Wind Power II

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Objective: Design a wind turbine that generates power from a moving air mass

Rules:

- A team may enter only one turbine.
- Turbine blades may be made out of any material. No turbine blades, propellers or other materials commercially designed as foils may be used. Blades are intended to be student-built. Wind tunnels or other non-rotating structures intended to focus the moving air mass are not allowed.
- Turbines will drive a single standardized electric motor. This is the same motor as the one supplied for last year's event: "Wind Power". Replacement motors may be purchased (cost $3 plus shipping) at: http://www.kidwind.org/xcart/product.php?productid=15&cat=79&page=1.

- The motor must remain in its original condition.
- The moving air mass will be created by a 24" box fan. The fan will be turned on the high setting.
- Teams may use gears, pulleys and transmission(s).
- The standard dc motor will be connected in series with a 100-ohm resistor (provided). Voltage and current across the resistor will be measured to determine power generated by the turbine. (Please take care to keep the motor leads intact so they can be connected to the meters.)
- Average power generated (Power = Voltage x Current) will be taken from a power vs time graph collected by the event runner.
- Aside from the fan, teams may not use any additional sources of energy during data collection. Power generated from any source other than the moving air mass will not be counted. (i.e., you can't have something else, like a battery produce power. You can only use the air coming off the fan.)

The Trial:

- Teams will have two minutes in which they can prepare their turbine for trial. Teams will need to complete the circuit connecting the resistor in series with the turbine motor and insure that the voltmeter and ammeter are connected properly.
- Teams may set the distance the turbine rests from the fan, but the turbine and fan must be free-standing during data collection.
- Teams will have a total of one minute in which data may be collected. The minute will be broken into two 30-second intervals.
    - During the first 30 seconds teams may adjust their turbine, observing the power generated and making adjustments.
    - During the final 30 seconds final power data will be collected. Teams may not touch their turbines during this time.
    - All circuitry will be grounded between the two intervals.
- The average power will be the statistical mean of the power generated during the final 30 seconds.
- Teams will be ranked according to the power generated, from most to least.
- Judges may grant additional time for data collection if the event runner(s) have technical difficulties.

Additional Information:

Kidwind has a number of resources that may help you to understand wind energy and how to better harness it. http://www.kidwind.org/lessons/students.html

Sample Data: