REDUCTION OF SNOW AND ICE ACCUMULATION ON STAIRS THROUGH HEATED PANELING

PROGRESS REPORT

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- Heating element
- Battery selection
- Solar panel
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INTRODUCTION

Goals Set during our last presentation

- Material Choice
- Meeting with Paul
- Design sketch
- Sunlight needed and power output analysis
- Cost analysis

Goals we have completed

- Material choice
- Meeting with Paul
- Design sketch
- Started sunlight and power output analysis

HEATING ELEMENTS/LOAD

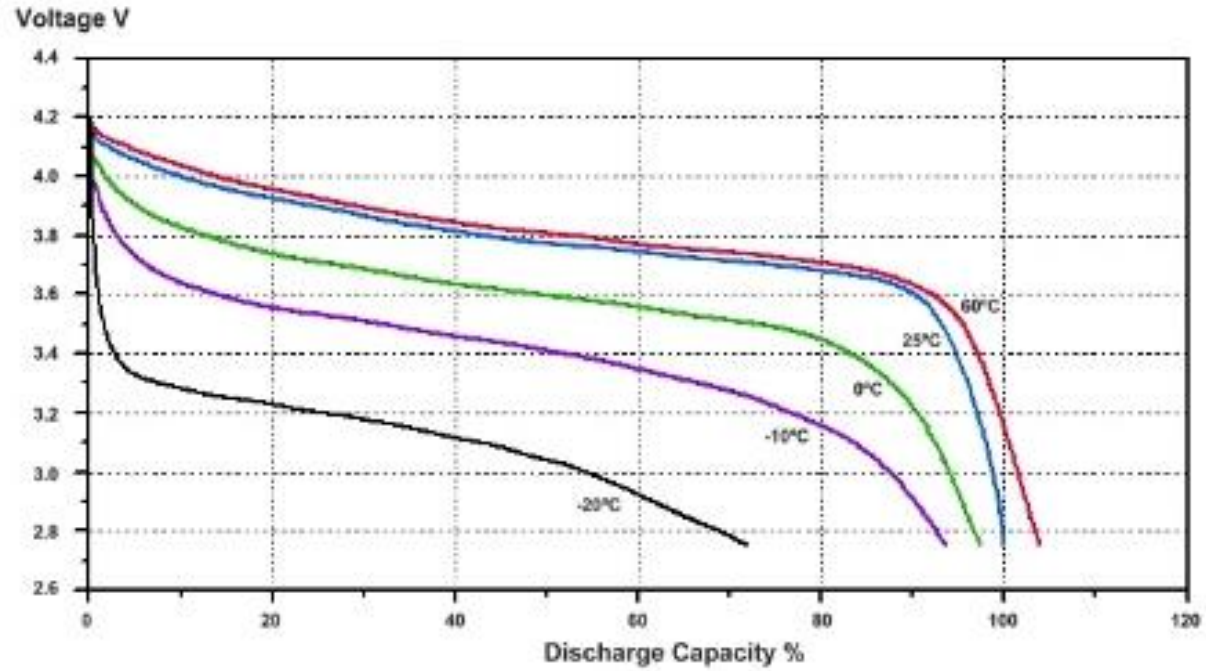
- OMEGA self-regulating rapid-trace heating cable
- Provides freeze protection
- This is a commercial type heating element
- These cables can provide 15W/ft of power that can melt 3.81 cm of snow per hour.
- Energy efficient

BATTERY SELECTION

- Be able to withstand a wide range of temperatures below freezing
- Small enough to fit within the Solar Step's design
- Long lifecycle for our low maintenance needs
- Fast charging
- Safe from toxic substances and explosions

BATTERY CHOICE

- Lithium ion battery type was the battery that best fit our specified needs.
- There are four main types of ions that pair with lithium batteries, Lithium-Cobalt oxide, Lithium-Titanite, Lithium Iron Phosphate, and Lithium-Nickle Manganese.
- Lithium-Cobalt oxide is prone to safety hazards when damaged. Materials are also expensive.
- Lithium-Titanite exceeds our required needs for this project which can operate at temperatures as low as –40 degrees Celsius.

