing the chance of Threshold shift. Exposure to noise constitutes a health risk. measure the private background level watching at glass trade and to scale back the exposure level therein trade. to require mensuration with the noise measuring system is to judge the common exposure of noise throughout a traditional shift (8hrs work shift). activity worker's exposures to noise is a vital a part of Noise Reduction Program.

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I. ABSTRACT

This studies aims at characteristic work things, during which workers be full of noise and improvement got to create to manage the noise and to scale back the exposure to noise within the geographic point thus it'll shield from the deafness. thanks to noise exposure within the trade noise it will produce physical and psychological stress, communication and concentration draw back within the geographic point. Over exposure to noise result in Noise elicited deafness (NIHL) and is one among the activity health sickness (Daniel Autenrieth). A main impact is Acoustic Trauma, Tinnitus, Temporary deafness, Permanent deafness. type of factors has been thought of as potential contributors to increasing the chance of Threshold shift. Exposure to noise constitutes a health risk. measure the private background level watching at glass trade and to scale back the exposure level therein trade. to require mensuration with the noise measuring system is to judge the common exposure of noise throughout a traditional shift (8hrs work shift). activity worker's exposures to noise is a vital a part of Noise Reduction Program.

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Author α σ ρ ω : Department of Mechanical Engineering K.S.R. College of Engineering, Tiruchengode 637215.

§: Department of Mechanical Engineering, Mahendra Engineering College, Tiruchengode 637215, Tamil Nadu, India.

II. INTRODUCTION

Noise mapping in general it is graphical representation of the sound level distribution and also creation symbolic representation (C.Asenio et. Al). Evaluation of noise around industrial area it will be long term process and it will be carried out by the short term measurement of noise (Luis conde santos et al.,). In order to assess the impact of noise on human health and it is necessary to undertake a survey of noise levels in different parts. For industrial noise production, the most important thing is the description of noise sources, sound power level, working periods some databases can be founded; in some it is necessary to make measurement for describing the source. To determine the noise source personal noise dosimeter is used and data was processed by the dBlink software (Ana PICU). The creation of a good acoustic model can be quite complicated. Software is used for noise mapping. Noise pollution is the main source of nuisance in our society. Sources of noise pollution have increased due to fast development of industry in decades has increased.

III. INDUSTRIAL NOISE

In Industrial operation machinery will generate excessive noise and it is exposed by the employees who working that area in the greater frequency range it will be risk of injury. Exposure to noise in the industry it will vary for every employee in the industry. So noise mapping for personal exposures is to measure the each individual in that same exposure group. It is to identify the employee how much decibel they are exposed to noise from the daily activities average. Each person interprets noise differently and may depend of age, health, temperament, or external factors may noise differently interpret for each person. Generally measurement of noise is expressed in decibels (dB), 'dBA' means sound level measured in A-weighting network is used as it corresponds to the frequency response of the

human ear. The physical characteristics of noise are sound intensity, time and frequency. Sound intensity depends upon the source, distance and possibility of transmission or copying. It is measured in decibel. Decibel is a logarithmic unit calculated starting from the absolute threshold of audibility of 0dB for 1000 Hz sound. Time- the period of time that the excitation sound acts on the auditory analyzer and frequency- the number of acoustic vibration in a second and is measured in the number of times per second or Hz.

3.1 Compliance

European Directive 2003/10/EC, Noise exposure value for 8-hour's time 85db-upper value limit in the workplace. Government and many organizations have established Rule for personal exposure limit and that can be implemented in every work place. Some company have the own standard for noise exposure for their worker in the company its must be regulated and implemented

Table-I: Noise Exposure limit and Guidelines

Total time of exposure (continuous or a number of short term exposure) per day, in hours	Sound pressure level in dBA (Company Standard)
8	85*
6	88
4	91**
3	94
2	98
1 ½	100

*=Orange Category **=Red Category

3.2 Personal Noise Exposures- Methodology

The Methodology is related to noise exposure of employee working and it will not cover environmental noise. HEG means in the workplace group of workers divided into the group and the group of workers which have same type of risk exposure related to noise is consider the similar exposure group (Mulhausen, J, & Damiano, J. (2006)). Noise Indicator (NOS) is an situation-based approach of potential exposure defined as a potential encounter between one individual exposure to noise in a type of Homogeneous exposure group (HEG). Noise Indicator is followed to categories the workers according to the noise exposure level. NOS describes the essential requirements for drawing up a noise risk matrix and providing indicators necessary to establish priorities for control actions and to follow up progress.

