California Science Center

CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)
Cassidy S. Clawson

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)
Sounds Radical!!

Science Fair Use Only

S0104

Division
S Junior (6-8) S Senior (9-12)

Preferred Category (See page 5 for descriptions.)
14 - Physics & Astronomy

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)
Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Overview: My project examines how density of various sound proofing materials effects the sound attenuation at a number of audible frequencies. Assuming a relationship between frequency and density exists, I will attempt to create a single composite that contains three materials, each with a different density to best attenuate one frequency range. I will then determine if my inexpensive composite performs better than an expensive and commonly used sound proofing material.

Method: My apparatus consists of a 4#x 4#x2# box with a speaker mounted on one end and a decibel meter placed on the other. A frequency generator and an amplifier are hooked to the speaker to make sounds at different frequencies and loudness. To measure the attenuation of different samples, the amplifier is calibrated to output 80dB while the box is empty. Take a reading after placing a material between the speaker and dB meter. To determine the attenuation, subtract the reading from eighty. Repeat for all materials at eight frequencies.

Hypothesis: I predict that density of a material is proportional to frequencies effectively blocked. I believe materials with a high density will block low frequencies effectively and materials with a low density will block high frequencies effectively. I predict my three-layer composite will perform better at a wide range of frequencies than traditional soundproofing material.

Conclusion: As predicted, density determines which frequencies are effectively blocked. However, higher densities block all frequencies well, whereas low density materials only block high frequencies. My composite performed almost as well as the acoustical paneling.

Summary Statement (In one sentence, state what your project is about.)
The relationship between sound-proofing material's density and the frequencies they effectively attenuate.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.
Father helped build apparatus and conceptualize project.