CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)

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Project Number

22048

Project Title

Motors, Motors & More Motors -- Original Electric Motor Designs

Abstract

Objectives/Goals

Electric motors are being used more due to increased demand for cleaner vehicles, energy and technology. Standard electric motors are only about 30% efficient, leaving significant room for improvement. Highly efficient electric motors need to be designed. In response to this problem, I created and built somex innovative designs. I predicted my original motors would be more efficient than the standard design, and Motor 4 most efficient.

Methods/Materials

I tested the models of my designs by comparing them to a model I also built of a basic electric motor with magnets around electromagnets, a commutator and brushes (Motor 1). Motor 2 has brushes and a commutator, but I placed magnets at both sides of the electromagnets. Motor 3 is a new brushless design with circuitry and a magnet switch. Motor 4, a simpler brushless design, has perpendicular magnets and a magnet switch. My main test method involved measuring speed, power in and power out as each model lifted weights with string and a smart pulley.

Results

Motors 2 and 3 proved more efficient than the standard electric motor, represented by Motor 1. Motorx tested least efficient. The first part of my hypothesis was correct. The second part regarding Motor 4 could not be verified.

Conclusions/Discussion

At least two of my designs will improve the efficiency of the electric motor when manufactured and refined using top quality industrial materials. Motor 4 requires a different type of magnet (rectangular bar-shaped instead of circular disk) to operate efficiently since its magnets are perpendicular to tx electromagnets. My design innovations are effective for many current and future applications, including electric-powered vehicles and conversion of gas-powered vehicles to electric.

Summary Statement

I designed, built and tested models of three new electric motors, compared with a similar standard control model, to improve efficiency of the modern motor.

Help Received

Mother helped type report; Parents helped connect board; Used lab equipment at Mount Everest Academy under the supervision of Mr. Jim Edwards.