

# Horizon Hoverboards

## DEVELOPMENT OF A CONSUMER-GRADE LEVITATING HOVERBOARD

### TEAM 20 – FINAL PRESENTATION

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# PRESENTATION OVERVIEW

- ▶ Background and Project Scope
- ▶ Entrepreneurial Aspect
- ▶ Designs
- ▶ Operation Factors
- ▶ Testing
- ▶ Conclusion

# BACKGROUND & PROJECT SCOPE

- ▶ Advanced hoverboards are very expensive (over \$10,000) and there is no simpler inexpensive product in the market.
- ▶ Our goal is to create an inexpensive hoverboard that can be used for recreational purposes and targets a wide market of people. This board will use air as levitating medium.
- ▶ Our main objective is to ensure proper inflation that would provide adequate lift and allow for smooth hovering.
- ▶ The project needs to be handled as a new product for the market.

# What is Hovering?





# ENTREPRENEURIAL ASPECT

▶ **Name: HHBoards**

- Tag Line: “Let Us Lift You”

▶ **Customer problems:**

- Commercial existing hoverboards - \$10,000.

- Our product will be significantly less expensive.

▶ **Intellectual Property**

Trademark: The name of brand, Tagline, LOGO

Patent: The Mechanical Design

▶ **Participate in:**

▶ **FSU's InNOLEvation Challenge:**

Team made it to the semi-finals (top 13)

▶ **FAMU-FSU College of Engineering's Shark Tank Competition:**

Team made it to the finals on April 13th, 2017.

