CASE

# Engineering Process Template

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| **Name: Mike Braithwaite and Tanner** |
| **Title: Bernoulli's Blades** |
| What is the name or title of the problem for your report? |
| **Problem** |
| What is the problem you are trying to solve? Harness the potential energy of the wind into kinetic mechanical via a wind mill. |
| **Requirements** |
| What requirements have you determined are needed to solve the problem?<br>Design a new and improved windmill using Bernoulli's Principle. Observe a demonstration on how to assemble and operate your model windmill. Then work in a group to construct windmill blades and test them using the windmill. |
| **Solution** |
| What is your solution for the problem? Describe your prototype.<br>We built a wind turbine. |
| **Materials for Prototype** |
| • Per group of four students:  KidWind® Advanced Wind Experiment Kit o 8 small screws o 1 wood tower o 1 center hub o 1 locking disk o 3 legs o 1 nacelle o 1 drive shaft o 1 spool o 1 hub quick connect o 2 hex locks o Blade protractor o Hex nut<br>•<br>•  Computer with Internet access  20″ box fan  Poster board  Scissors  Hot glue gun  Hot glue sticks  Scotch tape  Various tools for blade construction  LabQuest2  Vernier rotary motion sensor  Phillips screwdriver |
| **Procedure for Building Prototype** |
| 1. Research blades<br>2. Design blades<br>3. Draw out blades on balsa wood and cardboard<br>4. Cut out blades<br>5. Glue strips of balsa wood to the balsa blade<br>6. Attach cardboard blades to wood blades<br>7. Glue wooden dowels to blades<br>8. Construct tower (Part 1)<br>9. Attach blades to the tower |

10. Attach LabQuest
11. Use fan to test RPMs of turbine.

## Test and Evaluation

Explain how you will test your prototype to determine if it meets your criteria.
We tried the angle of the blades in order to get the best use of energy.

## Analysis and Results of Tests

Explain your results of testing your prototype. Be descriptive and complete in your discussion.
The wind caught the blades nicely and had a max RPM of 111. The blades worked nicely with some minor adjustments of the blade angle.

## Conclusion

Based on the results, what inferences can you make? Describe how your prototype did or did not meet your set criteria. What were possible sources of error? What new design problems or solutions arise based on your results?
Our prototype did a great job at RPMs. With some adjustments, it increased from 88 RPMs to 111 RPMS. We did have a minor issue with having the blades spin clockwise instead of counter clock wise. That had a challenge to attach the sensor. The lift could have been increased with additional blade adjustments.