First steps is preliminary survey of the plant to understand the noise level and employees work situation, second steps is measurement of individual noise exposure in the specific area to identify the noise is experienced by the workers and third steps is verification of the workers with the legal noise requirement and predication of individual risk of hearing loss if they are above the level the control measure is implemented in that area.

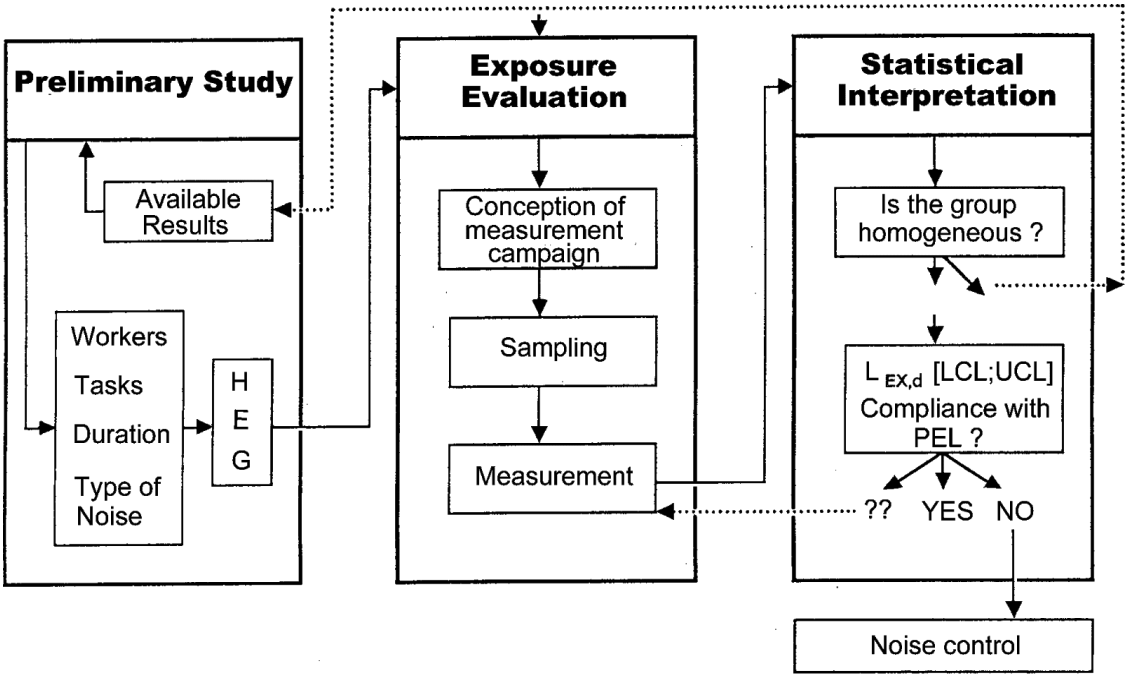


Fig-I: Steps involved in the measurement of the noise exposure of workers

3.3 Findings in factory

Personal noise exposure monitoring is carried out to indicate the extent of the severity of an employee's noise exposure. First Step is to identified by the noise level in the different areas in the plant and to identified the noise level in the industry *Preliminary survey around the glass plant* in various Areas and it is measured by *sound level meter*. Workers from each Similar Exposure Group SEG's are selected to undergo personal exposure monitoring to represent his group.

