Magnetic vs. Electromagnetic Helmets

Diltz, Jackson (School: Westfield High School)
Bone, Eric (School: Westfield High School)

This project was intended to show how electromagnets could provide a better cushion when implemented into sports helmets. Considering previous testing, we decided to see if electromagnets would provide a better option to preventing concussions. Along with this, we created another design only using magnets to see if it performed better than other designs. We tested by using a Newton's cradle design. We hung two helmets on chains and put PVC piping around them. We measured by pulling one helmet back and releasing it from two different angles. We tested without magnets, magnets, and electromagnets. Our new design only used one helmet and we tested by dropping it from three different heights with and without magnets. The set-up for the magnets was modeled after an airbag-like contraption in hopes of increasing the time of impact. After a total of 60 trials, we took the averages and the standard deviation so we could put error bars on them. We found that the electromagnet was successful in being the most effective in reducing force of impact. We used this same idea to analyze the data collected from our new design, proving successful again. Based on our results, electromagnets have the potential to prevent damage to the brain when it faces a force. Although the electromagnets show promise, the size of the battery is not feasible in the design, so normal magnets have a better potential. Our new design is much more practical and the data collected showed that it was effective.

Awards Won: