



Additive Manufacturing- Experimental System

Team: Ice Quenchers

Sponsor: Dr. Amneet Pal Singh Bhalla / SDSU Mechanical Engineering



Team Members

CAD Design – Exploded View

Final Product



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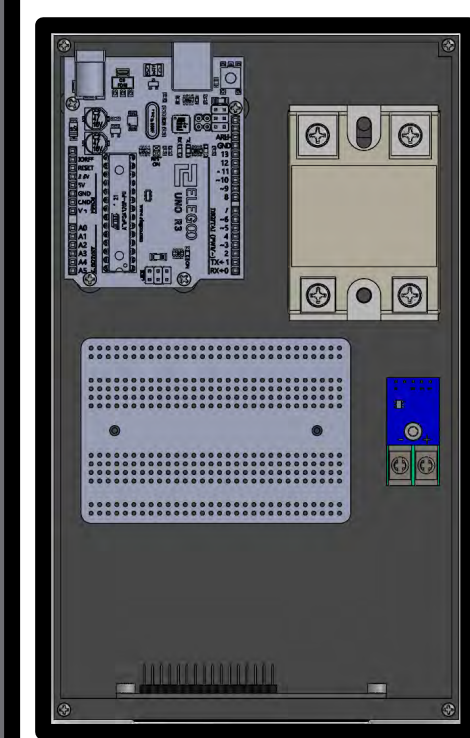


Figure 1: Electrical Housing Schematic

- Housing for all electrical components
- PCB
- Arduino Uno
- LCD Screen
- Breakout Board



Figure 2: Assembled Electrical Housing

- Fully 3D Printed using PLA filament

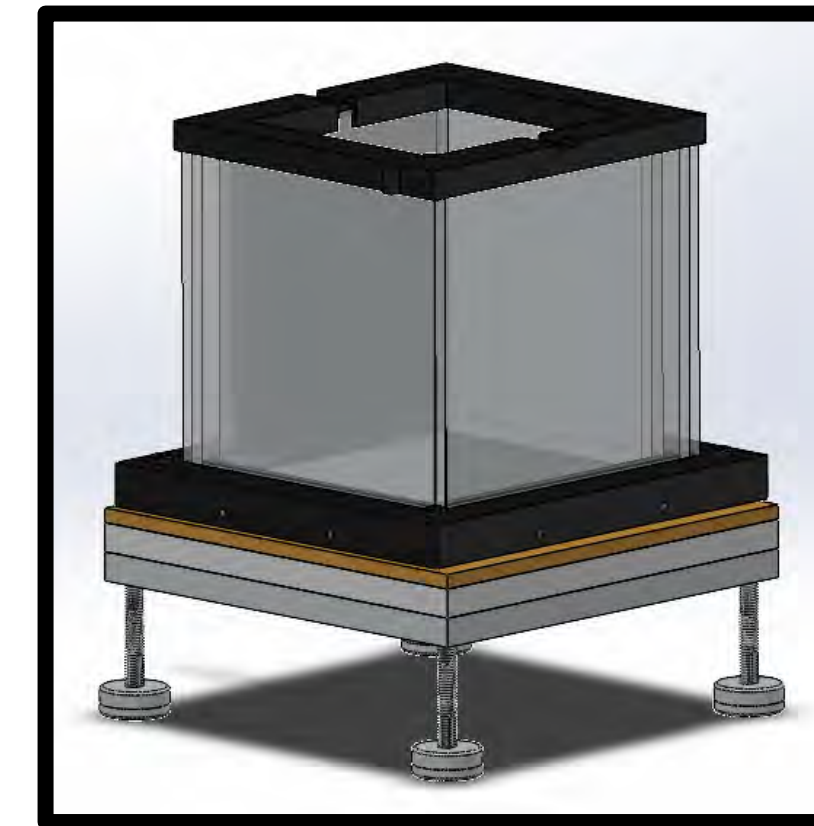


Figure 3: Assembled Chamber Design

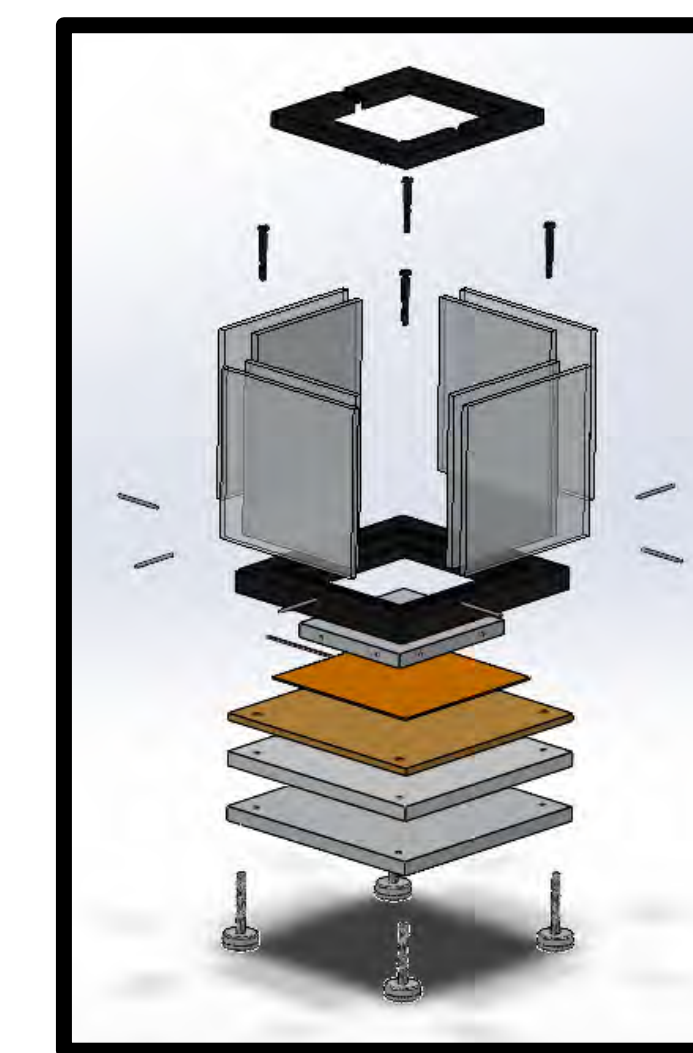


Figure 4: Exploded View of Testing Chamber



Problem Statement

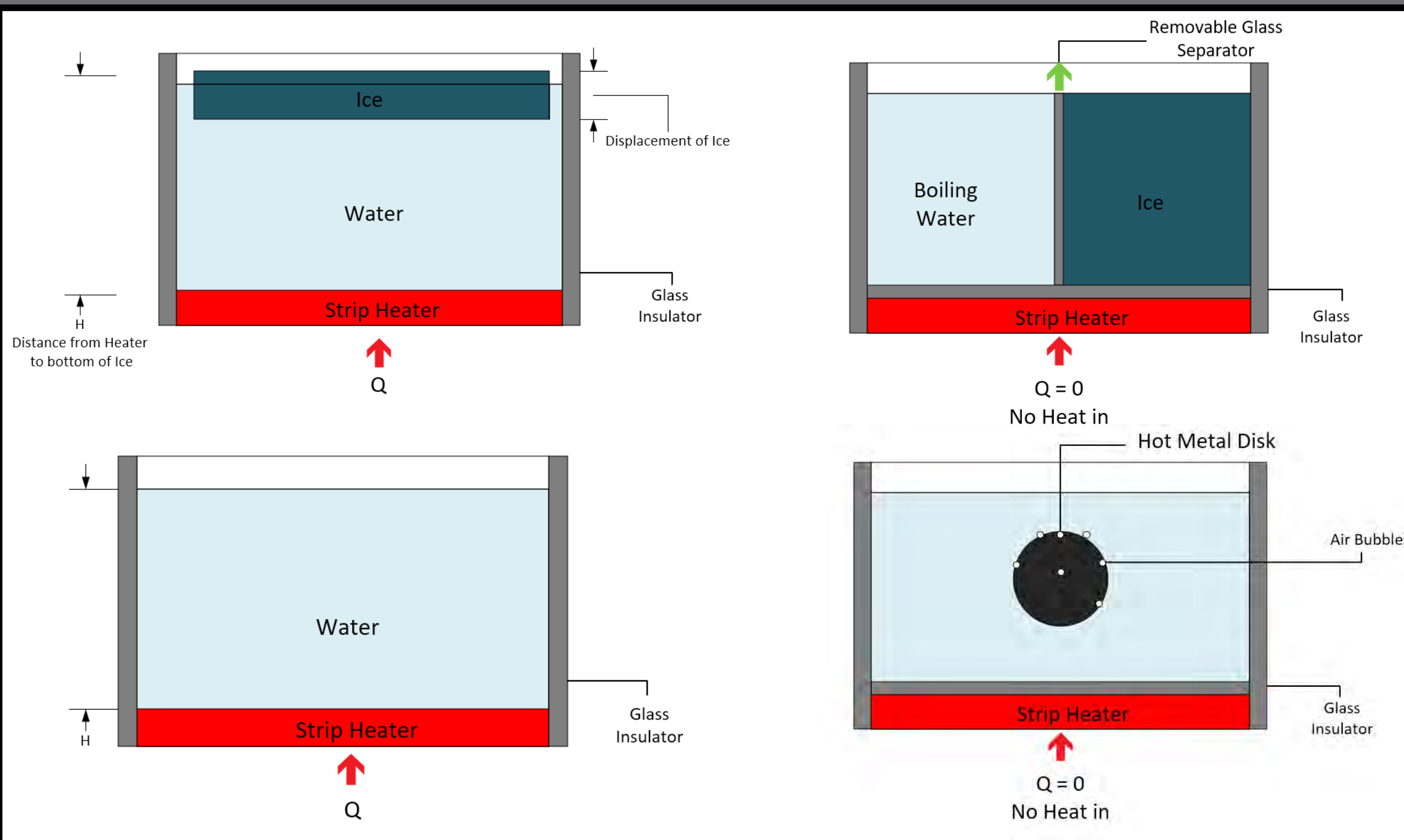
Problem Statement:

Dr. Amneet Pal Singh Bhalla is attempted to validate his numerical code demonstrating phase changes in ice, water, and metal interfaces. These numerical codes serve to improve the understanding and development of selective laser sintering (SLS). The process of SLS is the 3D printing of metals. A testing Chamber must be Designed to house four different experiments to allow observation and data collection.