Noise measurement-Instantanous reading				
		db		
s.no	Area /Zone	Reading 1	Reading 2	Reading 3
1	Float Bath-I 55meter	81.8	82.2	83.5
2	Coater - I Cooling Tower	77.6	75.8	82.9
3	Batch Plant-II Mixer	89.3	87.3	90.6
4	Float-I Furance 55meter	93.8	95.3	96.4
5	Offline -2	87.6	86.3	88.3
6	Coater-I Washing area	86.1	88.4	86.4
7	Cold End -II	74.6	77.9	90.8
8	Offline-IV Glass cutting	87.7	88.4	86.5

Red marking area are selected for the personal noise measurement because more man power engaged in this area

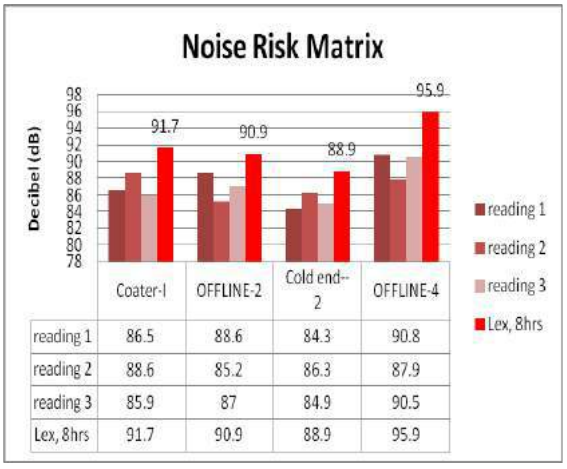
Fig-II: Preliminary Survey

The personal noise exposure levels are measured at the four locations for the Operators and Technician in the zone are as detailed below:

Dept/Area	READING 1	READING 2	READING 3	Lex, 8h	NOISE RISK MATRIX		
					>85	80-85	<80
Coater-I	86.5	88.6	85.9	91.7			
OFFLINE-2	88.6	83.4	87	90.9			
Cold end--2	84.3	86.3	84.1	88.9			
OFFLINE-4	90.8	87.9	90.5	95.9			

Fig-III: Personal level Monitoring-I

Fig-III show that Four areas were measured for three days and were equivalent sound level is taken (LAeq) and the average exposure level (Lex, 8hrs) is also measured with reference to the (LAeq) sound level. The sound level is above 85dB so they are come under the red category according to the risk level



	Coater-I	OFFLINE-2	Cold end--2	OFFLINE-4
reading 1	86.5	88.6	84.3	90.8
reading 2	88.6	85.2	86.3	87.9
reading 3	85.9	87	84.9	90.5
Lex, 8hrs	91.7	90.9	88.9	95.9

Fig-IV: Noise risk matrix

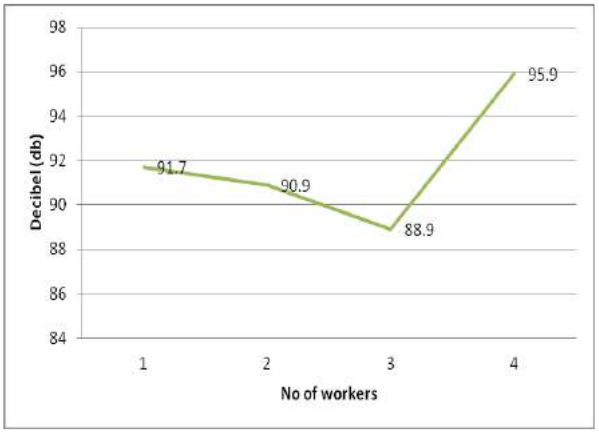


Fig-V: No of workers v/s dB

Fig-IV show that Noise risk level of the four areas were same HEG and noise they noise level is compared with the compliance of the company standard these four area workers are above the 85dB for 8hrs work shift and So control measure should be implemented in that area

IV. RECOMMENDATION FOR NOISE CONTROL

First step in any noise control problem is to gather qualitative and quantitative data on the extent and nature of the problem by adequate measurement.

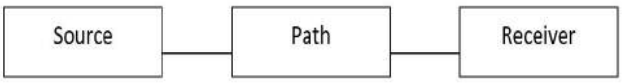


Fig-IV: Noise source path

The source is the point where the noise originates, and the path is the line or lines in air along which the noise can be consider propagating to the receiver or ear.

