CASE

Engineering Process Template

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Title:

Bernoulli's Blades

Problem

We are trying to surpass our instructor's RPM of his blades by designing a blade that can spin faster.

Requirements

We need the following: windmill tower, LabQuest2, RPM sensor, cardboard, dowels, tape, and hot glue

Solution

Our prototype was constructed using cardboard as the blades, the doewls to hold on the blades to the system, and a fan to test the prototype.

Materials for Prototype

- Dowel
- Spool
- Cardboard
- Skewers
- PVC pipe
- Hot glue
- Tape
- Angle measurer

Procedure for Building Prototype

1. Cut the blades to resemble an airplane wing
2. Glue the blades to the dowels
3. Angle them correctly using the angle measurer
4. Test the prototype using the fan and the RPM sensor
5. Clean up materials

Test and Evaluation

We will place it in front of the fan and turn it on low. If it spins, we will know that the prototype works. We will continue to tweak the angle of the blades until we have a desired RPM.

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Analysis and Results of Tests

At first, our windmill did not spin. The blades were flapping and did not rotate the machine. We decided to angle the blades at 40 degrees. This helped the blades pick up the wind better. This was effective, and we were able to get our windmill to turn at 106 RPM.

Conclusion

At first, our prototype did not work. After tweaking the blade angles, it began to spin a little more. It was important for us to make sure the blades were all at an equal angle, and using the angle tool helped with this. Since we only had 3 blades, we had to space them evenly apart along the spool. All of those factors helped us get 106 RPM, one of the fastest in the class.