# CUSTOMER DISCOVERY

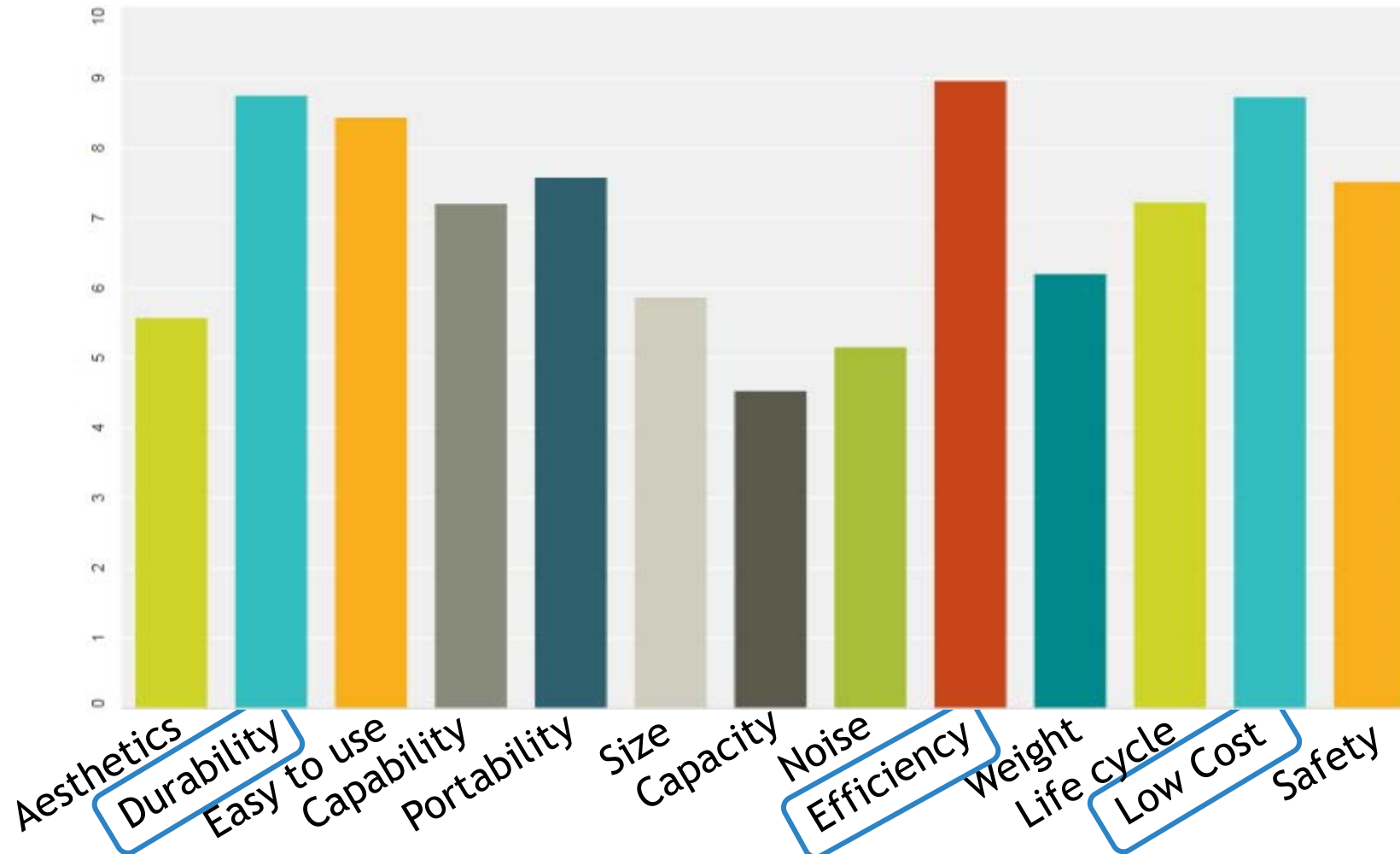


Figure 01 - Survey of Customer Interest

# PRELIMINARY DESIGNS

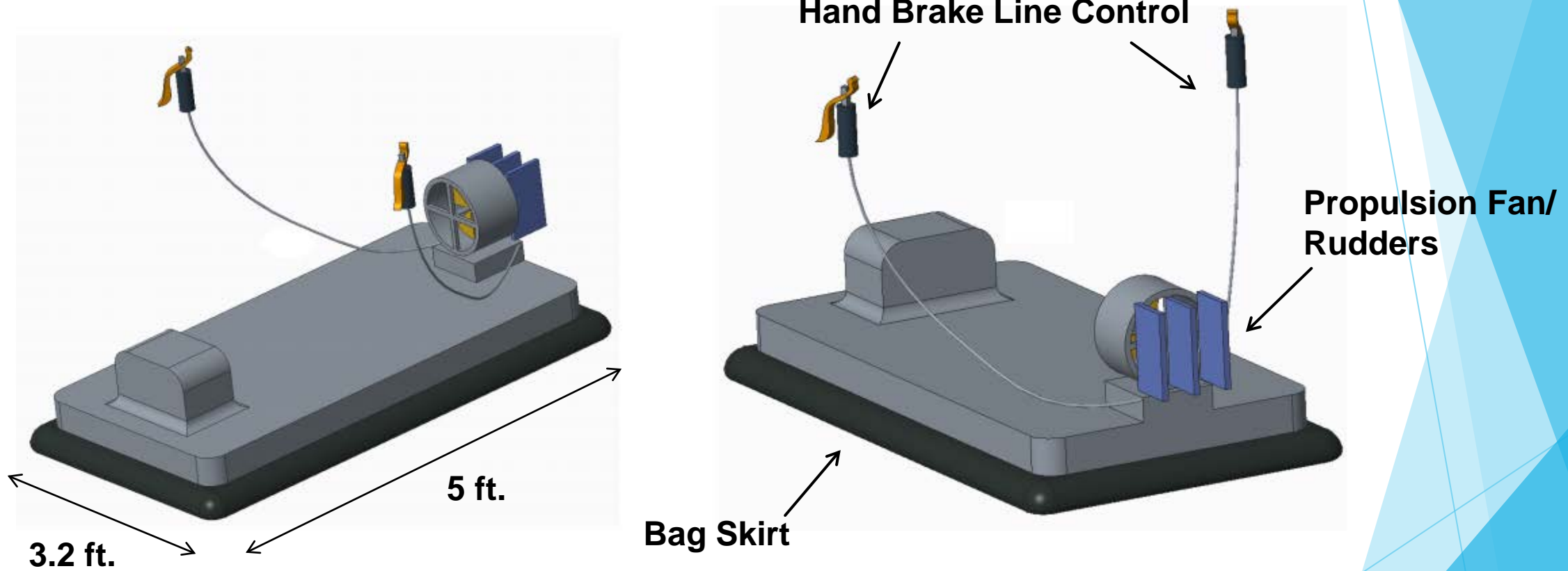


Figure 02 - Preliminary Design #1



# PRELIMINARY DESIGNS

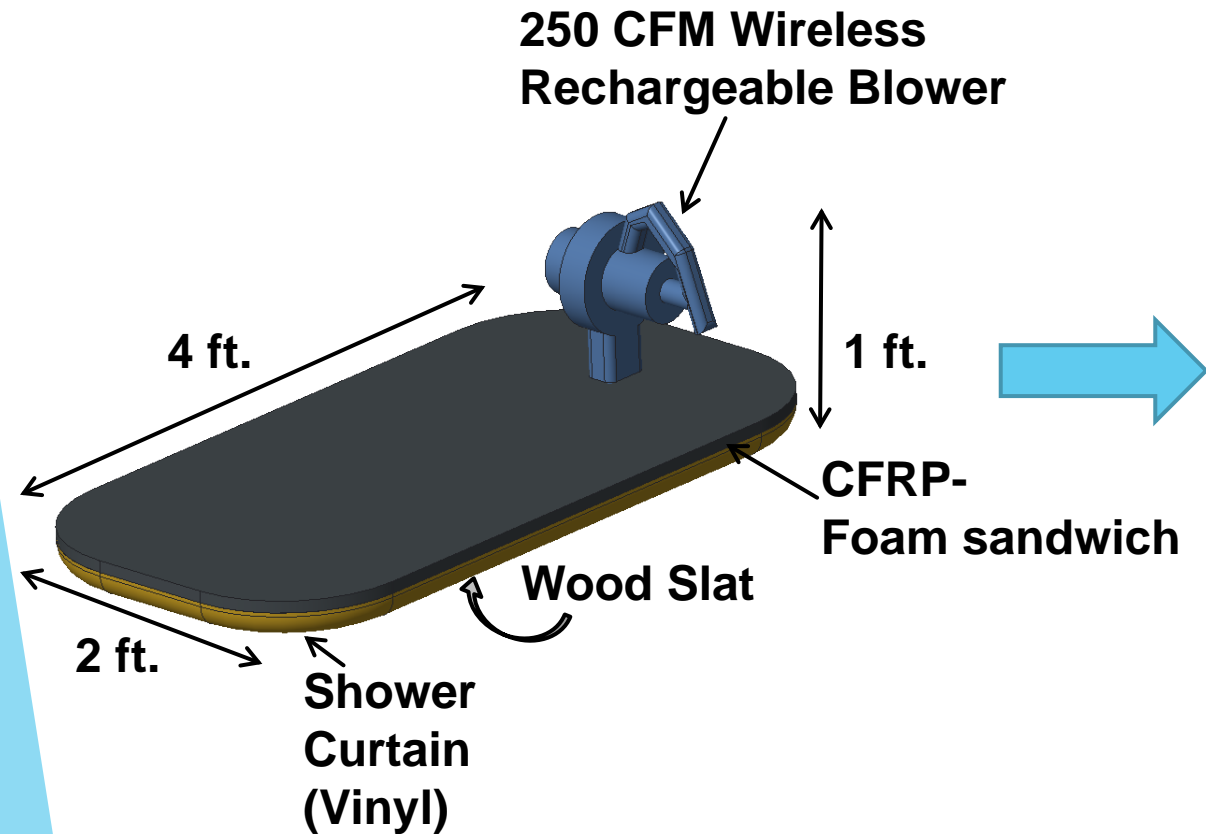


Figure 03 - Preliminary Design #2

# PRELIMINARY DESIGNS



Figure 04 - Video of Testing for Preliminary Design #2

# LIFT CALCULATIONS

- ▶ Force needed to support the weight (W)

$$W = P \times A_c$$

Cushion  
Pressure

Effective  
Cushion Area

- ▶ Required Volumetric Flow Rate (VFR)

$$VFR = A \times V_d$$

Area of the  
Vessel

Velocity of Air  
Discharge

- ▶ Results: at least 900CFM to lift a child and maintain a 0.25" air gap.

