CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Fletcher T. Matthews

Project Number
J0925

Project Title
Spin Right 'Round with Electric Motors

Abstract

Objectives/Goals
The amount of energy that industrial nations are using continues to increase. Making electric motors more efficient would help reduce the use of energy and help the environment. My objective was to investigate different wire diameters in the coil of the electromagnet in an electric motor to determine if a larger diameter wire will produce a stronger electromagnet. This should result in a faster more efficient electric motor. Based on Ohm's law, I hypothesize that the larger diameter wire will have less resistance and will produce a faster electric motor than a smaller diameter wire.

Methods/Materials
I first built a simple electric motor. I then built three different wire coils for the electromagnet using 25, 27 and 29 gauge copper wire but kept the length of the wire the same for the coils. I then tested the electric motor with each different electromagnet and measured the rotations per minute of the armature. I repeated the test 10 times for each different electromagnet.

Results
The electromagnet with the largest diameter wire (25 gauge) consistently spun the electric motor the fastest over the smaller diameter wire.

Conclusions/Discussion
My conclusion is that the larger diameter wire used in the electromagnet coil produces a stronger electromagnet and a more efficient electric motor than the smaller diameter wire. The wire gauge used in the electromagnet coil is an important factor in electric motors. This experiment supports Ohm's law that a larger diameter wire has less resistance and results in a faster spinning electric motor. For stationary motors such as washing machines and air conditioners, using the larger diameter wire should produce a more efficient electric motor. However, for electric motors used in moving vehicles where weight is important, the extra weight with a larger diameter wire for the coil may not prove beneficial.

Summary Statement
Does using a larger diameter wire in the coils for an electromagnet produce a stronger electromagnet which results in a more efficient electric motor than smaller diameter wire in the coils.

Help Received
My mom helped record the data and helped me type my report. My dad helped me build the electric motor. Finally my mom and dad helped me understand the concept of electromagnetism.