

FABRICATION OF LIGHT WEIGHT FUEL CELL COMPONENTS FOR DRONES.



#4 | Fuel Cell Systems - TRA 275 | Mechanics & Maritime Science - Chemistry & Chemical Engineering

INTRODUCTION

Drones, frequently driven by electric motors, can benefit from the use of fuel cells. Fuel cells provide enhancements in both range and immediate power for demanding maneuvers.

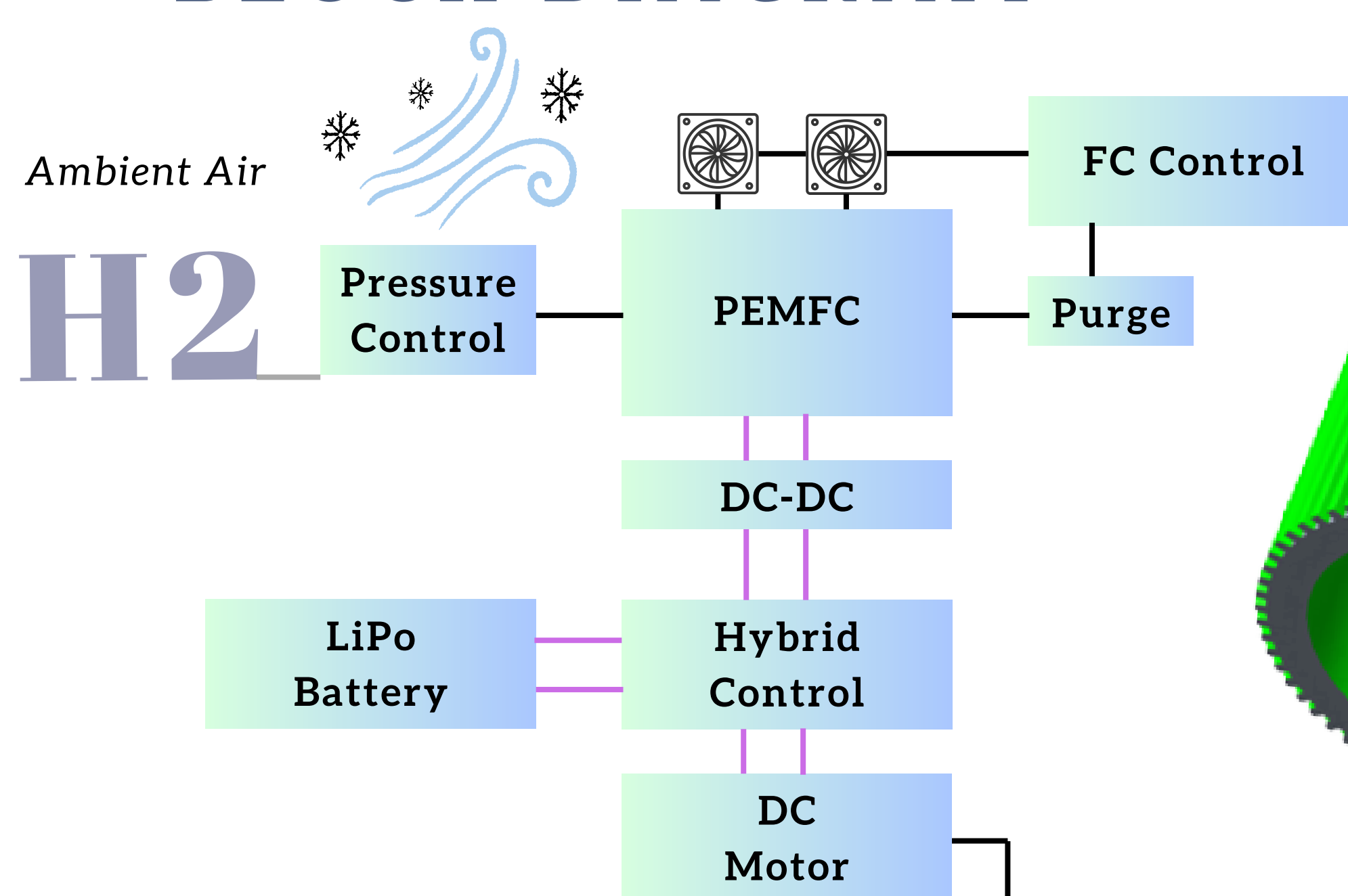
SCOPE

In the future, this project will refine and enhance the lightweight fuel cell components designed for Uncrewed Aerial Vehicles. The primary goal is to improve efficiency by researching advanced materials.