4.1 Source control

Generally modifications at source are considered to be the best solution. The noise producing energy is concentrated at the source, if the cause can be sufficiently reduced or eliminated there need be no worry about relatively cumbersome and often more expensive path and receiver treatments.

Source control may be achieved by reducing

1. The area of the panel,
2. The amplitude of vibration of the panel

4.2 Path control

Controlling path along its path involves some kind of modification to the space enclosing both source

and receiver. For the direct path, barrier constructed of impervious materials is necessary to reflect the noise back to the source. For indirect paths, it is necessary to use an absorptive material on the reflective surfaces to absorb the sound energy

Some of the usual techniques for control of sound in the transmission path:

1. Construction of enclosures
2. Mufflers
3. Vibrations isolation
4. Break mechanical paths (add absorption material between metal parts.)
5. Lengthing of transmission paths.
6. Absorption of acoustical energy (acoustic tile, porous material etc)
7. Construction of heavy air tight enclosures.

4.2 Protection at receiver:

Ear protector is a device that is worn to reduce the effect of ambient sound on the auditory system.

Type of ear protectors:

1. Ear plugs and
2. Ear muffs

4.3 Noise Control

If the noise levels in workplace are in excess of the exposure standards, steps must be taken to reduce noise levels and protect workers. This can be achieved by introducing noise control measures as part of a noise control program. A noise control program sets out ways in which to minimize noise exposure in the workplace.

The key elements of a noise control program are:

- ➢ A noise policy statement
- ➢ Assessing and prioritizing noise problems for attention
- ➢ Engineering and administrative noise control measures
- ➢ Education and training
- ➢ Personal hearing protection
- ➢ Audiometric testing
- ➢ Evaluation of the effectiveness of the program

Noise control measures are ways to minimize the risks of noise induced hearing loss. The following hierarchy of noise control measures should be followed:

- ➢ Elimination of the noise source
- ➢ Substitution
- ➢ Engineering controls
- ➢ Administrative controls
- ➢ Personal hearing protection equipment.

The purchase of new, quieter machinery and the design of the area in which it is to be installed, provide opportunities for cost effective noise control measures.

Priority for action should be given to the noise sources that contribute the highest noise exposure to the largest number of workers.

If administrative noise controls or the use of personal hearing protection equipment are relied on, there should be regular checks to ensure they are being correctly complied with.

Training must be given to workers exposed to excessive noise levels and to those responsible for the purchasing of plant, noise control equipment and hearing protectors.

4.4 Reducing noise at the source

This can be done by:

- Replacing outdated, noisy machinery
- Using quieter materials and equipment e.g.
  - replacing metal gears with fiber or nylon gears
  - replacing roller conveyors with belt type conveyors
  - avoiding metal to metal contact by using plastic or rubber bumpers
  - using lagging to dampen vibrating surfaces
  - using mufflers to silence gas or air flow
- Checking the noise levels of machinery before purchasing it and having a company policy of purchasing only quiet equipment
- Separating noisy elements, such as pumps, fans and compressors that are not an integral part of the basic machine, from the work area occupied by the workers

- Modifying material handling processes to reduce the noise from shock and impact e.g. reducing the distance where objects fall onto hard surfaces or fixing damping material to surfaces or containers
- Improving maintenance programs.

4.5 Blocking the noise transmission path

This can be done by:

- Moving noisy machines or processes to remote areas of the workplace
- Fitting sound absorbent materials to ceilings and walls
- Enclosing noisy machinery within sound absorbent materials
- Mounting noisy floor standing machinery on rubber pads to reduce vibration
- Fitting flexible or fixed screens or curtains of sound absorbent material
- Limiting entry of people in areas where there is excessive noise.

4.6 Personal hearing protection

A last resort is personal hearing protection such as earmuffs or earplugs. Workers must be trained in fitting and wearing earmuffs and earplugs. Hearing protection must be worn for the entire duration of a noisy shift. Wearing hearing protection for only part of the shift is not sufficient. Routine maintenance and replacement procedures are also needed for the personal hearing protection equipment.

