Designing an Efficient Propeller by Prototyping With 3D Printing

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Humanity’s carbon emissions have started to affect the global climate. In order to reduce this impact, we must dramatically reduce carbon emissions in all sectors. In aviation, increasing the efficiency of the propulsion system directly reduces the amount of energy needed to power it. This would directly result in fewer fossil fuels being burned. In my engineering project, I attempted to design an efficient air propeller. I modeled my initial designs in SolidWorks and 3D printed them. I then evaluated the efficiency of each propeller in a static test while measuring the generated thrust and current draw at 3 different rotational speeds. After analyzing the results, I implemented changes in order to improve the efficiency. I focused mainly on changing the profile of the propeller blade and kept all other factors constant. After my testing and iteration, I created a propeller that was half the efficiency of an injection molded propeller I had bought. Due to this result I concluded that I did not fully meet my goal of making an efficient propeller. I believe the main factor that led to this result was not implementing an airfoil into the profile of my propeller designs. My design does not seem like it could be improved much further without a complete redesign. The project did support the value of 3D printing in prototyping aerospace components. I was able to rapidly redesign and have my propellers precisely printed within a few hours.

Awards Won: