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Project Title: Measuring Pin Drop Silence

Objectives/Goals

This project will be measuring the sound produced by dropping several pins of varied materials from different heights onto the surface of varied materials. This study will help correlate the effect of sound produced based on height, types of pin materials, and the material types of the surface used. The goal of this experiment is to create a relationship between the sound produced by pin dropped based of the variables that impact it.

Hypothesis

It is hypothesized that:

1. The sound produced by a regular metal pin on a metal surface when dropped from a height of 25 inches will produce a sound of 98 dBSPL (15 dBFS).
2. It is also predicted that the sound produced by a regular metal pin on a metal surface will be the loudest.
3. All pins dropped from the height of 25 in. will be louder than any pin dropped from a lower height.

Methods/Materials

1. Anechoic Chamber measuring 10ft. x 8ft.
2. 4 pins consisting of at least 2 different Pin Materials (Plastic and Metal) and at least 2 assorted sizes (Small, Medium or Large).
3. At least 3 different landing pad materials (rubber, plastic, and metal) on which the pin will land on.
4. Adjustable stand for pin dropping at a specified height.
5. Multiple microphones to collect sound data.
6. Computer with compatible software for observations and results.

Results

The following data trends were computed in support of hypothesis #1 and #2:

- a. All metal pins were louder than the plastic pin at most heights
- b. The wooden surface created the loudest sound when a metal pin was dropped on it
- c. In most cases Plastic created the smallest sound except on the rubber surface
- d. The range of the data was from 47.85 – 98.53 resulting in an average of 73.2 dBSPL
- e. 82.98 dBSPL was the measurement of a metal pin falling on a metal surface from a height of 25 in.

Conclusions/Discussion

Sound produced by a pin depends on several variables such as material of pin, material of surface, and the height from which the pin is dropped. While there is no direct correlation between the sound produced and these variables universally, each combination (material of pin, material of surfaces, and height) of variables can be directly associated. For example, the sound produced by a wood surface is always louder than sounds produced by a metal or rubber surface. On a wooden surface, the height of the pin drop does not impact the sound.

Summary Statement

It is concluded that a metal pin when dropped on a wood surface produces the loudest sound.

Help Received

Ricardo Bernal: Sr. Staff Engineer , Qualcomm Technologies Incorporated

Steven J. Orfield: Founder of Orfield Laboratories Inc.

Atul Suri

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