4.7 After implementation of noise control techniques

Implementing of noise control techniques in that four areas after that four areas the personal noise measurement was taken for three days for operator and technician same 8hrs exposure . Fig-VI show that over all Exposure level (Lex, 8 hrs) is reduced.

Dept/Area	READING 1	READING 2	READING 3	Lex, 8h	NOISE RISK MATRIX		
					>85	80-85	<80
Coater-I	81.2	83.4	82.9	82.5			
OFFLINE-2	85.6	83.4	84.2	84.5			
Cold end--2	82.3	83.3	84.1	83.9			
OFFLINE-4	84.8	83.9	82.5	83.7			

Fig-VI: Personal level monitoring –II

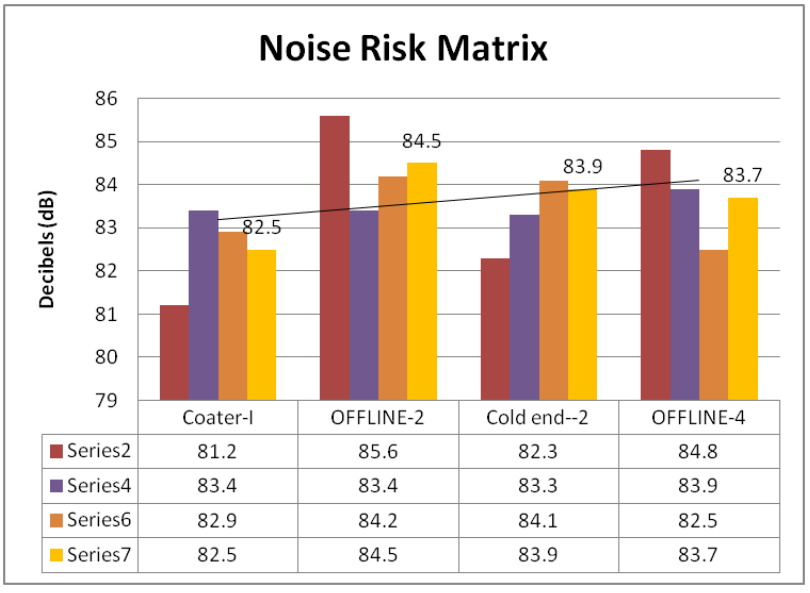


Fig-VII: Noise Risk matrix after implementing the control

Above Fig-VII show that after implementation of noise control techniques over all noise reduction is 2-5dB of personal exposure is reduced. In that areas operator and technician is come under the orange category.

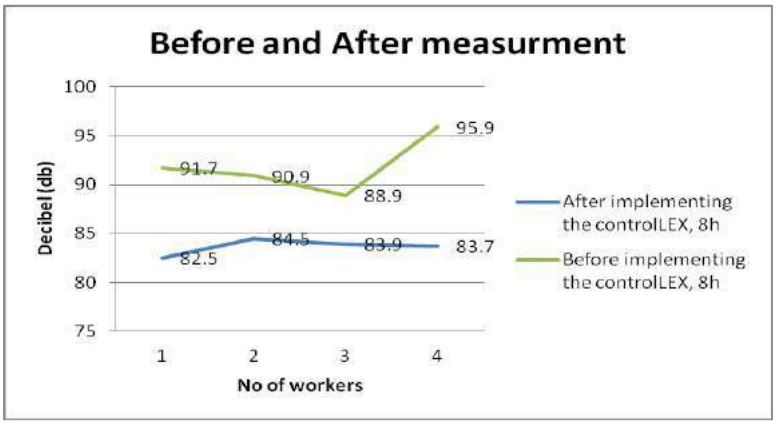


Fig-VIII: Before and After Implementation Measurement Comparison

The graph comparison between the before and after implementation of the control technique . Before the implementation of the control measure in area workers are cross above the safe level it means they are in the red category it leads to noise related issues to the employees. After implementation, blue line shows that they are under the 85dB only so they are under the orange category. According to the hierarchy of control they must wear the last line defense PPE in that area. Over all 3%decibel is reduced by this control technique.

