CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
J0109

Project Title
The Effects of Blade Size and Shape on the Electrical Output of a Generator

Abstract

Objectives/Goals
My objective was to determine what effects windmill blade size,shape and angle placement has on the generation of electrical energy. I hypothesized that the small trapezoidal blade would be the best energy producer.

Methods/Materials
Materials: One windmill-wooden base with triangular shaped sides,One Amp Meter,One Fan,One Tape Measure,One Electrical Motor,24 Square Blades(3 sizes),24 Rectangular Blades(3 sizes),24 Trapezoidal Blades(3 sizes)& 24 Triangular Blades(3 sizes).

Experimentation Methods:
a) Build the windmill
b) Attach the motor & amp meter to the windmill
c) Cut out 96 blades(4 shapes-3 sizes for each shape)
d) Place the fan one meter from the blades of the windmill
e) Set the angle of the blades on the windmill hub to 75 degrees
f) Turn the fan on medium
g) Read the voltmeter and record the amount of electricity produced
h) Repeat steps D-G using the different sizes and shapes of blades
i) Repeat steps D-G but setting the angle on the windmill hub to 45 degrees and 60 degrees
j) Use the recorded data to prepare graphs to display results

Results
I observed that the smaller, lightweight blades placed at a 45 degree angle produced more energy. Blades placed at a 75 degree angle consistently produced less energy.

Conclusions/Discussion
In conclusion, I found my original hypothesis to be incorrect in that the Square and Rectangular shaped blades were more efficient energy producers rather than the trapezoid that I had originally theorized. Of the four shaped blades, the Triangle was the lowest producer followed by the Trapezoid. The Square and Rectangle were higher producers and had very similar test results. My final results show that the small Square and Rectagular shaped blades placed at a 45 degree angle were the most efficient producers of electrical energy.

Summary Statement
My project is about measuring electrical output when using various sizes, shapes and angle placement of windmill blades.

Help Received
Father-Collected/organized materials & assisted with testing. Wilson Wang-Assisted in buiding windmill. Kevin Sill-Technical advisor/assisted with testing. Antone Natale-Provided motor. Christine Voe-Cut out blades. Vanessa-Cut out blades. Mother-Assisted in collecting data, reports & display board.