CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
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Project Number
J1814

Project Title
Are Composites of Wood Stronger than Solid Wood?

Abstract

Objectives/Goals
I believe that solid wood will have greater torsional resistance (twisting) and drop resistance (bending) than a comparable piece of composite wood. In my experiments I will compare Douglas Fir, which is, used in for structural support in construction to various composite woods.

Methods/Materials
We conducted tests on solid wood vs. three kinds of solid wood to determine which was stronger. The types of wood used were: solid wood # Douglas Fir; Composite panel material # plywood, MDF, and OSB. Two types of experiments were conducted: twisting and bending. For the twisting test weight was applied to a wire fishing line from a 4-inch arm to cause the test bar to twist. The degree of twist was measured for each increment of weight applied until the wood sample broke. For the bending test the test bar was held at one end, and a predetermined amount of weight was applied at the opposite end. The amount of deflection was measured for each increment of weight applied until the wood sample broke.

Results
The arc of twist and the amount of bending for each sample were proportional to the weight applied for both the solid wood and the composite woods. More torque was required to break the solid wood than the composite woods. The solid wood broke into two pieces at a smaller arc of twist than the composite woods. More weight was required to break the solid wood than the composite woods.

Conclusions/Discussion
The solid wood proved stronger in both tests than the composite panel materials, which supports my hypothesis. I believe I got these results because the long, continuous fibers going in the same direction in the solid wood hold together better than the manufactured composite wood held together by resins. However, I learned in my additional research that there is a category of composite wood engineered beams. These beams are stronger and can be manufactured longer than solid wood beams. I learned that in construction solid woods and composite woods (composite panels and engineered beams) have specific applications ranging from decorative to structural support.

Summary Statement
To determine if a wood composite has a greater torsional resistance and drop resistance than a comparable piece of solid wood.

Help Received
My parents helped me build the testing apparatus.