

Stop Building Damages Using Earthquake-resistant Supporters

The objective of this project is to find a solution to damages of buildings caused by earthquakes. Earthquakes have been making disastrous effects throughout the world. As a result, many people are losing their houses, schools, and places to work. From 1998-2017, over 800,000 people have died from earthquakes, and most of these people lost their lives from damaged buildings. Others experienced trauma-related injuries and losses. Areas where the ground consisted of high moisture would cause liquefaction, bringing great consequences.

To prevent further disasters, I proposed to design and test a supporter on the base of a building that would minimize the damage of earthquakes. Using TinkerCAD, I designed a 5 cylinder earthquake-resistant supporter, and printed it out with a 3D printer. I also designed 3 other prototypes with different shaped supporters, including a pyramid, rectangular prism, and 4 rubber shock absorbers. With a VEX robot motor that was coded to simulate an earthquake, the prototypes were tested in containers consisting of sand and water.

The 5 cylinder earthquake-resistant supporter would prevent the tilting, swaying, and sinking of the building. This would prevent big impacts of earthquakes on buildings, which would decrease death and injury rates by earthquakes. During testing, recorded in qualitative data, I found that the prototype was highly successful and met all of the requirements. The supporters trapped sand between its legs, which prevented that area from liquefaction, and left the building with no damage. This would help create a safer environment for people who live in areas where earthquakes occur frequently.

I would like to thank the Professional Engineers in California Government for awarding me the James E. Roberts Award at the 73rd Annual Los Angeles County Science and Engineering Fair of 2023. James E. Roberts is an inspiration for many young engineers through his achievements of making the highway safer.

I am very grateful to receive such an amazing award and be recognized for my hard work. As this was my first engineering project, I was able to have many new experiences. This award has given me confidence and enthusiasm to move forward in my future career as an engineer. I am honored that the design I made to help various people from earthquakes was recognized. I will definitely continue to work upon my solution to help people feel safer in their communities. Thank you so much for giving me and other students support and the opportunity to realize the greatness of engineering.