Abstract

In today’s society there is a global push to become more sustainable. A major focus in this pursuit is to increase green energy. Wind power is one of these underutilized solutions, offering unlimited power with little cost to the environment. However, concurrent wind power comes with major problems, namely turbine inefficiency. This project focused on designing a tubercle array on the leading edge of turbine blades to maximize efficiency. In order to test which design maximized efficiency, we used a base CAD model to which different tubercle designs were added. These were then tested in a simulation software called Solidworks Flow to determine the increased efficiency.

Conclusions

Two of the major impacts of our project are the increased energy production produced by wind turbines and applications of wind turbines to other blades. By increasing the efficiency of wind the blade our project has the potential to increase the effectiveness of wind energy. By increasing the amount of wind energy dependence on other power sources, such as coal and oil could be decreased. This would mean a decrease in the dependence on foreign resources and thus an increase in national security. Our project, while it was designed for wind turbines, could feasibly be applied to any rotary air foil such as fans or helicopter blades. It also has the potential to improve static airfoils such as plane wings.

Acknowledgements

InVentus 2.0 would like to formally thank Prof. Diran Apelian for his support and guidance in the project, Prof. Fred Looft for his help on calculating power output, Prof. David Olinger for his assistance with the wind tunnel, Erica Stults for her aid with rapid prototyping, and Adrianna Hera for her assistance with CAD.

References