CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
22294

Project Title
Electromagnetic Brakes

Abstract

Objectives/Goals
This experiment was designed to show the advantages and/or disadvantages of an electromagnetic brake (as compared to a friction brake).

Methods/Materials
A wheel was constructed by attaching a paper disc by an axle to a small motor. In the first part of the experiment, the wheel was covered with aluminum foil. A strong magnet was held up to the spinning disk of aluminum to induce an eddy current in the foil. The induced current opposed the motion of the disk, creating a brake like effect. Next, a mechanical brake was applied to the wheel to compare the braking efficiency.

The goal of the second part of my experiment was to create a generator from the electromagnetic brake. The wheel was covered diagonally with four strips of aluminum foil. Copper wire brushes at the terminals of a voltmeter made contact with the aluminum strips. As the wheel spun, the voltmeter measured any voltage in the strips. The magnet was applied to the wheel five times to test the amount of generated voltage.

Results
In the first part of my experiment, I was able to demonstrate a working electromagnetic brake. This brake consistently slowed the wheel faster than a friction brake.
In the second part, I consistently measured an output of over 11 millivolts.

Conclusions/Discussion
My experiment showed that an electromagnetic brake would be very advantageous, as it has great braking efficiency and has the potential to regain energy lost in braking. When used in a large vehicle, these regenerative brakes could generate large quantities of electricity to be re-used by the vehicle, instead of being lost as heat. Furthermore, these electromagnetic brakes would reduce break wear, a common problem with many cars.

Summary Statement
This project demonstrated the feasibily of a regenerative electromagnetic brake.

Help Received
Father helped solder wires and took me to a surpluss store to pick out materials.