METHODOLOGY

- Literature Review
- Need Analysis
- Material Selection
- Design & Development
- Fabrication

BLOCK DIAGRAM

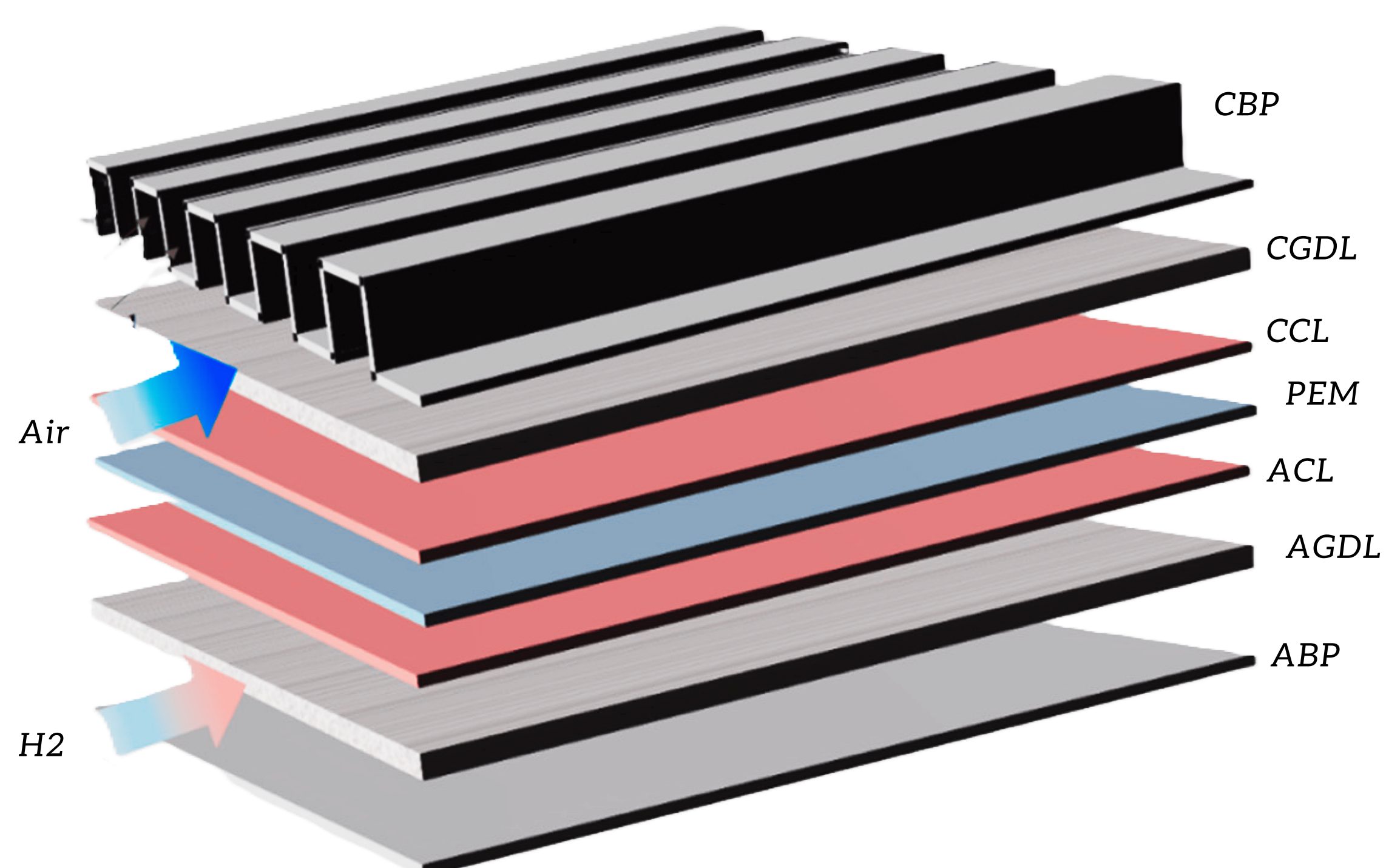
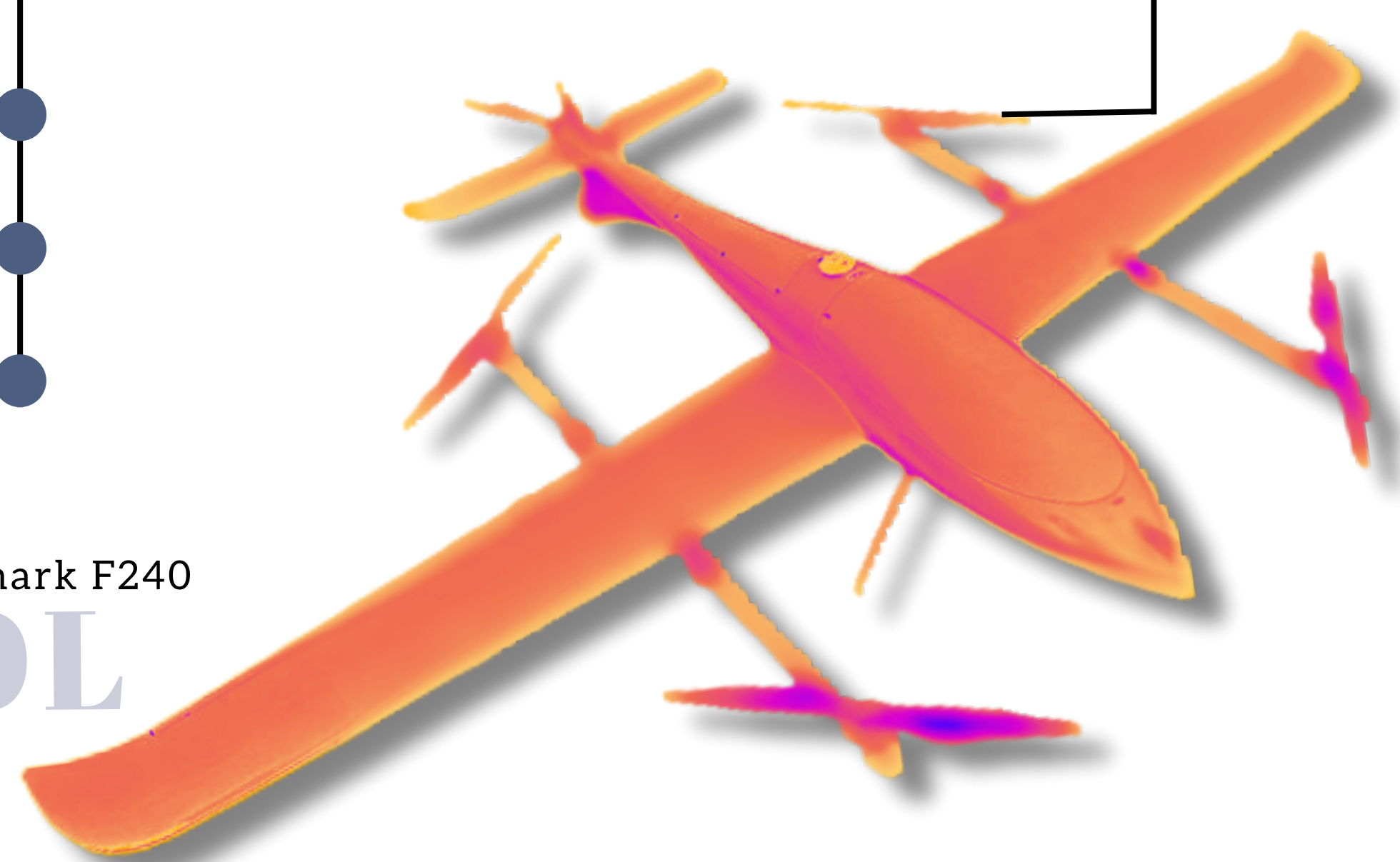