# OPERATION FACTORS

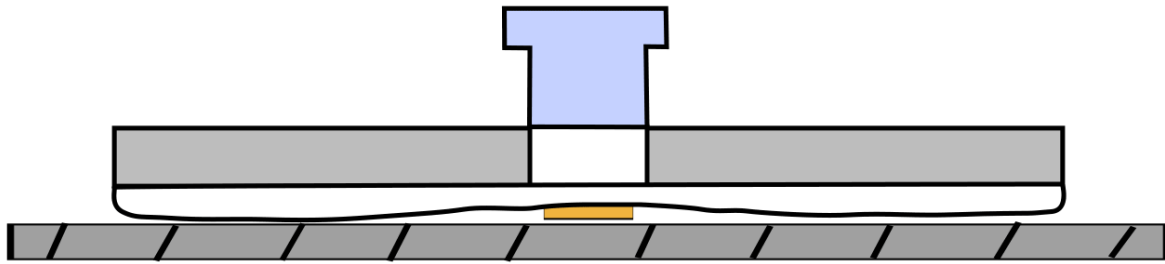


Figure 05 - Animation of Horizon Hoverboard Lift Theory

1. Blower inflates the skirt
2. Air flows through holes in skirt
3. Pressure builds up underneath and lifts board

# OPERATION FACTORS



Figure 06 - Bottom View of Preliminary Design #2

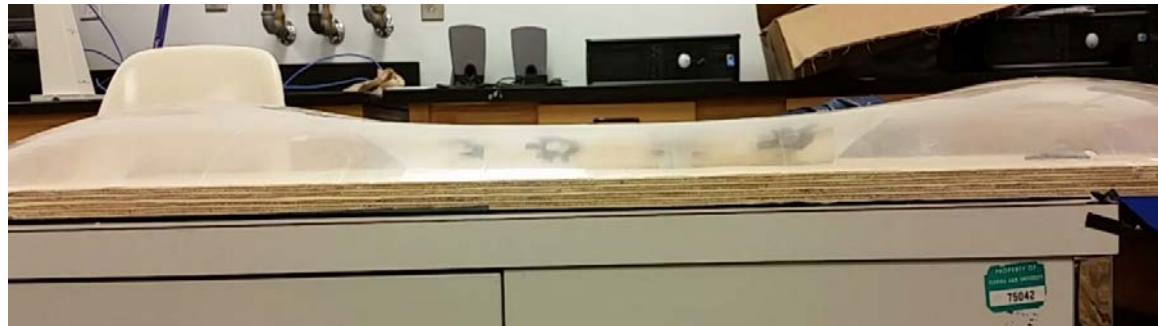


Figure 07 - Side View of Preliminary Design #2

# CONSIDERED MATERIALS

Board	Air Cushion	Skirt	Air Blowers		
Plywood	Urethane-Coated Nylon Fabric	Bag Skirt	Jet Powered Air Blower		
Carbon Fiber	Vinyl	Finger Skirt	Gas Powered Air Blower		
ABS Polymer	Polyethylene	Bag and Finger Skirt	Electric Powered Air Blower		
			Electric Powered Centrifugal Fan		

