



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Nicholas Kellar	Project Number J2015
Project Title Rammed Earth: Packing Construction's Future	
<p style="text-align: center;">Abstract</p> <p>Objectives Rammed earth is a material made from soil and its contents. It is nearly free and available virtually anywhere with soil. The question is if it is viable enough to use it in place of clay brick. The rammed earth made in this experiment will be more viable than the clay brick in terms of cost, strength, and availability. This project is important since the population is rising so that a cheap but effective building material is crucial to keeping people housed.</p> <p>Methods Essentially, this experiment compared the independent variable of the viability of the clay brick compared to the dependent variable, the viability of the rammed earth. The controlled variables are the mix of the rammed earth and the amount of pressure used to pack it. Units of measurement used are the strength of the material (Mohs Hardness Scale) and the price of each material (USD). First, experiment made to the rammed earth using a mold and a mix of materials. The experiment measured the clay content in the soil, which was around 50%. Based off of that, the amount of sand and gravel needed to balance out the soil were calculated. The ratio would have to be 2:1:1 to have a correct mix. The amount of cement (5%) was then added to the mix. The mixture was packed and dried. The economic testing was done by first finding the inflation rates of the ingredients each material and multiplying that exponentially to the price of the materials. This showed the cheapness of rammed earth comparative to clay brick. A strength test was done using the Mohs Hardness Scale. With the mix created in the experiment, the rammed earth was less strong than the clay brick.</p> <p>Results The experiment overall does support the hypothesis, as rammed earth is superior to clay brick often, but both materials are usable (just rammed earth is better for many parts of the world. The experiment collected information that noted how rammed earth could be constructed anywhere where soil is, whereas red bricks are fired in factories and shipped to a location).</p> <p>Conclusions Rammed earth can be used as a material everywhere. Rammed earth, while the mix in this experiment was proven to be less strong than the clay brick, in actual use would be far stronger. People all over the world could benefit from rammed earth, and construction costs for the world would drop as it would be used more.</p>	
Summary Statement I tested the overall viability of the building material rammed earth in terms of economics, strength, and overall availability.	
Help Received Other than supervision from my father with power tools, the entire experiment was composed and designed by myself.	