APPLICATIONS

- Surveillance
- Search & Rescue Operations
- Mapping & Surveying
- Scientific Research
- Delivery

Bionic Blue Shark F240

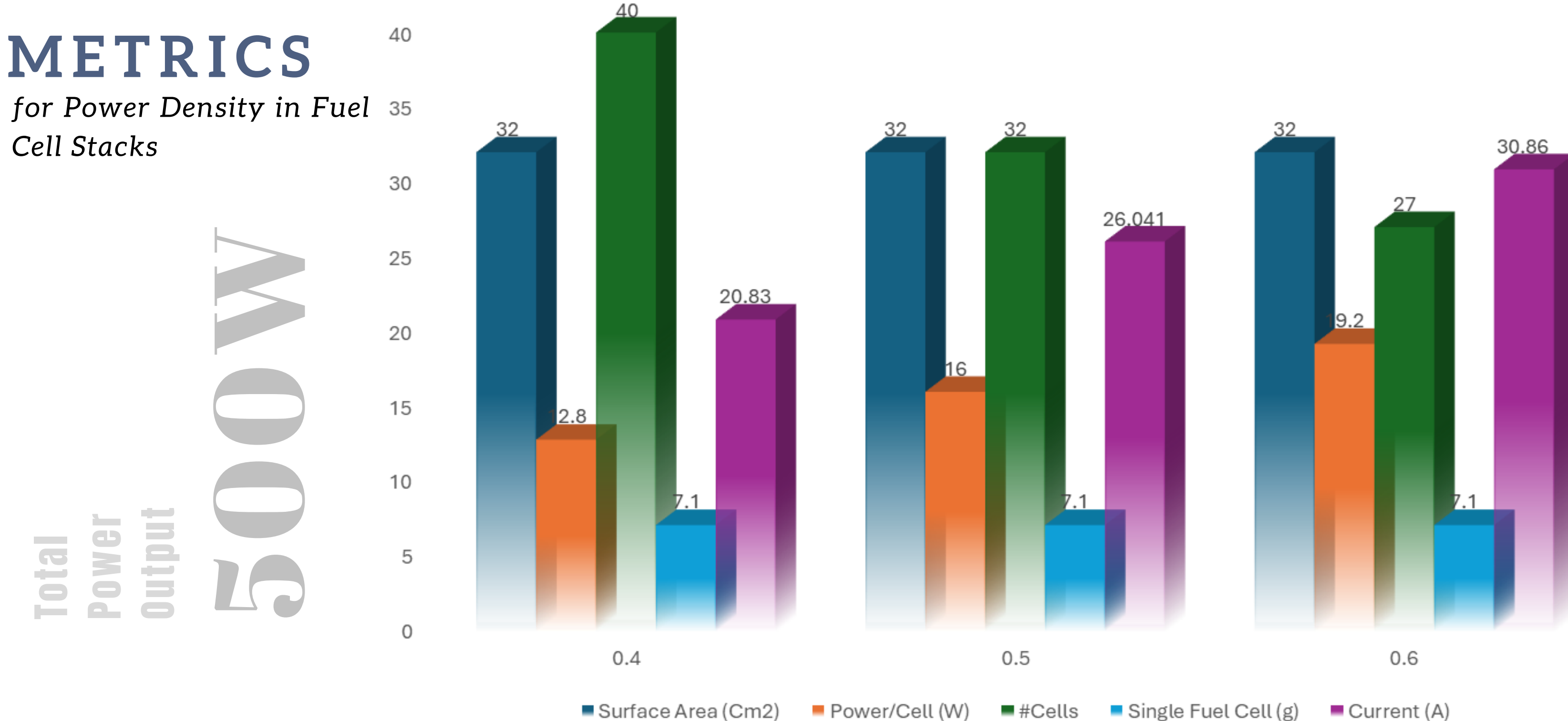
VTOL



FUEL CELL STACK ASSEMBLY

