Mount HIRA Matriculation School

Nellikuppam

STUDENT NAME

M.S.HAAFIZ

CLASS

GRADE 7

PROJECT TITLE

SUPREME MUFFLING STATISTICS FOR WALLS AND HOME

Title:

Supreme muffling statistics for walls and home

Introduction:

Sound plays a very important role in our daily lives. It helps us to communicate, enjoy music, and be aware of our surroundings. However, not all sounds are pleasant. Unwanted sound, called noise, can be very disturbing. Noise from traffic, construction, loudspeakers, and crowded places is now a common problem in cities and even in small towns. This problem is known as noise pollution.

Noise pollution not only disturbs concentration but also affects health. Continuous exposure to loud noise can cause stress, lack of sleep, headaches, irritation, and even hearing problems. Students find it difficult to study in noisy surroundings, and people cannot relax properly in their homes if outside noise keeps entering.

One way to solve this problem is by soundproofing. Soundproofing means using special materials to block or reduce sound so that less noise passes through walls, windows, or doors. Different materials can either absorb sound waves or block them.

For example

- Soft and porous materials like sponge, foam, and cloth can absorb sound waves and reduce echoes.
- Hard and dense materials like cardboard or thermocol can block sound from passing through.
- Special shapes like egg trays can scatter sound waves and reduce noise.

In professional buildings like studios, theaters, and hospitals, expensive acoustic panels and fiberglass are used for soundproofing. But in homes, especially in places where people cannot afford costly materials, there is a need for simple and low-cost options.

The study is important because it can help identify affordable soundproofing materials that can be easily used in homes, classrooms, and other places where noise is a problem. It will also make us understand how science can be applied to solve a real-life issue that affects health and comfort.

Selection of Problem and Background Information

Problem Selection:

In today's world, noise pollution has become one of the most common environmental problems. With growing cities, increasing vehicles, loudspeakers, construction work, and machines, people are surrounded by noise almost all the time. This noise does not stop at the roads; it also enters homes, schools, and workplaces.

Most homes, especially in India, are built with normal bricks and cement walls that are not designed to block noise. As a result, sounds from traffic, neighbors, or even household appliances can disturb the peace inside. For students, it becomes difficult to concentrate on studies, and for families, it affects sleep and relaxation. Unlike big studios or offices, normal houses do not have expensive acoustic materials.

Background Information:

Sound travels in the form of waves. When these waves strike walls or objects, they can do three things:

- Reflect – bounce back, causing echoes.
- Absorb – get soaked into the material, reducing the sound.
- Transmit – pass through the material to the other side.

Effective soundproofing requires materials that either absorb sound or block it from passing through.

In professional soundproofing, advanced materials such as acoustic panels, fiberglass insulation, mineral wool, and double-glazed walls are used. But these are expensive and not always available for ordinary households.

Therefore, by comparing different materials in a controlled experiment, this project will provide a better understanding of which simple and affordable material works best for reducing noise at the student level.

Hypothesis

1. Does the type of soundproofing material used affect the level of noise reduction in a given space?

2. Is there a significant difference in sound transmission loss between different types of soundproofing materials?

3. Can the thickness and density of soundproofing materials impact their effectiveness in reducing noise transmission?

4. Do soundproofing materials with high sound absorption coefficients also exhibit high sound transmission loss?

5. Can the strategic placement of soundproofing materials in a room or building optimize noise reduction?

6. What are the most effective soundproofing materials for reducing noise transmission in different environments (e.g., residential, commercial, industrial)?

7. How do different soundproofing materials work on buildings?

Abstract

The aim of this project is to identify the best soundproofing materials that can be used for walls and homes. For this, different materials like cardboard, thermocol, sponge, foam, fabric, and egg trays will be tested for their ability to reduce sound passing through them.

The experiment will involve creating a simple model box with one side covered by the test material, playing sound inside, and then measuring how much sound passes through the wall. The sound intensity will be compared using a sound level meter app or mobile phone.

This project is important because noise pollution is increasing and affects concentration, health, and sleep. If effective and low-cost soundproofing materials are identified, they can be used in homes, classrooms, and even hospitals to create quieter spaces.

