International Journal of Research in Engineering, Science and Management
Volume-1, Issue-12, December-2018
www.ijresm.com | ISSN (Online): 2581-5792

Experimental Study on Machine Noise and its Monitoring along with Controls Measures in FIBC Industry at Flexituff Ventures International Ltd. (SEZ) Pithampur

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***Abstract*: Noise always plays an challenging part in today industrial world as its create lots of physical & psychological effects on workers who were continuous exposure to these hazards which results to symptoms of hearing impairment, fatigue, laziness, irritation ,sleep deficiency etc. In Flexituff noise plays a widespread role in production activities. As extrusion activitiy produces large amount of noise. As Noise is harmful because it interfaces the normal working activities via affecting the communication & efficiency of workers exposed to noise generated from machineries. The study is totally based on noise that is generated from machineries such as Tape Extrusion, Multifilament, Weaving, Webbing, Lamination, & Stitching at Flexible Intermediate Bulk Container manufacturing plant .In this research noise is monitored along with the study on its control measures in order to increase the efficiency of workers as well as protection from noise hazards.**

***Keywords*: Noise, Hearing, FIBC, Health Hazards, Efficiency, Workers, Source, Path, Monitoring, Hearing aids. Path, Source, Receiver, Audiometric**

1. Introduction

Noise is unpleasant sound as well us unwanted sound which results in interference of normal activities & efficiency of human being. In other words anything which cause irritation to human ears called as noise. Like Air pollution, water pollution noise pollution plays important role in today's world .Noise also acts as annoyance, but the level of annoyance depends on the quality of sound. Machinery noise plays a vital role in various types of industrial hazards, as continuous exposure to it result permanent hearing disablement or symptoms like ATD (Acoustic Trauma Deafness) resulting from hearing long term to loud noise from machinery. The physical effects such as loss of hearing, memory & communication interference along with psychological effect of irritation & working efficiency.

2. Sources of noise in FIBC industry

The noise source identification is an important activity for overall strategy of noise control in the FIBC industry. As the major areas were noise is emitted consist of

- Tape plant.
- Multifilament.
- Circular Loom.
- Needle Looms.
- Lamination.
- FIBC Stitching.

These are the major areas were the noise source has identified above the TLV or above the Standard prescribed limit as per Statutory norms. The machineries are well maintained with timely preventative maintenance, since due to frictional moments of machine parts its quiet natural.

3. Industrial noise and hazards

The noise has been classified in two types:

- Inside the industry which directly affects workers only.
- One which is outside the industry.

Noise is unacceptable by the workers, usually considered as nuisance. It's not a new problem for an organization, however in major cases it was accepted by the workers as well as management as a part of their occupation. The factors that create noise inside the industry are:

- Regular machineries noise
- Human noise
- Working tool and tackles its impact
- Induces noise.

In FIBC industry the major noise generating areas the:

- Tape extruder machines & Bobbin winding machines
- Multifilament extrusion & winder.
- Circular Loom /Weaving.
- Needle Loom/webbing.
- Lamination.
- FIBC stitching.

These are the sectors were the highest amount of noise is produced as the mechanical moment of machine parts are the greatest area of concern. Hazards which affects workers during these operations:

- Permanent hearing loss.
- Lack of efficiency in work.
- Difficulties in communication due to noise.
- Mental Stress, annoyance, fatigue.

Hazards which affects to industry:

- Loss of Productivity.
- Compensation given due to medical ill health.
- PPE (Hearing Aids).
- Medical health checks up.
- Potential accidental risks.

A. Explanation

- *Loss of Productivity* - Noise creates productivity by reducing workers concentration due to irritation. Noise slowing down the performance, increase error rates.
- *Compensation* – As this is direct loss which causes monetary loss to industry by providing support to workers who has suffered loss of hearing due to continuous noise exposure.
- *PPE (Ear Plug)* - It is necessary to protect workers from heavy noise but these may produce discomfort and are less acceptable to workers rather than noise control.
- *Medical Checkup* - During exposure to noise the worker has to mandatorily go through medical health check up as this creates loss of production because of the involvement of worker in health checkup duration.
- *Accidental risk* -As noise interfere in the communication process contributing a major factor of industrial accidents.

4. Noise monitoring

Monitoring is the greatest part of the all noise control measures as it helps to identify the noise emitted from the source and how much amount of noise is transferred to the receiver and how much distance the worker must keep from source in order to protect worker from ATD. In flexituff noise play widespread role in the loss of efficiency of workers. As the above listed departments has major role .There are regular monthly noise monitoring as part to identify the noise hazard severity.

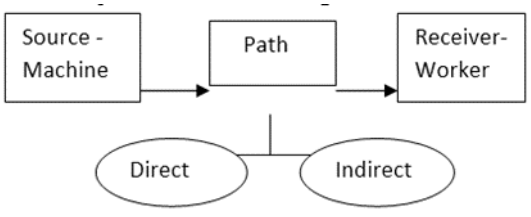

Fig. 1. Noise monitoring

The Noise level study consist of –

- Monitoring.
- Machine condition & other facts for noise protection.
- Threats.
- Department were monitoring is carried

A. Monitoring

An study of noise level monitoring has been conducted through source, Path & Receiver with the use of sound measuring device called as noise dosimeters “an instrument which integrates sound pressure as a function of time over a period of time” integration is of 8 hours or more . Dosimeters record the noise exposure of workers during their normal working day. The Dosimeters are calibrated and carried to all of the 6 respective departments on day shift & night with the help of QA & EHS personal and found the measurement.