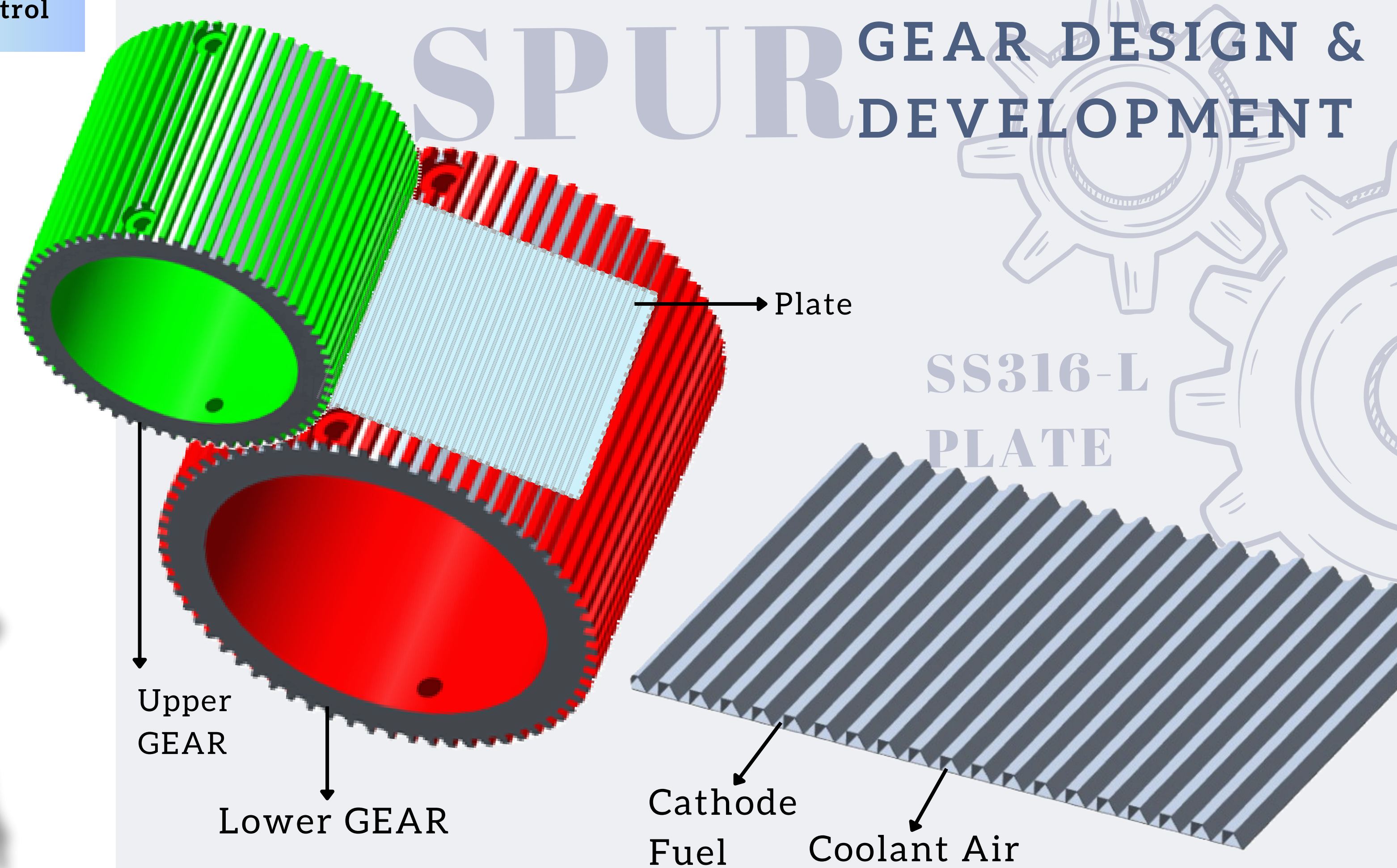
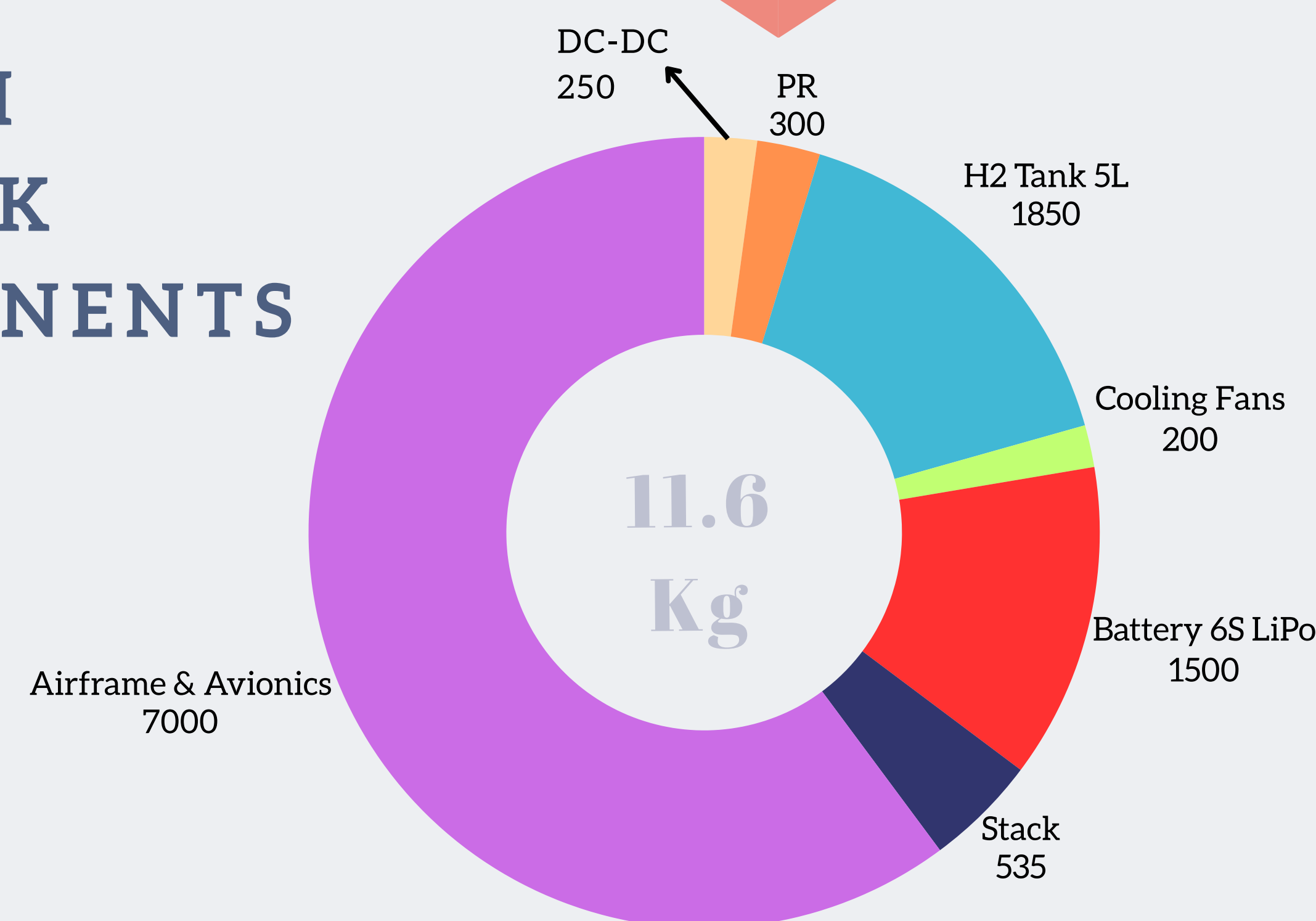
PERFORMANCE METRICS