Table 01 - Materials Selection

# FINAL DESIGN

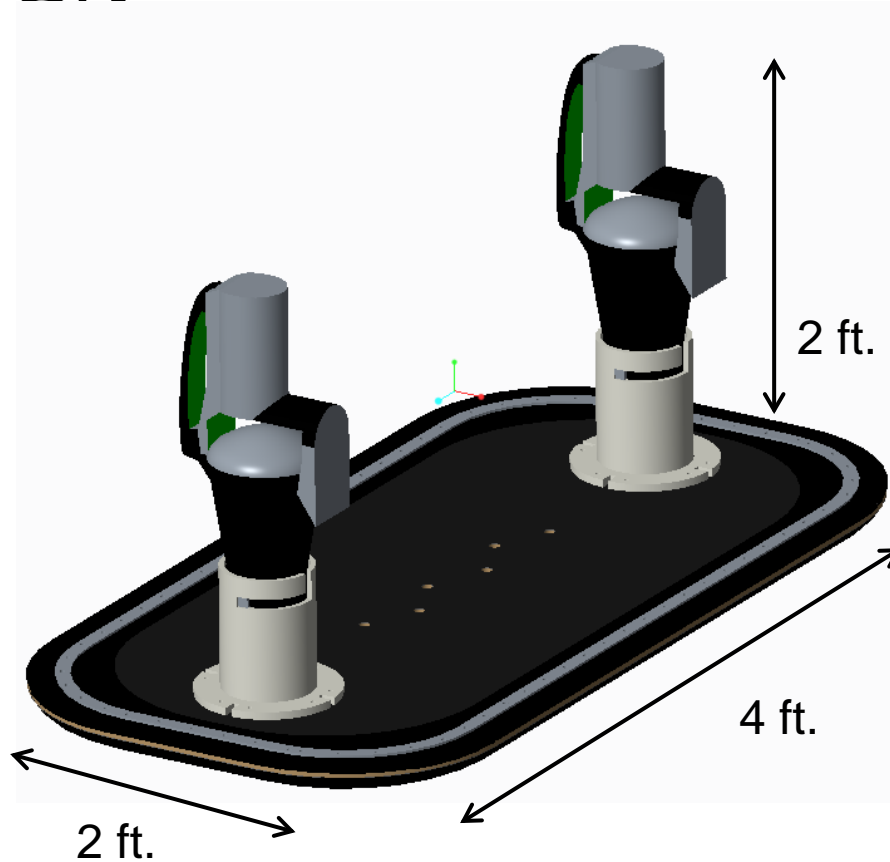


Figure 08 - Assembly View of Final Design

- ▶ Adding a second blower improves hovering performance
- ▶ A metal gasket seals the skirt nondestructively (allows for replacements)