Table 1
Noise monitoring

S. No.	Department	Level Day - Night
1	Tape Plant	94db - 92db
2	Multifilament	88db - 86db
3	Circular Loom	92db - 89db
4	Needle Loom	89db - 86db
5	Lamination	85db - 80db
6	FIBC	84db - 82db

Monitoring has been conducted as per legal standards. After noise monitoring taken a detail round of all machines & examine the machine conditions to find out the cause of noise generation which consist of

- Machine lay out
- Foundation & Fitting of machine in well maintained condition
- Uniforms floors.

All found satisfactory as there was no region for noise due to vibration in machines as it was only generating due to mechanical movements of parts due to friction. As there was 2 ways to reduce the noise –

- From the Source.
- From the Path.

But both ways are not practically possible because from the source all the machines are in well maintained condition with dampers provided & noise generating parts are not in the possible condition to isolate or insulate to reduce the noise level. From path direction point view noise absorption rate is possible at walls & from roof but workers workstation is near to machines, so from path protection point of view is not an appropriate solution. The only way to control is from receiver point

5. Noise control

The noise control is a major work in FIBC industry, as there are three elements from were noise to be controlled

- Noise control from the source of noise

- Noise control from the path
- Noise control from the receiver.

The purpose of noise control study is to prevent hearing loss to workers, to allow effective communication in the plant, to increase the efficiency of workers, to reduce the hearing heath issues .To define the problem of noise & to set control methods factors should be considered such as-

- Noise Type
- Level of noise
- Distribution of noise frequency.
- Location of noise source.
- Pathway of noise through different medium.

There are other things to be considered such as number of workers exposed and work type. During the plant study all the criteria of control measures has been taken in account I order to arrive on the root cause of the noise hazard. During the research all the three basic elements were taken step by step: Controls at source-

- By proper maintenance.
- By engineering methods.
- By Substitution technique.
- By modification technique.
- By substitution of material.
- By changing in work procedures.

A. Control at path

During the study the most complicated area was to hoe to control noise at the path as there is very less techniques we can do to stop the noise from path to receiver because critical parts cants be covered from the barriers as there may continuous human intervention which make it impossible to control the path of noise & after all its not practically possible as well as economically feasible.

B. Control at receiver

The most successful approach during our research is the control at receiver point .It is possible to limit from receiver point as there are lot of techniques for receiver noise suppression methods. Limit the exposure of workers to noise is to limit the time during the worker exposed to high level noise .Hear aids like earplugs, muffs etc. In Flexituff we have provided disposable and reusable earplugs for noise induced hearing loss. It can reduce up to 32Db of noise when used directly. During our study we identified that rotating job of workers from the noise atmosphere reduce the impact of noise as well as prohibited the continuous working. Then noise level of more 90db for 8hrs continuous has been prohibited. PPE (Personal Protective Equipment):

- Ear Plugs.
- Ear Inserts.
- Disposable earplugs.
- Ear Muff.

6. Medical health check

It was very clear that noise is causing noise induced hearing loss but how it was too been known .So during the study we decided to take sample medical checkup at our OHC with the help of Dr. Ashok Kumar for selected worker working in that particular departments .We have taken 6 workers from each department & comparatively their exposure was 2 to 5 years in industry .All were age group of 20 to 30 years. Out of 6 workers five workers were found conductive loss or minor impairment in hearing.

7. Training

Fig. 2. Noise control

After the result off medical checkup an training secession has been conducted with help of training department under the guidance of Mr. Rahul Vyas & supervision of Mr. Nagendra Patel to all 6 departments regarding the usage of PPE ear plug at training hall SEZ .During this an brief explanation of Noise & defaults has been explained to HODS of respective departments and benefits of ear plug & awareness of safety of ears. The observations were clearly thought to them. As training plays an wide spread role in control measures of noise protection as more impartment of awareness more reduction of noise related health symptoms as it induces workers to were ear plug mandatorily. After the study we found weekly training has to planned to departments for effective control of noise induced hearing loss ,as continuous brain feeding of awareness make

them to wear earplugs .In training program importance of noise level, ear protection, psychological & physical effects of noise on workers & productivity discussed with them. How to use ear plug, method of wearing etc. were shown to them.

8. Conclusion

At last during the whole study the final results shows that it is mandatory to make compulsory use of ear protection in all the departments as well as partial use will not be an effective solution .If all workers use it uniform as well it will be appropriate for conversation because everyone will be on same level of hearing & listening due to noise reduction in hearing system. When one is using & other is not using they shall have different level of noise & noise reduction it will be obstacle for the conversation and speech level. It will effect to all but may be some time-consuming for those people having an exposure for long time or more than 10 years but gradually they shall feel level of comfort definitely. As flexituff is a FIBC food grade industry it is very critical issue to provide ear plugs in stitching area due to contamination issue. .As it is very critical to identify the metal detectable ear plugs for stitching area and are in process to identify the same. It would be better if audiometric test of all senior persons every year who are with the organization since long time and will improve the improve the efficiency of man power .We are trying for an better improvement technique to avoid the threat of contamination by simple arrangement of fixing hair net with ear plug to make it an single unit.

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