CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
J0312

Project Title
The Duomo: Art and Science

Abstract

Objectives/Goals
This project tests the strength of two different building techniques.

Methods/Materials
Two domes, equal in size, were constructed, but each was created with a different building technique. One dome was built with the same technique that was used in 1420 to construct the Basilica di Santa Maria del Fiore. When the basilica was built a herringbone brick pattern was used on the dome because the architect, Filippo Brunelleschi thought that it would give the building more support. The other model was built in a traditional manner by regularly laying the bricks one on top of the other. Each dome has the same diameter and the same height. The two models were tested by putting the domes on the "squeezer" to see how much weight each model could withstand.

Results
The dome with the herringbone pattern withstood 376.2 pounds of force until there was 2.189 inches of deflection. However, the dome with the regularly laid bricks was able to keep its shape until the squeezer reached 634.1 pounds of force. After the dome with the regularly laid bricks was put on the squeezer, there was 0.98 inches of movement on the dome.

Conclusions/Discussion
There are at least two possible conclusions that can be drawn from my experiment; one of these being that buildings with regularly laid bricks might actually be stronger than building with the herringbone pattern. In the test of the two domes the dome with regularly laid bricks was able to go through two different tests and withstand a greater amount of force. The dome with the herringbone pattern was only able to endure a little more than half of what the other dome withstood.

Another presumption that can be taken from this test is that using the herringbone pattern on a building really will make it stronger. Although in my test the building with the herringbone pattern was not as strong as the building with regularly laid bricks, it is possible that it is an error on my part. There were more variables when constructing the dome with the herringbone pattern because there were certain pieces that needed to with precision and sometimes they did not. It took 35 years to build the Duomo, where I had two weeks to build my two replicas.

Summary Statement
I am testing to see if a dome with a herringbone brick pattern has more support than a building with regularly laid bricks.

Help Received