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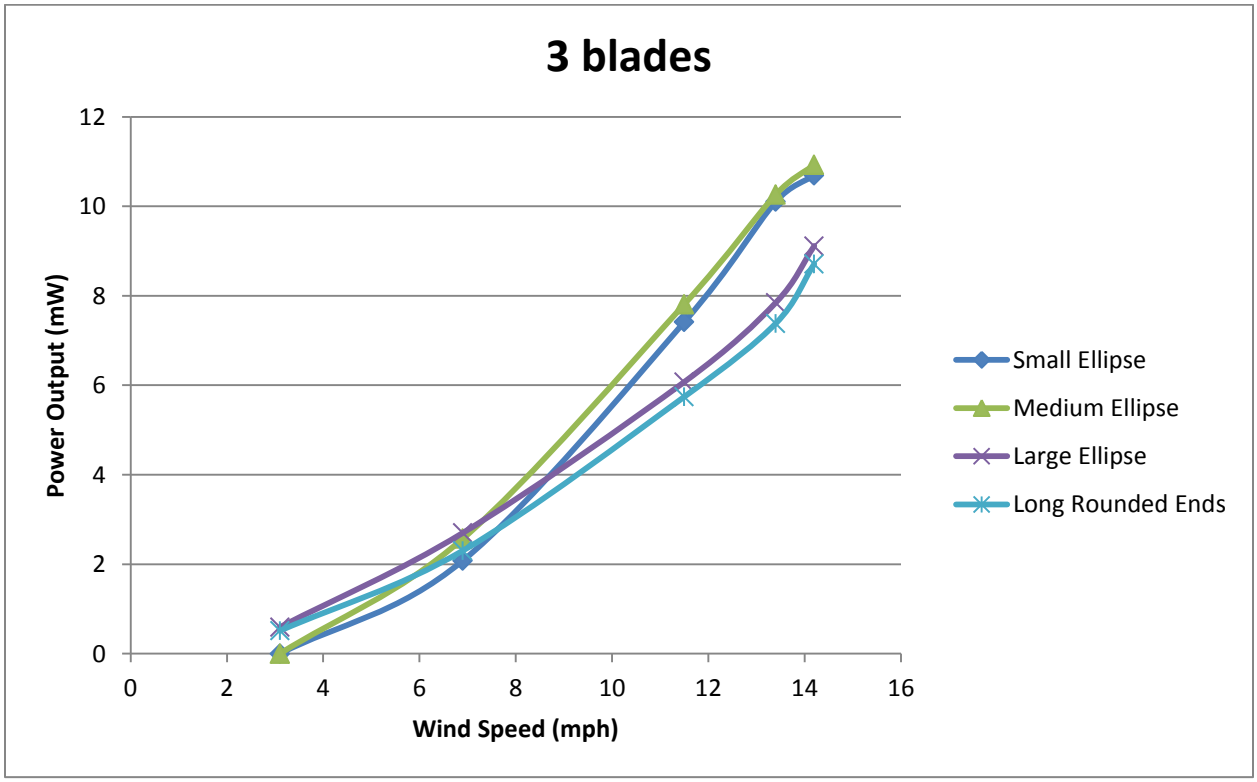
Objective: Analyze the power generated from various blade shapes and lengths. We tested these blades under two categories: three blades and six blades. Our tests were performed with a constant pitch of 15 degrees.

Procedure: The blade designs tested were small ellipse, medium ellipse, large ellipse and long rounded end flat sides. From hub to tip, the span was 7 inches for the large ellipse and long rounded, 4.75 inches for the medium ellipse, and 3.5 inches for the small ellipse. The chord length was 2 inches for all blades. We tested each configuration with three blades and six blades. A total of eight unique blade arrangements were tested.



3 Blades We found that at the lowest windspeed of 3.1mph, the medium and small ellipses did not have any power, while the large ellipse and long rounded ends shape had about the same power of about 0.5mW. The trend was upward, and at the highest windspeed of 14.2mph, we observed that the small and medium ellipses had the greatest power at 10.69mW and 10.92mW, respectively. The large ellipse had a power of 9.11mW and the long rounded ends had power of 8.71mW. This differed from the six-blade test, in which the small and medium ellipses still had

the greatest power, but so too did the large ellipse. The power estimates for the different shapes of the three-blade test were also not as similar as the six-blade test. Overall, however, six blades was not as effective, since the highest power reached by the small blade of the six blade trial was only 8.20mW.

6 Blades: We observed that at the lowest wind speed of 3.1 mph, the small ellipse did not have any power output, the medium and large ellipses had a power output of about 0.4 mW, and the long rounded end blade had the greatest output of 0.5 mW. The power output increased as wind speed did, and at the greatest windspeed of 14.2 mph, the small ellipse ended up having the greatest output with 8.2 mW. The large ellipse is second with 8.0 mW, the medium ellipse is 7.9 mW, and the long rounded end blade is 7.6 mW. This shows that as the wind speed increased, the small blade, while having the lowest output in the beginning, ended up overtaking the rest in power output at the end. This is the opposite of what happened with the long rounded end blade. This blade started out with the greatest power output, yet at the end had the lowest.

Conclusions: It is apparent that these graphs show a fairly consistent testing process, since all of the data is within an acceptable range. The data tends to show that at the wind speeds that we were able to test we were only able to see the very beginning of the logarithmic power curve. The slope of the smaller blades starts out higher than that of the bigger blades but the slopes tend

to flatten out while the bigger blades have a slope that continues to increase. This trend leads us to believe that at higher wind speeds the larger blades would have a higher productivity.

For the speed range we have in the lab, the best blade configuration is three blade test with the medium ellipse shape, as it produced a maximum power output of approximately 11 mW at 14 mph.