CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
J0299

Project Title
What Material for an Acoustic Instrument Soundboard Has the Widest Range of Response?

Abstract

Objectives/Goals
The objective is to determine which material for an acoustic instrument soundboard has the widest range of response as defined by duration of vibrations and amplitude.

Methods/Materials
A stringed test instrument was built with the ability to interchange different soundboard samples to be tested. Ten different materials were cut into circles to be placed and secured above the sound chamber. The tested materials were acrylic, plastic, aluminum, birch plywood, brass, raw cowhide, engelmann spruce, high pressure laminate, red cedar, steel, and sub-alpine fir. A contact microphone was mounted on top of each material to capture the sound. A string picking device was used to strike the string. A computer was used to record and analyze the sound.

Results
The tested materials produced an initial voltage in a range of 168 mV to 895 mV. The sustained voltage at 2 seconds was from 29 mV to 221 mV and at 4 seconds, it was from 8.33 mV to 72 mV. The sub-alpine fir had the widest range of response, produced the longest sustain, and one of the highest voltages.

Conclusions/Discussion
My conclusion is that my hypothesis was incorrect. The red cedar did not have the widest range of response. The sub-alpine fir outperformed all other materials in sustained volume and high voltage, thereby producing a wider range of response compared to the other materials I tested.

Summary Statement
My project demonstrates and compares the ability of different materials to produce sound vibrations in an acoustical stringed instrument.

Help Received
My father gave me advice on the design and supervised my use of power tools during construction. My mother helped me with typing and proofreading.