# COMPONENT ARCHITECTURE

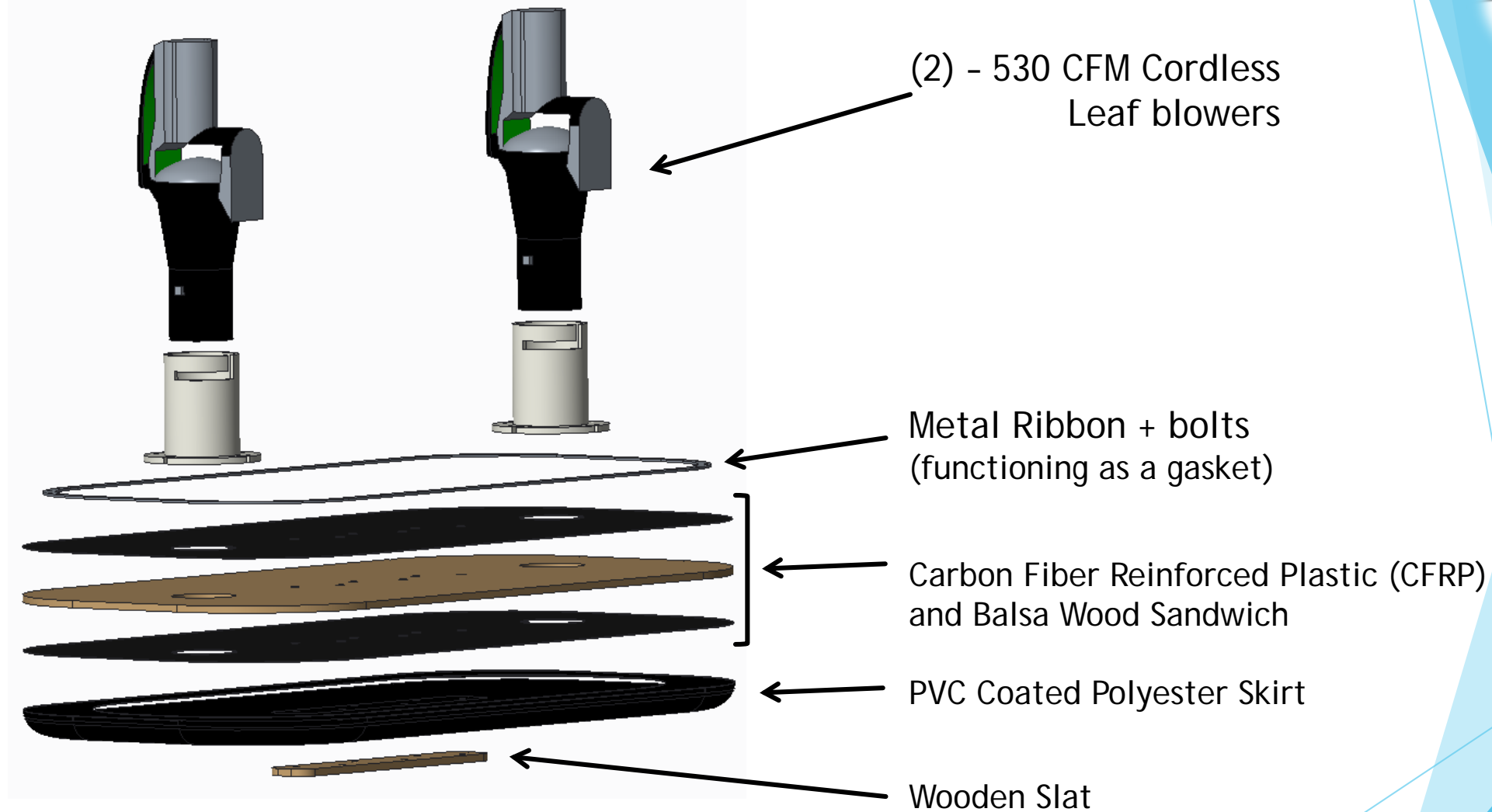


Figure 09 - Exploded View of Final Design



# FABRICATION PROCESS

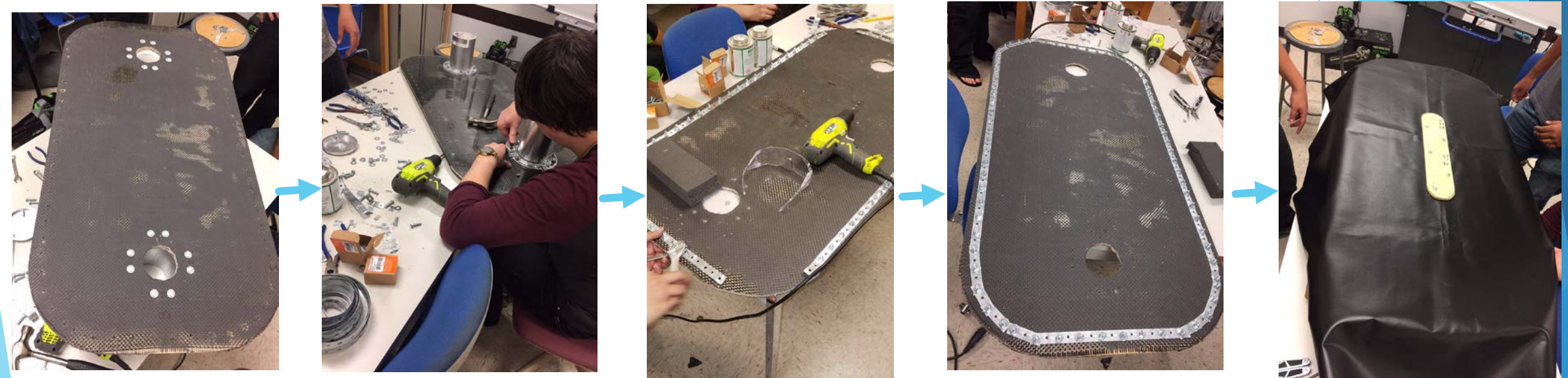


