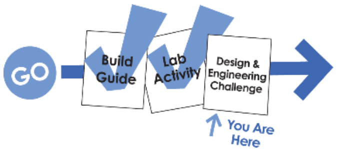
Mini Wind Turbine Engineering Challenge

Name: ____ Set: _____________



The Challenge

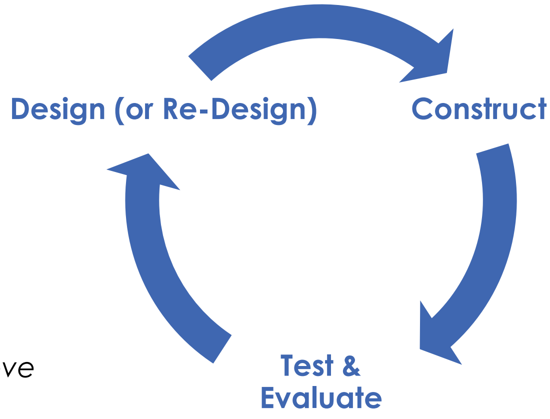
Engineer a mini wind turbine with the greatest output.

Criteria:

1. Only components from the TeacherGeek Mini Turbine kit may be used, as well as approved blade materials.
    a. Blades may not be:
        i. *Premanufactured (purchased in the shape they are used)*
        ii. *Dangerous*
        iii. *Metal*
        iv. *Sharp Edged*
2. Safety glasses must be worn when testing wind turbines.
3. Turbine must be tested 50cm (20in) from the teacher provided fan. Fan speed, angle and direction may not be modified.

Engineering Process:

The engineering process will be used to evolve your wind turbine through revisions (design changes). Scientific testing will provide data to engineer the ultimate turbine.



1. **Design:**
    a. ***Research:*** *Analyze your current design and test data. Explore science that makes it work. Study existing designs and concepts.*
    b. ***Identify a Problem:*** *Use your Research to identify an area where your turbine can be improved.*
    c. ***Generate Possible Solutions:*** *Come up with creative ideas that could solve the problem.*
    d. ***Choose the Best Solution:*** *Select the solution you believe will best solve the problem.*
    e. ***Plan:*** *Create drawings, identify materials & processes required to construct the solution.*
2. **Construct:** Create the mini turbine, or turbine revision according to your design plan.
3. **Test & Evaluate:** Evaluate the wind turbine and solution. Did your last revision work well? What can be improved? No design is perfect. Your wind turbine can always be improved.
4. **Repeat (Redesign):** Engineer a solution to the problem(s) identified in the evaluation. Create a new revision.

Don't worry about having a design "flop". Spectacular design revisions often follow "flopped" designs (you can learn a lot from a "flop"). Challenge yourself to create unique designs.

Mini Wind Turbine Engineering Challenge

TeacherGeek

Getting Started

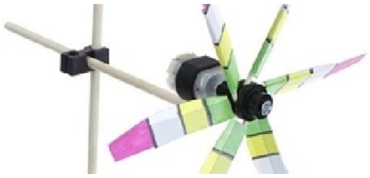
1. Redesign your basic wind turbine using an Engineering Note page:

Engineering Notes

Revision #: 1 Name(s) Wind eaters

Description: 6 Blade Design Complete a new note page for each design revision.

2. Construct the new design.



3. Test the design. Record your test data in the test record, and on the engineering note page:

Test Record

Class: Science 8 Fan Distance: 1M Sheet #: 1

Test each design revision up to two times (A & B):

Team/Name	Output							
	Design Rev. 1		Design Rev. 2		Design Rev. 3		Design Rev. 4	
	A	B	A	B	A	B	A	B
Example: Wind Eaters	1.2v	1.13v	2.11v	2.13v	1.92v	1.80	2.37	2.34

4. Evaluate the design based upon test performance, observations and research:

Output: 1.2v Revision Evaluation: Not great. A blade broke during testing. We need a new blade material.

Next Problem/Challenge:
Broken Blade: Redesign with a stronger material

5. Redesign (create a revision) to overcome the problem(s) identified by the evaluation.

Engineering Notes

Revision #: 1 Name(s) Wind eaters

Description: 3 Blade Design Complete a new note page for each design revision.

6. Redesign, Repeat.

Mini Wind Turbine Engineering Challenge

TeacherGeek

Evaluation Rubric

Name: ____

Set: ______________ Date: ______________

Criteria: 10pts

How well does the turbine fit the competition criteria?

0 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10

Use of Time: 15pts

How much productive time did you spend working on the challenge? Did you work until the time ran out? Did you work extra hours (for bonus points)? Regular Points= 0-15. Bonus Points= 16-18.

0 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → 11 → 12 → 13 → 14 → 15 → 16 → 17 → 18

Revisions: 15pts

What was the quantity and quality of your design revisions?

0 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → 11 → 12 → 13 → 14 → 15

Innovation: 20pts

How unique and creative was your design and revisions? Regular Points= 0-20. Bonus Points= 21-15.

0 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → 11 → 12 → 13 → 14 → 15 → 16 → 17 → 18 → 19 → 20 → 21 → 22 → 23 → 24 → 25

Performance: 15pts

How did your turbine output compare to the output of other turbines in your class? Higher Output = More points.

0 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → 11 → 12 → 13 → 14 → 15

Documentation: 15pts

Did you carefully document the engineering process using note sheets?

0 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → 11 → 12 → 13 → 14 → 15

Spirit: 10pts

Did you demonstrate energy and enthusiasm for the project? Were you cooperative and helpful to your teammates and competitors?

0 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10

Student Provided Score (Self-Score): ☐

Teacher Provided Score: ☐

Mini Wind Turbine Engineering Challenge

Test Record

Class: ____________________________ Fan Distance: __________ Sheet #: _________

Test each design revision up to two times (A & B):

Team/Name	**Output**							
	Design Rev.		**Design Rev.**		**Design Rev.**		**Design Rev.**	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	Design Rev.		**Design Rev.**		**Design Rev.**		**Design Rev.**	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	Design Rev.		**Design Rev.**		**Design Rev.**		**Design Rev.**	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	Design Rev.		**Design Rev.**		**Design Rev.**		**Design Rev.**	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	Design Rev.		**Design Rev.**		**Design Rev.**		**Design Rev.**	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	Design Rev.		**Design Rev.**		**Design Rev.**		**Design Rev.**	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**

Engineering Notes

Revision #: _________ Name(s) ____

Description: ____ *Complete a new note page for each design revision.*

Output: ______________ Revision Evaluation: ____

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Next Problem/Challenge:

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