



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

<b>Name(s)</b> Amy L. Shoemaker	<b>Project Number</b> <b>J0222</b>
<b>Project Title</b> <b>Exploring Torque Using Pilot Holes in Wood</b>	
<b>Abstract</b> <b>Objectives/Goals</b> This experiment tested how different size pilot holes affect torque required to advance screws into wood. The effect of screws versus bolts, and maple (hard wood) versus pine (soft wood) on torque was also tested. <b>Methods/Materials</b> Different variables were tested to see what affects torque needed to advance a bolt or a screw into wood. The variables were bolts versus screws, hard wood versus soft wood, and eight different size pilot holes. The experiment was tested by advancing first a screw, then a bolt into the eight different size pilot holes in the first wood (pine soft wood) five times. Then the same steps were performed in the second wood (maple hard wood). This resulted in 20 tests for each pilot hole size, totaling in 160 tests. <b>Results</b> The results showed that torque required to advance screws and bolts depends on both pilot hole size and the type of wood, but not on a screw versus bolt. The results had a very linear relationship, ranging from about 0.17-1.80 Newton-meters in pine, and about 1.00-6.10 Newton-meters in maple. The largest amount of torque in maple was extrapolated (because it exceeded the torque wrench limit). <b>Conclusions/Discussion</b> It was hypothesized that the pilot hole size would affect the torque in that the larger the hole the less torque required. This was true, but the part of the hypothesis that stated that the wood type would have no effect as incorrect.	
<b>Summary Statement</b> This project tested how different size pilot holes affected torque required to advance screws and bolts into maple and pine.	
<b>Help Received</b> Father helped supervise for safety	