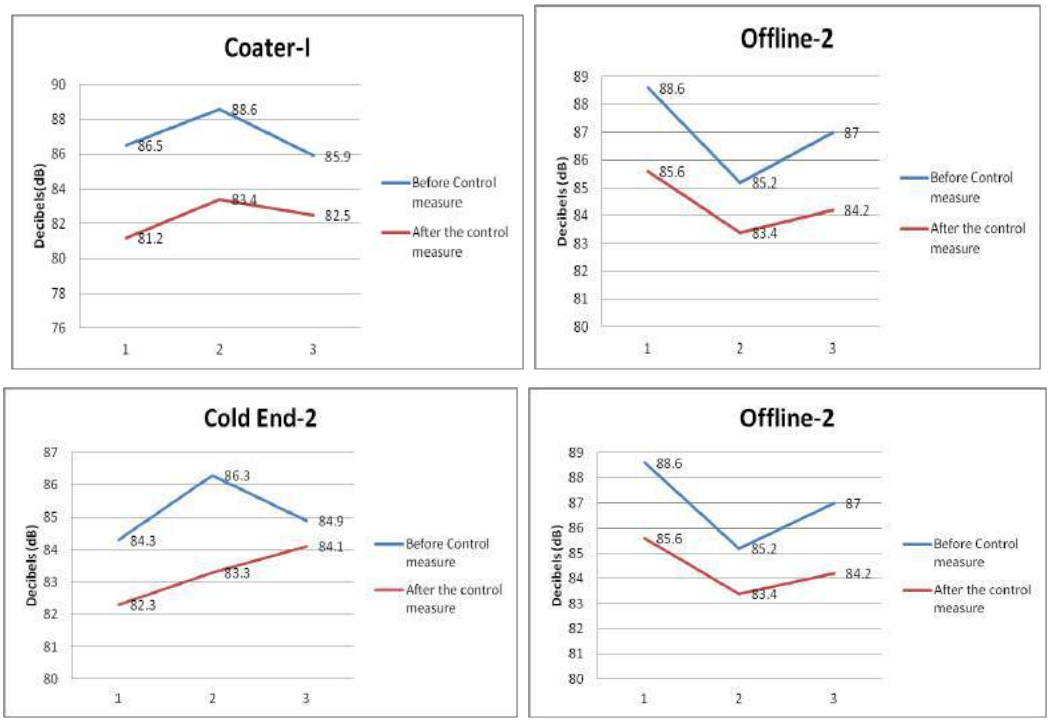


Fig-X: Before and After Implementation of Control Measure

In Four Areas, the noise source Air blower and leakage is controlled by the Sound barriers is installed in those areas, to control the noise that have wide application across the whole of industry. In many cases, they will produce substantial noise reductions quickly and cheaply - with little or no effect on normal operation or use. It will be reduced 3-4dB of noise from the source it will decrease the overall noise exposure by individual in the fig it shows clearly before and

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after implementation of control method. Vibration, Conveyor, Unconstrained layer where a layer is similar have high damping material is stuck to the surface. When Constrained layer damping is more rugged and generally more effective. Either aluminum guards, panels or other components from commercially available sound deadened steel or buy self adhesive steel sheet it will reduce the noise 4-5dB. When compare to the noise exposure by the individual to company compliance they workers are come under the orange category.

V. CONCLUSION

The study concludes that the Noise Level in different areas at Glass Plant, are measured and noise in that are controlled after implementing the noise control in that specific area. From the measurement result show that the workers are above the compliance so that noise control is implemented the vibration damping, Pneumatic control (Air leaks), Blower noise control, vibration isolation pads and acoustic absorbent it will be reduce the noise in that for 2-5dB so that it will be reduce the over exposure to the noise will be reduced. It brings the employees form the red category to orange category and it will be reduce the noise related health issue. Whereas hearing damage is the main concern of this project and it is reduced.

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