Keywords

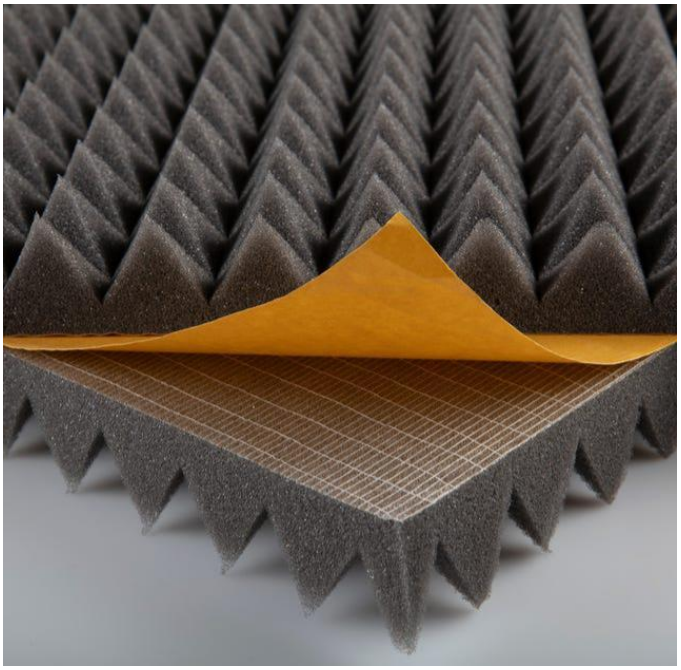
1. Soundproofing
2. Noise reduction
3. Acoustic materials
4. Sound absorption
5. Sound transmission loss
6. Noise control
7. Acoustic insulation
8. Soundproofing materials
9. Noise mitigation
10. Acoustic performance

Objectives

1. To understand how sound travels and how it can be reduced using materials.
2. To test and compare different materials for their soundproofing ability.
3. To identify low-cost, easily available materials suitable for home soundproofing.
4. To raise awareness about noise pollution and its effects on health and daily life.
5. To create a simple model experiment that demonstrates soundproofing.
6. To encourage students and communities to use science to solve real-life problems.

Guiding Principles

1. Follow the scientific method: observe, experiment, and analyze results.
2. Use simple, low-cost, and eco-friendly materials wherever possible.
3. Ensure fair testing by keeping the sound source, volume, and distance the same for all materials.
4. Record data honestly and repeat trials for accuracy.
5. Follow safety precautions during cutting, gluing, and handling materials
6. Connect the project to real-world applications such as homes, classrooms, and hospitals.
7. Promote sustainable and affordable solutions to reduce noise pollution.



Variables

Independent Variable: Type of material used for soundproofing (sponge, cardboard, thermocol, cloth, egg tray, plastic sheet).
Dependent Variable: Sound level (in decibels) measured outside the box.
Controlled Variables: Size of the box, position of sound source, volume of sound played, distance of measurement, time of measurement.

Materials Required

- Cardboard sheets
- Thermocol (Styrofoam) sheets
- Sponge or foam pieces
- Egg trays
- Thick cloth or fabric layers
- Plastic sheets
- Tape or glue
- A cardboard box (to act as test chamber)
- Mobile phone with sound level meter app (for measuring sound in decibels)
- Speaker or mobile phone (to play sound/music inside box)
- Stopwatch
- Notebook and pen for recording observations

Procedure

1. First, I will take a cardboard box and cut a square opening on one side to act as a test wall.
2. Then, I fix one type of material (e.g., cardboard sheet) to cover the opening completely.
3. After, I place a mobile phone or speaker inside the box and play sound/music at a fixed volume.
4. And then, place another mobile phone outside the box with a **sound level meter app** running to measure the sound level passing through the wall.
5. Next, I record the decibel (dB) reading after 30 seconds.
6.Further, I repeat the test for each material: sponge, thermocol, fabric, egg tray, plastic sheet, etc.
7. Then, I compare the readings for all materials.
8. At last, I identify which material reduces the sound the most (i.e., lowest dB value outside the box).
9. And repeat trials 2–3 times to ensure accuracy.

Risk Factors and Safety Measures

- Do not play sound/music at very high volume, as it may damage hearing.
- Use scissors/cutters carefully while cutting cardboard and thermocol.
- Handle thermocol and foam pieces gently to avoid small particles spreading.
- Avoid keeping mobile phones near water or heat during the experiment.
- Work in a quiet room so background noise does not disturb readings.

Safety Measures

1. Wear PPE, such as gloves, safety glasses, and masks, when handling soundproofing materials.
2.Ensure good ventilation when working with soundproofing materials that emit chemicals or fumes.
3.Use proper lifting techniques and mechanical aids to handle heavy soundproofing materials.
4.Wear ear protection, such as earplugs or earmuffs, when working in noisy environments.
5. Follow local fire safety regulations and guidelines when working with soundproofing materials.

Additional Precautions

1. Material safety data sheets (MSDS) precautions.
2.Training and experience
3.Regular inspections

Bibliography

1. Rossing, T. D. (2007). *Springer Handbook of Acoustics*. Springer.
2. Everest, F. A., & Pohlmann, K. C. (2009). *Master Handbook of Acoustics*. McGraw-Hill Education.
3. Fahy, F., & Gardonio, P. (2007). *Sound and Structural Vibration: Radiation, Transmission and Response*. Academic Press.
4. Ministry of Environment, Forest and Climate Change (2022). *Noise Pollution and Its Control*. Government of India.
5. Science Buddies. (2023). “Which Materials Can Block Sound?” https://www.sciencebuddies.org
6. National Geographic Kids. (2022). “Noise Pollution Facts for Students.” https://kids.nationalgeographic.com
7. Wikipedia Contributors. (2023). “Soundproofing.” *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Soundproofing
8. XSEED Science content book