



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Alex L. Chang</b>	<b>Project Number</b> <b>J0205</b>
<b>Project Title</b> <b>A Study of Utilizing "Maglev" Base Isolation for Reduction of Structure Damage During an Earthquake</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this experiment is to apply magnetic levitation as a way of effectively minimizing structure shaking and displacement during an earthquake.</p> <p><b>Methods/Materials</b> A shaking table made of plywood and timber was constructed. A model building made of clay sticks, wooden dowels, and foam boards was assembled. The model building was affixed on a floating platform that was comprised of wooden planks with Neodymium magnets attached to the bottom. There were two series of experiments were conducted. The first series of tests subjected the building to shaking without the maglev base isolator. The second series of tests subjected the building to shaking with the maglev base isolator. The initial and final positions of the model building were compared.</p> <p><b>Results</b> With the levitation (base isolation) provided by the Maglev base isolator, the model building accumulated an average of 1mm and 1.6mm of lateral displacements at the second floor level and the roof level, respectively, after 5 cycles of induced shaking, and the shape of the model building remained relatively intact. Without the levitation (base isolation) provided by the Maglev base isolator, the model building did not survive more than 5 shaking cycles.</p> <p><b>Conclusions/Discussion</b> As clearly evidenced and supported by the results and data from the experiments, the Maglev base isolator indeed was able to separate the building from the underlying ground shaking, as opposed to the building founded directly on the ground. While the model building supported by the Maglev base isolator recorded an average 1 to 2 mm of lateral displacement at various points of the building after each experiment, the model building without the Maglev base isolator nearly collapsed after a mere 5 shaking cycles.</p>	
<b>Summary Statement</b> My experiment clearly demonstrated that "maglev" is a viable method of separating the building from ground shaking during an earthquake, thus rendering the building safe and minimizing the potential property and human losses.	
<b>Help Received</b> Dad helped with the building of the shaking table; Science teacher, Mrs. Driscoll, helped with editing my notebook.	