for Power Density in Fuel Cell Stacks



SYSTEM & STACK COMPONENTS

Unit = Grams

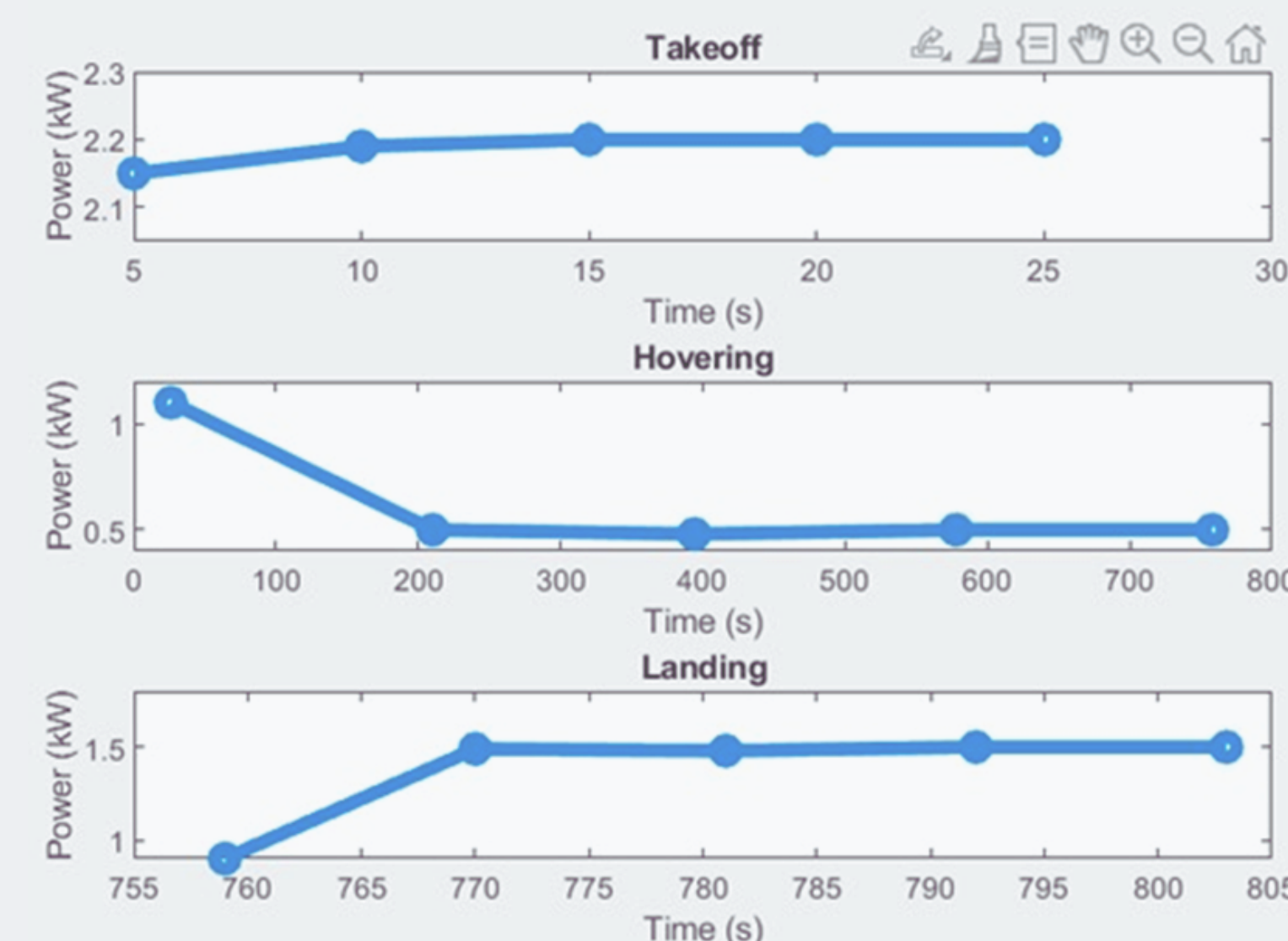


DISCUSSION & LEARNINGS

Plate Fabrication: For making plates, lightweight materials like SS316L are chosen because they are: Highly resistant to corrosion, Low in carbon content, Strong and good conductivity and Easy to weld.

Fuel Cell Stack Weight Optimization: Balancing the stack's power output and weight involves: Determining the optimal number of cells for a given area. Calculating the power required per cell based on the performance needs of unmanned aerial vehicles (UAVs).

Establishing the cell voltage and current necessary for designing the fuel cell stack. These factors play a key role in minimizing the weight of a fuel cell stack



CONCLUSION

This project successfully developed lightweight fuel cell components for drones, including lightweight bipolar plates. By optimizing weight while preserving performance, we significantly extended drone flight times compared to battery-powered models. Further research and development are needed to improve these lightweight components, such as bipolar plate materials and manufacturing techniques. Our project's success paves the way for a future where drones have greater range, adaptability, and potential sustainability.