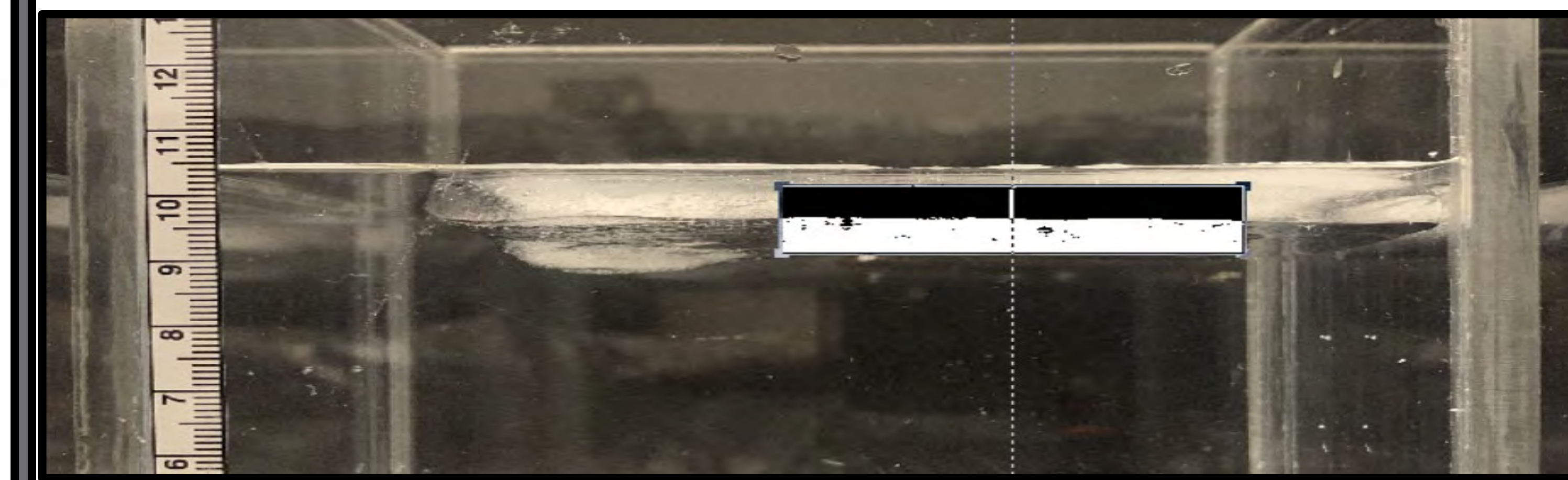
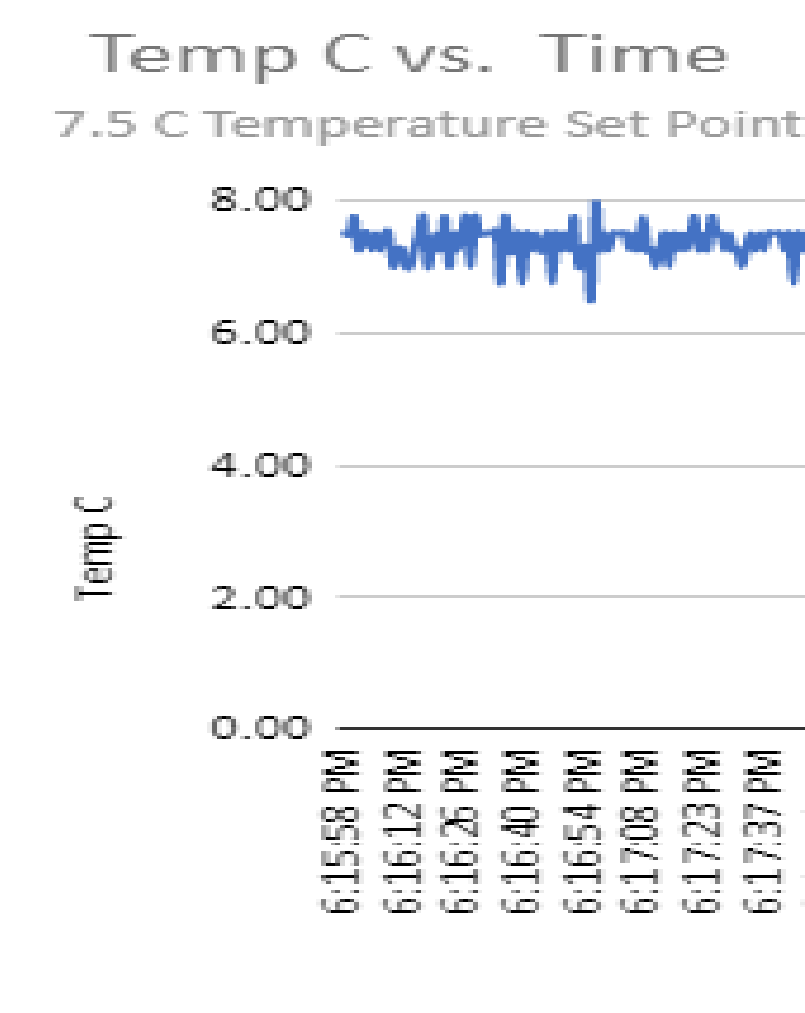
Need:

The team must design a testing chamber to conduct four different experiment that demonstrate the phase changes and interface relationships between ice, water, and metal. The testing chamber must be insulative, rectangular, have constant temperature and heat flux, and lastly it must be transparent.

