# CALIFORNIA STATE SCIENCE FAIR
## 2017 PROJECT SUMMARY

**Name(s)**
Jack W. Collins

**Project Number**
**J1406**

**Project Title**
## The Shear Strength of Velcro

**Abstract**

**Objectives/Goals**
The purpose of this experiment is to find out if the shear strength of Velcro will be affected by the amount of times it is pulled apart and put back together "cycled#.

**Methods/Materials**
Tested the shear strength of Velcro by hanging a bucket of weight from a 4"x 4" section of Velcro attached to plywood until failure, then "cycling" the Velcro by pulling it apart and putting it back together 25 times and then repeating the process. Materials included rope, bucket, various weights, and plywood pieces with 4" x 4" of Velcro attached.

**Results**
The results showed that after just one cycle of the Velcro, the shear strength was dramatically reduced. On the first try, instead of the Velcro failing, the screw hook in the wood failed at 280 pounds. The next test became baseline 1. Further cycling of the Velcro showed additional reduction in shear strength until the reduction started to level out at 50 cycles. The shear strength started to reduce again at 150 cycles, where the experiment ended.

**Conclusions/Discussion**
What the results concluded is that Velcro was indeed affected by the number of times it was cycled and 25 cycles resulted with the biggest reduction from 265 pounds to 165 pounds. Velcro is made up of tiny hooks and loops, and every time it is pulled apart, those hooks and loops are weakened. The deterioration is due to some of the hooks and loops breaking and some probably just bending so they are not as strong. In conclusion, Velcro is affected by the number of times it is cycled and it can show a big difference in the amount of weight it can hold in shear.

**Summary Statement**
I tested and found that the shear strength of Velcro is affected by the number of times it is pulled apart "cycled", with the highest reduction in strength with 25 cycles.

**Help Received**
I designed, built (with the help of my father), and performed the experiments myself.