Figure 11 - Process for Manufacturing Boards

# COMPONENT PRICE BREAKDOWN

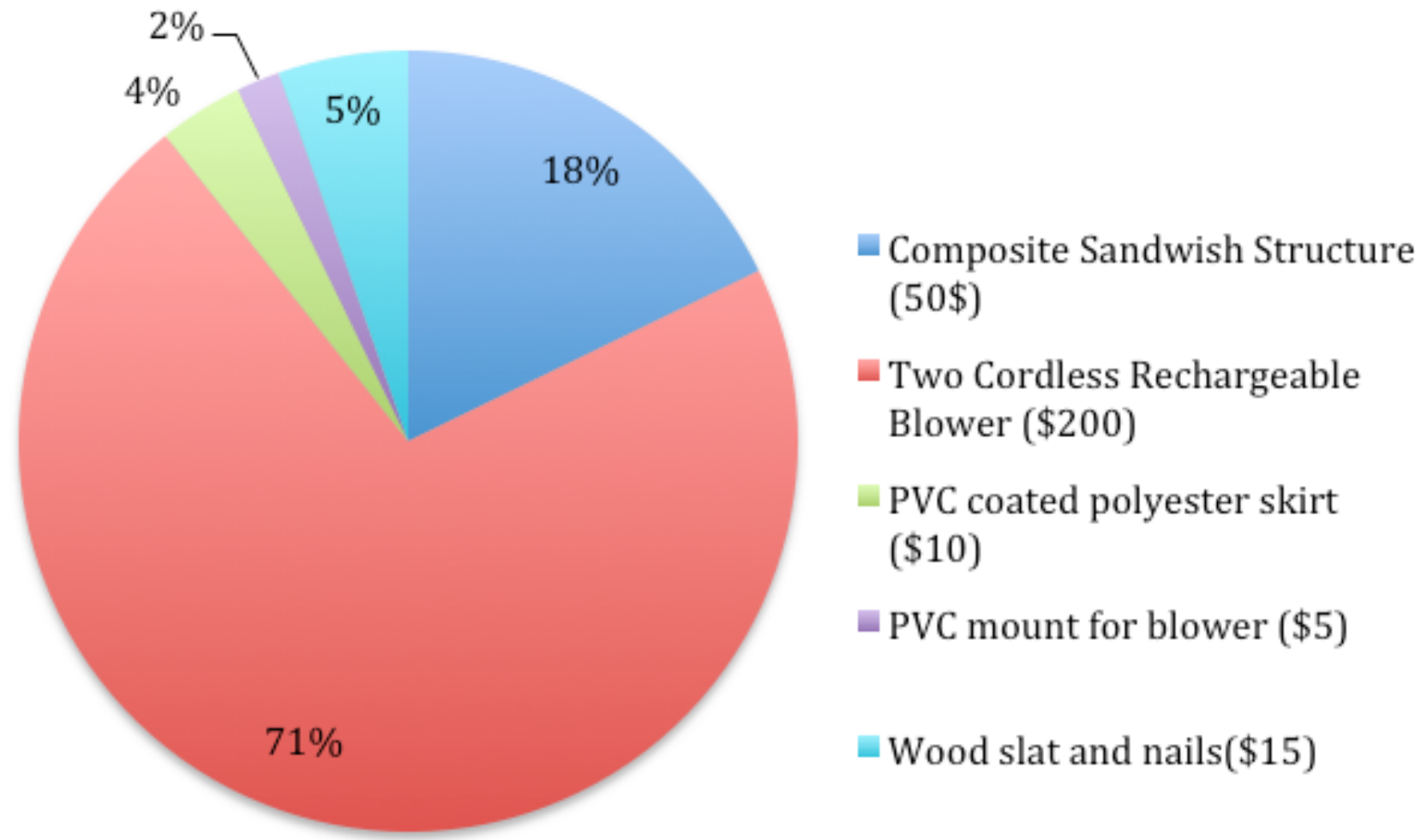
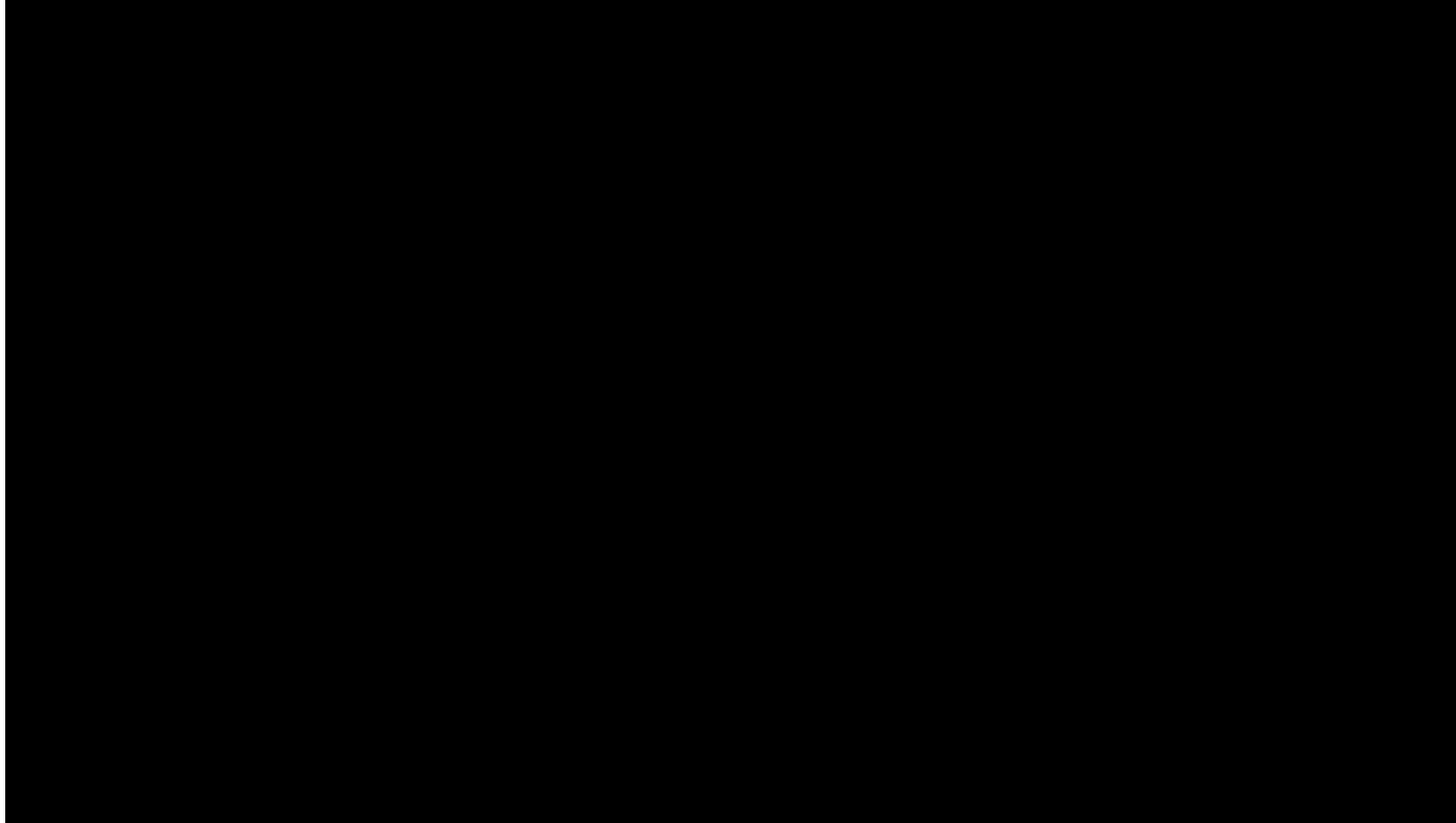


