Assessment and Control of Sawmill Noise

Vaishali Prakash Choudhari, Deepak S. Dhote and Chandrakant Ramesh Patil

Abstract—Noise generated from various industrial activities can disrupt the activities. The scope and purpose of this is to control or minimize the noise pollution and its effects on human being. Noise control method can be classified as noise control at source, during transmission and at the receiver. Using these noise control methods we can reduce the noise level up to the desired level (i.e. 70 dB). There are two basic ways of eliminating noise at sources. Through the design or modification of machinery itself or through isolation or enclosure of the noise source. Noise can be controlled along the path through separation of worker from noise sources and use of barriers or reflected. Acoustical control is one of most popular technique available for absorbing noise. This paper presents the principles of noise control, various noise control techniques, use of noise control materials at saw mill.

Keywords—Acoustical control, barriers, Noise control and saw mill.

I. INTRODUCTION

Noise is defined as unpleasant or unwanted sound. The word noise comes from the Latin word nausea meaning seasickness. Band re-saws are widely used in the wood industry. Without any measures to reduce noise at source, they can produce noise levels of over 85 dB (typically 100 dB at the operator position). At this level of noise, an employee’s daily personal noise exposure would reach the 85 dB upper action value after 15 minutes. The best way to deal with the problem is to reduce machinery noise at source, eg by providing a noise enclosure, and also to organise your workplace so that fewer employees are at risk. Machine noise can be reduced, particularly when the machine is idling, by maintaining the machine and blade in good condition. Well-maintained machines with pulley diameters up to 900 mm produce idling levels in the region 80 to 90 dBA. Poorly maintained machines, which are otherwise identical, may idle at levels as high as 110 dB. Cutting noise is typically between 95 and 105 dB. Machines that are cutting for any substantial part of a working day will usually need to be enclosed where practicable.[1]

II. NEED OF REDUCTION OF NOISE AT SAWMILL

Every day workers face many hazards in their job some easier to spot than others. One of these hazards noise—probably affects more workers than any other. Noise is a serious and widespread problem in many workplaces like in sawmill, corn mill, printing m/c etc. Almost 70% of workers experience noise in their workplace to protect themselves, workers must learn about noise, how the ear functions, and the effects of noise on the body.

The world Health organization (WHO) estimates that 250 million people have a hearing loss and two third of these people live in developing countries.

A recent study by the University of British Columbia of over 27000 B.C sawmills workers found correlations between working in a noisy environment and heart disease.

III. NOISE MEASURING EQUIPMENT

An instrument known as sound level or noise-level meter can be used to measure noise levels at any particular point in the mill. There are different types of noise measuring instrument, which should be selected according to the type of noise and the type of exposure being measured.
IV. SAWMILL NOISE ASSESSMENT

Noise levels generated by sawmill saws in operation have been reported to vary from 80dB(A) up to 120dB(A). Not only can the cutting noise be extreme, there is also the additional factor that, even when idling, saws can produce noise levels up to 95dB(A). It is well recognised in industry that noise is a serious problem with saws. A large body of literature is available which discusses a wide range of noise control techniques which have been applied to sawmill noise reduction [2]. A research study shows the following noise level measured on selected sawmill machines in six factories.

![](image_url)

Fig 1. Locations of sound level meter for assessment

<table>
<thead>
<tr>
<th>Factory</th>
<th>Type of Machine</th>
<th>Total average noise level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Bandsaw</td>
<td>87-107</td>
</tr>
<tr>
<td>II</td>
<td>Cross-cut saw</td>
<td>86-105</td>
</tr>
<tr>
<td>III</td>
<td>Chain saw</td>
<td>88-107</td>
</tr>
<tr>
<td>IV</td>
<td>Edger saw</td>
<td>91-100</td>
</tr>
<tr>
<td>V</td>
<td>Moulding</td>
<td>88-98</td>
</tr>
<tr>
<td>VI</td>
<td>Planning</td>
<td>88-103</td>
</tr>
<tr>
<td></td>
<td>Plyer</td>
<td>86-97</td>
</tr>
<tr>
<td></td>
<td>Resaw</td>
<td>96-102</td>
</tr>
<tr>
<td></td>
<td>Silic</td>
<td>87-92</td>
</tr>
</tbody>
</table>

Study reported that 86% of the six workplaces had daily noise levels over 80 dBA-TWA and 23% of them were over 90 dBA.

One of the unique features of the noise associated with wood product plants is its intermittent nature. While the OSHA regulation stipulates a limit of 90 dBA for 8 hours, higher sound levels are allowed if employee exposure is less than 8 hours. [6]

V. FACTORS AFFECTING MACHINERY NOISE EMISSIONS

| Table II |
|-----------------|-----------------|
| NOISE EMISSION DEPENDS ON TYPES OF WOOD AND DIMENSION |
VI. NOISE AND VIBRATION REDUCING TECHNIQUES

Depending on the source, noise can be reduced in several ways:
1. Buying quiet machinery and equipment
2. Maintaining machinery and equipment routinely
3. Reducing machinery and equipment vibration
4. Muffling engine and compressed air noise
5. Isolating the noise source in an insulated room or enclosure
6. Placing a barrier between the noise source and the employee
7. Isolating the employee from the source in an insulated booth or room.  [4] and [5]

A. Ways To Quiet A Noisy Area are as:

**Treat the room**

When noise is reverberating around a room (Fig. 2), the only way to reduce it is through absorption. Panels and Baffles absorb a high percentage of sound energy and dissipate it as kinetic heat energy. Maximum noise reduction potential is from 4 to 6 decibels, resulting in a noise level reduction of 20 to 30 percent.

![Fig 2. Treat the room](image)

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(Source-3)
Treat the wall nearest the noise source
Another option is to cover the wall closest to the noise source with acoustic foam panels (Fig. 3). Maximum sound reduction will vary from 2 to 6 decibels. This solution reduces noise levels from 10 to 30 percent at low cost.

Build a barrier or shield
Barriers can be used to create “instant walls” that isolate noisy machinery. Composite combines the sound absorption of foam and the containment of barrier material to isolate noise effectively (Fig. 4). The most effective way to prevent single-source noise from reverberating around the room is to create an acoustic barrier around the machine to physically block the sound energy.

Build an enclosure
An acoustic enclosure around the machine also contains noise at the source. The Curtain Enclosure System provides maximum noise reduction of at least 20 to 30 decibels.
At most basic level, correction of room acoustics involves using sound-absorbing materials on three non-parallel surfaces (Fig. 5). This technique suppresses unwanted reverberation by keeping sound waves from bouncing back and forth between parallel surfaces. It also reduces the overall noise level by preventing noise from building up. [6] and [7]

VII. CONCLUSION
We conclude that, the noise produced in the both the sawmills is above the desired limits and it should be reduced. In order to reduce the noise at observer, acoustic barriers, overhang baffles and acoustic foam on the side walls may be installed. And in order to reduce the noise at the source i.e. at the machine dampers may used between the machine and the foundation block to reduce the vibration. Acoustic enclose
may installed either partial or full to reduce noise. Another safety measure that should be taken at source is the use of earplugs by the operator, as he is the person who is exposed to this more. If all or few of the precautionary measures are taken into consideration and implemented then the noise level of 99.5 dBA can be reduced upto 65 dBA to 70 dBA.

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REFERENCES

[4] Noise: A Leaflet Published by Steel Authority of India.