California Science Center

CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)
Lynn A. Hiel

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)
Can Foam Make Steel Stronger?

Science Fair Use Only

J0114

Division
X **Junior (6-8)** _ **Senior (9-12)**

Preferred Category (See page 5 for descriptions.)
10 - Materials Science

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)
Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Introduction: In nature structures such as tree trunks and bones are very strong. After reviewing literature it became clear that natural fibers running through them are vertically aligned. They are surrounded by a substance/medium that reinforces the natural fibers. My experiment recreates this natural phenomenon by placing weights on top of a steel rod [fiber].

Objective: To determine if the load capacity of a steel rod, that is subject to compression loading, increases when it is surrounded by foam.

Materials and Methods: I did this experiment using 21 steel rods cut to the same length and 6 different types of foam cut to exactly the same size. I tested how much load a steel rod could support by itself. Then, I measured the load which each type of foam could support by itself. Finally, I measured the load which a steel rod surrounded by foam could sustain. I did each experiment three times and calculated the average.

Results: When a steel rod is surrounded by foam, it always supports more load than the sum of the loads supported by the foam and the steel rod separately. All these results were graphed and showed the interaction between the type of foam and the increased amount of load the steel rod could support. An explanation of the observed results was developed.

Conclusion: My conclusion is that the load capacity of a steel rod rapidly increases as it is surrounded by foam. My results explain the material's selection for both natural materials and engineering structures (i.e. earthquake resistant structures.)

Summary Statement (In one sentence, state what your project is about.)
The load capacity of a steel rod rapidly increases when it is surrounded by foam.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.
Mom helped type the report. My neighbor supplied steel rods. Used the Instron machine at USC. My dad's friend supplied foam.