Figure 10 - Breakdown of Cost for Board

# LULU 3.0 HOVERBOARD



# RESULTS

Characteristics	Theoretical Expectations	Tested Results
Air Gap	0.25-0.5"	0.1-0.25"
Weight Supported	Up to 300lbs	Up to 150lbs
Blower Runtime	At 200CFM ~1.5h At 530CFM ~0.5h	At 200CFM ~1.0hr At 530CFM ~0.25hr
Weight of Board	>50 lbs	>22 lbs

# CONCLUSION

- ▶ Horizon Hoverboards has successfully designed a hoverboard that is functional, aesthetically pleasing, and durable as well. Though from our tests, we would have to change our focus to children under 100 lbs as the key market.
- ▶ As a business, we plan to further our exploration in the hoverboard field in order to find the best performing materials and components so our customers enjoy a fun and exciting ride.
- ▶ We consider this project a success:
  - ▶ Functional Design
  - ▶ Significantly under budget
  - ▶ Met with customer needs

# REFERENCES

- ▶ [1] "EGO 110 Mph 530 CFM Variable-Speed Turbo 56-Volt Lithium-ion Cordless Electric Blower-LB5302." *The Home Depot*. Home Depot Product Authority, LLC, n.d. Web.
- ▶ [2] Bow, Wangbow Violin. "Carbonfiber Pernambuco Ebony." *Bow Materials | Pernambuco | Ebony | Brazilwood | Carbon Fiber*. 2017 WangBow, n.d. Web. <<http://www.wangbow.com/shop/carbonfiber-pernambuco-ebony-ezp-22.html>>.
- ▶ [3] "Learning Center - Vacuum Bagging Equipment & Techniques for Room-Temp Applications." *Fibre Glast*. N.p., n.d. Web. <[http://www.fibreglast.com/product/vacuum-bagging-equipment-and-techniques-for-room-temp-applications/Learning\\_Center](http://www.fibreglast.com/product/vacuum-bagging-equipment-and-techniques-for-room-temp-applications/Learning_Center)>.
- ▶ [4] Burchell, Graham. "Composite Panels." *Composite Panels, Flat Panel Laminates And Sandwiches | Fibrefusion*. N.p., n.d. Web. <<https://www.fibrefusion.com/composite-panels>>.

QUESTIONS?

| |orizon  
| |overboards