

SUSTAINABLE CAPSTONE PROJECTS (SCAP)

Design And Testing Of An Experimental Wind Turbine

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INTRODUCTION

By building a wind turbine from scratch, one can better understand the limitations regarding design as well as the effect of different parameters on the power production of the turbine.

Once the turbine is constructed, tests will be conducted to determine the power curve of the turbine and its efficiency to convert the kinetic energy of wind to electrical energy. The now functional wind turbine will have different aspects changed and the power curve will be remade to adjust to the new changes.

FINAL PRODUCT

The turbine is functional, with the blades being replaceable with the blades of any fan lying around at home. When the blades rotate, so do the magnets and since they are around a set of copper coils which induces a current and produces power. The wires are exposed for any connection but are not dangerous at all since the power output is very low. The configuration of the blades determines the maximum power output and at which wind speeds that power is reached. Sustainability was the aim of the project and that was absolutely accomplished, with a broader set of materials and learning from what we have accomplished this project can be easily improved upon.

RESULTS AND DISCUSSION

The turbine only barely managed to power an LED unit, capping at 0.8V, when running at its maximum power production which was hard to capture as the power output would significantly drop moments after. The largest limitation with the turbine ended up being the size of the rotor, not only limiting the power output but the other factors that may have been tested such as the presence of a gearbox. If given a second attempt, the turbine would be built on a larger scale with better parts and a more effective magnetic layout. The previously mentioned limitations would have been remedied and, with more results a better model can be created to give a larger range of solutions.

MATERIALS USED IN CONSTRUCTION

Re-Used/Recycled Materials:

- Fridge Magnets
- Fan Stand
- Fan Motor
- Fan Blades
- LEDs from old computers

Other Materials:

- Testing Apparatus

CONCLUSIONS

All in all the project provided a lot of valuable information on the effects of different parameters on power production with enough data collected to effectively model an accurate equation despite its limitations. The SCAP program allowed us to gain inspiration from our fellow colleagues and opened our eyes to the possibilities available to us thanks to this program, without the university's support for supplies and ideas this project would not have been possible.

REFERENCES

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3. ENR 312 Lecture 4 Notes - Asst. Prof. Dr. Neyre Tekbiyik Ersoy
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Figure 1. Turbine

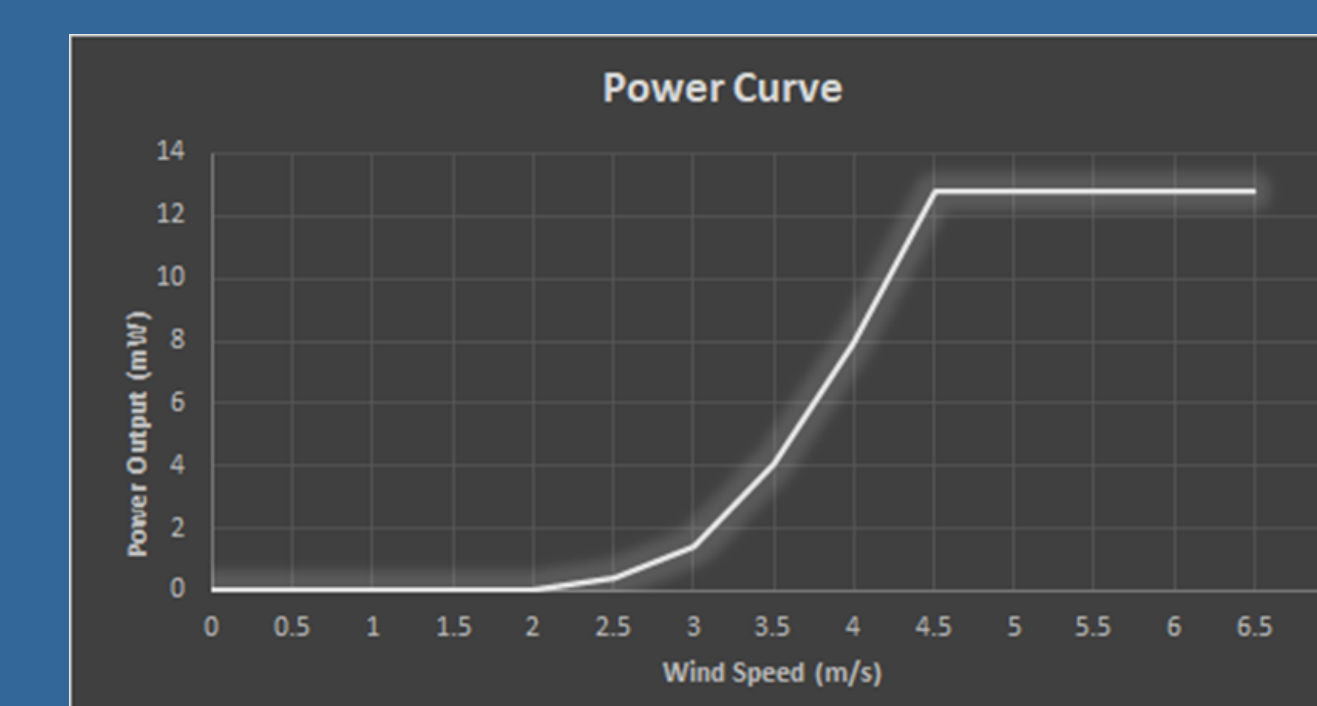


Figure 2. Power Curve