



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

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Project Title Honeycombs: The Shape of the Future	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To create a possible highrise tower design that is more space and money efficient than current designs. This would be accomplished by building the tower higher and by using only a little more if not less material in order to construct it than currently existing designs.</p> <p>Methods/Materials First, eight towers of tube-in-tube and hexagonally honeycombed design (four of each type) were constructed out of balsa wood. The adhesive used was cyanacrylate. Then, a testing platform was constructed on which each tower was tested for axial and lateral strength. The towers# axial and lateral strength was measured in the amount of mass in grams that they withstood axially and laterally respectively.</p> <p>Results In the lateral strength test, the hexagonally honeycombed type towers withstood an average of 3,700 grams while the tube-in-tube type towers withstood an average of 2,540 grams. So, the hexagonally honeycombed type withstood about 46% more mass than the tube-in tube type towers. In the lateral strength test, the hexagonally honeycombed type towers withstood an average of 12,282.5 grams while the tube-in-tube type towers withstood an average of over 23,000 grams (they withstood all of the available mass). So, the tube-in-tube type withstood about 87% more mass than the hexagonally honeycombed type towers.</p> <p>Conclusions/Discussion In a highrise building, the axial load resistance is more important than the lateral load resistance, as the wind speed, and therefore force, does not increase as much as the load which the tower must support axially as the tower rises higher. Therefore, it was determined from the results of this experiment that the tube-in-tube type tower is the most efficient design because it withstood a much higher percentage of axial loading than the hexagonally honeycombed towers even though they withstood less lateral loading.</p>	
Summary Statement This project compared the axial and lateral strength of two types of building structures- a conventional tube-in-tube design and an experimental hexagonally honeycombed design.	
Help Received Parents funded project; Father helped with usage of power tools; Father drove to shops so that materials could be purchased; Mr. Hank Berthiaume helped in material selection; Mr. Brian Finley provided metric masses; Andrew Nichols provided some background information about the forces that act upon towers.	