Name(s)

Thomas Chase

Project Number

J1302

Project Title

How Does the Density of Wood Affect the Frequency of Vibrations?

Abstract

Objectives

I wanted to test how much or if different densities of wood affected vibrations when a piece of wood is vibrated. This experiment would help instrument makers because it could indicate which woods have higher pitches and lower pitches. It also helps furniture makers because as the information could help technicians know which woods are lighter but sturdier and which ones are heavy or brittle.

Methods

Tested the frequency of vibrations (hz) of 6 different wood types (pine, redwood, cedar, oak, poplar, ipe). Cut to 1m long 2cm wide 8mm thick. Clamped to table, traced for control parameters, then pulled down and released. Measured with SpectrumView app on phone. Completed 5 tests for each wood type.

Results

The higher the density the lower the vibrations, with the exception of Oak which had an exceptionally high average frequency. A different independent variable could be affecting the frequency.

Conclusions

These results conclude that woods with higher densities emit lower frequencies and woods with low densities emit higher frequencies. This was true with the exception of oak, which is dense and had high frequency vibrations. As experienced in the case of oak, one factor that could affect the frequency could be the structure or grain of the wood. For example straight grain would bend easier while criss cross grain would be harder to bend which would affect the frequency greatly.

Summary Statement

I tested 6 equal sized pieces of different species of wood, measured their vibrations, and determined that the both the structure and the density of wood effects their vibrations.

Help Received

I took advice from a general contractor, David Chase, who helped me find a variety of woods with different densities. He also helped me safely cut the wood using a table saw. I conducted and measured the experiment with the minor help of a friend, Joey Rook.