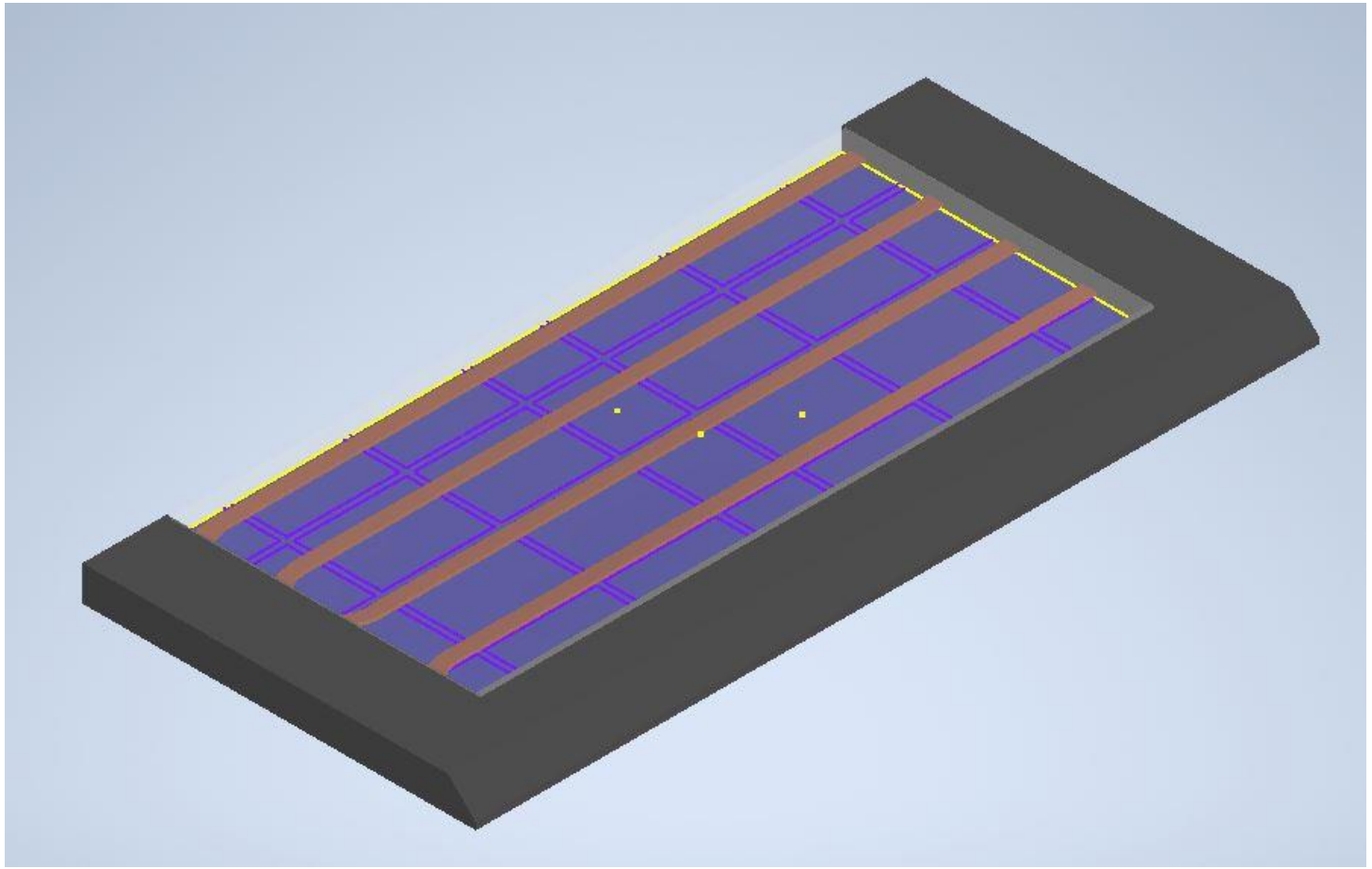


BATTERY CHOICE: LITHIUM IRON PHOSPHATE (LIPO4)

- Performs in temperatures as low as –20 Celsius.
- Lower price point compared to its competitors that operate at low temperatures
- Small size that fits our design needs
- Further calulations will be required to see how long the battery will last. However the heating element opperates at a 120V supply.

