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## Design Brief for the Wind Generator

**Wednesday 11/2/11**

Make Groups

Assign Motors

Begin Building Proposal

### **Situation**

Fossil fuels such as oil and coal are *nonrenewable*, that is, they draw on finite resources that will eventually dwindle, becoming too expensive or too environmentally damaging to retrieve. In contrast, *renewable energy* resources – such as wind and solar energy – are constantly replenished and will never run out. Most renewable energy comes either directly or indirectly from the sun. Wind Turbines have a long history and they date back to the ancient times. They have been used through history and they are still in the process of development. Windmills may be used to do a work such as grinding grain into flour or pumping water out of a water well. They may also be used to create electricity.

### **Problem**

Design and be able to predict the amount of power that your Wind Generator will produce at different wind speeds. Construct and test your design then check performance against your predictions including the maximum power efficiency. (Amount of power compared to the amount of power your motor can produce.)

## Design Constraints

Your solution may use a variety of materials, but it must:

- attach to the base that we will provide
- have two wires from the generator that can be hooked up to a voltmeter
- have no design which is unsafe or hazardous
- have a turbine that is aerodynamic to reduce air friction
- maximum blade diameter 2 M minimum 1M

## Competition

Students must work in groups of 4 or 5. The contest is based on two different outcomes. First, the group that is nearest to its predictions and the second is the group that produces the most power efficiency).

## Before Construction Checklist The proposal will need to include: (Due 11/4)

1. List possible solutions to the problem (brainstorming):
2. Complete sketches of possible solutions
3. Which solution is the best (circle solution chosen)?
  - A. Complete all the calculation of your design
    - Motor output
    - Find wind speed averages for this area
    - Swept Area
    - TSR
    - CP
    - Materials list
    - Rational for your design
4. Complete an orthographic drawing in AutoCad of your solution (CAD drawing for windmill and housing for the motor). This drawing **MUST** be approved by the instructor **PRIOR** to constructing the Wind Generator.
5. Construct your Wind Generator. (Blade completion and mounting)  
**(Due 11/16)**
6. Make test runs. Initial testing **(11/16)**

7. Make any modifications.
8. Compete with class.
9. Written component will need to include: (11/17)  
You will need a detailed description of the efficiency of your wind turbine and any changes that would need to be made to become more efficient. Also, a detailed description with pictures of the construction and engineering. Also, include a description of the challenges that your group faced during construction.
10. Sales Presentation (11/21-22)  
Sell your wind turbine and you company to a group of prospective buyers or investors.

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**Pre-Competition Day**

WS Wind

**Competition Day**

1. How much power did your Wind Generator product( different wind speeds)

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2. Did your Wind Generator perform well? Why or why not?

3. What improvements could you make to enhance your Wind Generator's performance?

Comments (overall evaluation of your experiences; explain):