Experiments Performed



Experimental Data



Major Components

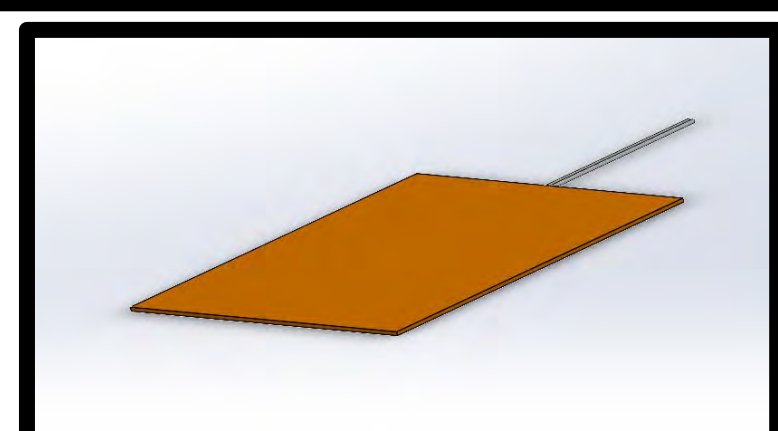


Figure 7: 6x6 in Minko Strip Heater

- This heater allows for constant temperature and heat flux
- We can record the temperature of the heat plate during the experiments



Figure 8: 6x6 in Plexi Glass

- This Plexi Glass serves as the second boundary layer from the atmosphere



Figure 9: 5x6 in Borosilicate Glass

- This Borosilicate Glass sheet serves as the main insulative material for the chamber
- Borosilicate is ideal for high temperatures and transparency

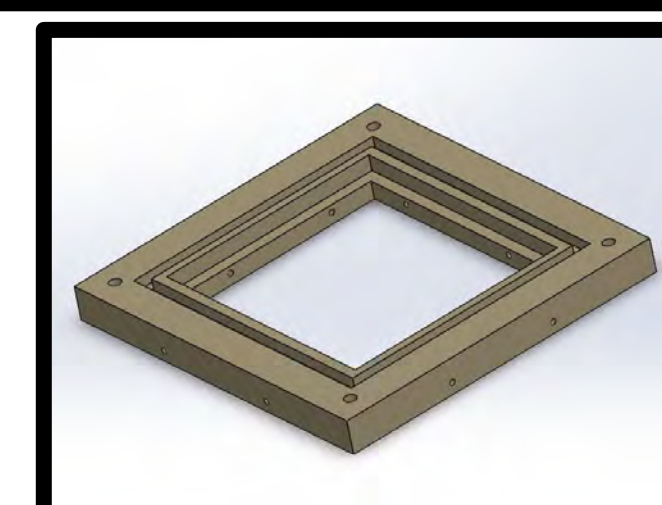


Figure 10: Wooden Base

- This intricate part was machined to hold the aluminum conducting plate as well as all the glass sheets

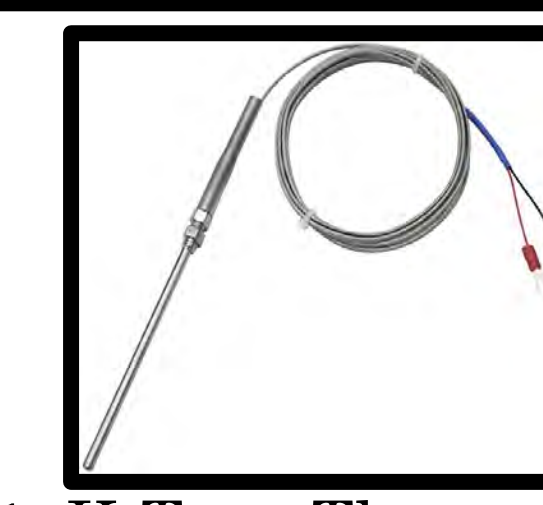


Figure 11: K-Type Thermocouple

- The thermocouple is connected to the electrical housing and collects temperature data from within the chamber

Acknowledgments

The Ice Quenchers team would like to thank Professor Scott Shaffar for his guidance and support. Furthermore, we would like to thank Dr. Fletcher Miller and our sponsor Dr. Amneet Bhalla for their expert knowledge, time, constant feedback, and support during the preliminary and final stages of this project.