PANELS

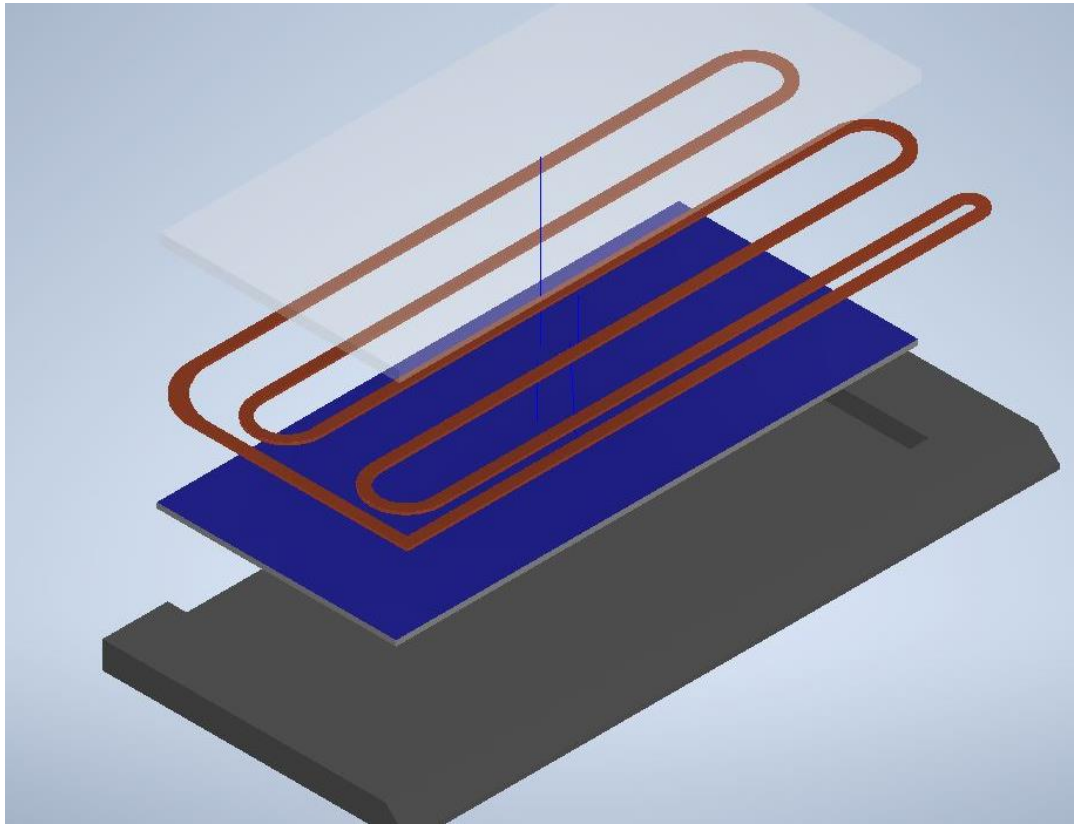
- Thin film panels provide the lowest profile for ease of installation into the assembly
- A 100-Watt panel is common for the size that would be used in the assembly
- 100 watts at 4 sun-hours a day would produce 400 Watt-hours a day
- Efficiency will affect how many actual Watt-hours are produced
- Thin film panels provide some additional challenges as many of the materials used in construction are not eco-friendly and require careful recycling.



INVENTOR BASIC DRAWING

- Prototype representation of a single stair assembly
- Will be revised further based on performance needs
- Displays the combination of the rubber base, solar panel, heating coil and glass cover

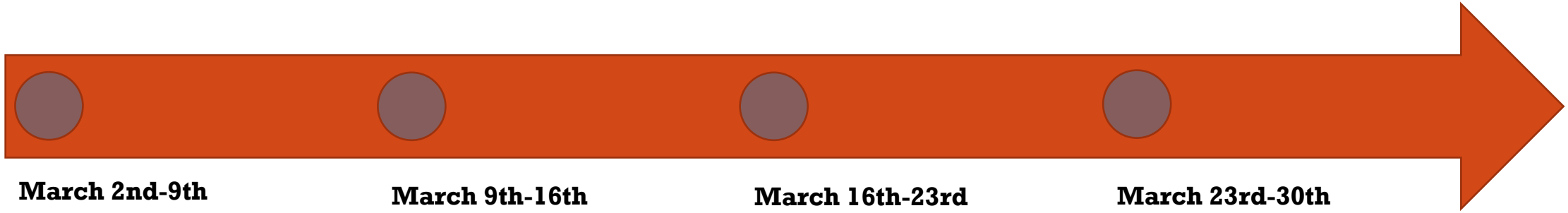
EXPLODED VIEW OF ASSEMBLY



Layers from the top down:

- Tempered glass
- Heating coil
- Thin film panel
- Rubber base and storage for battery and other materials

UPDATED TIMELINE



March 2nd-9th
- Continue analysis of sunlight required and power output
- Solve obstacles outlined in previous proposal

March 9th-16th
- Prepare for project update
- Complete detailed drawings in AutoCAD and Inventor

March 16th-23rd
- Complete Website
- Analyze cost of materials and product

March 23rd-30th
- Complete final report

QUESTIONS?