

Insulation Testing

Yue Yu, Nick Chen, Cameron Moore, Austin Anderson

Results

Project Objective

- Design and fabricate the experiment equipment to measure the temperature gradient through several types of insulation.
- Record the temperature decay over time for different insulation materials by using the designed testing equipment.

Requirements

Testing Equipment Characteristics

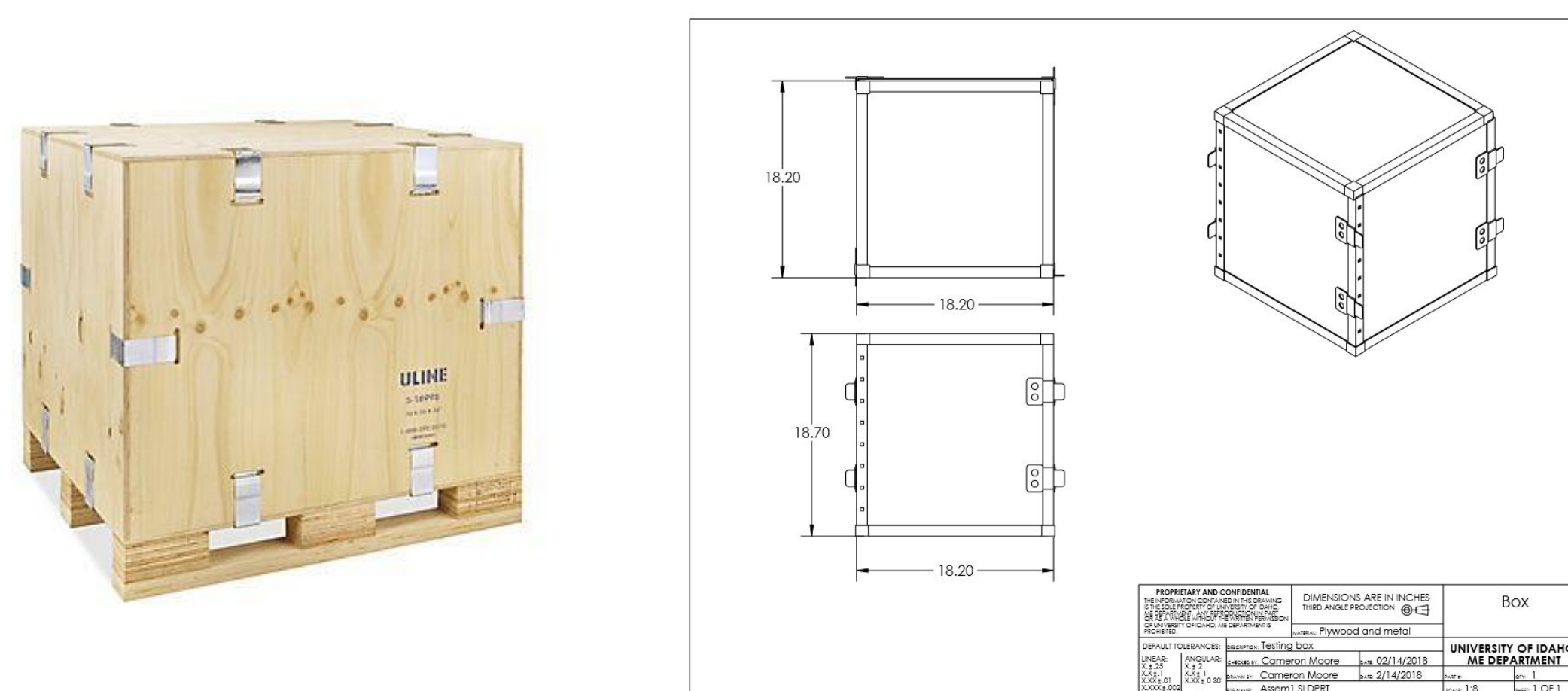
Design Considerations:

- Testing equipment easily transported through doors.
- Interchangeable building insulation materials.
- Durable Test Equipment.

Experiment

- Test duration of 90 minutes,
- Testing specimens of equal thickness,
- Accuracy: +/- 1 Degree F,
- Data sampling frequency of 1 sample/s.

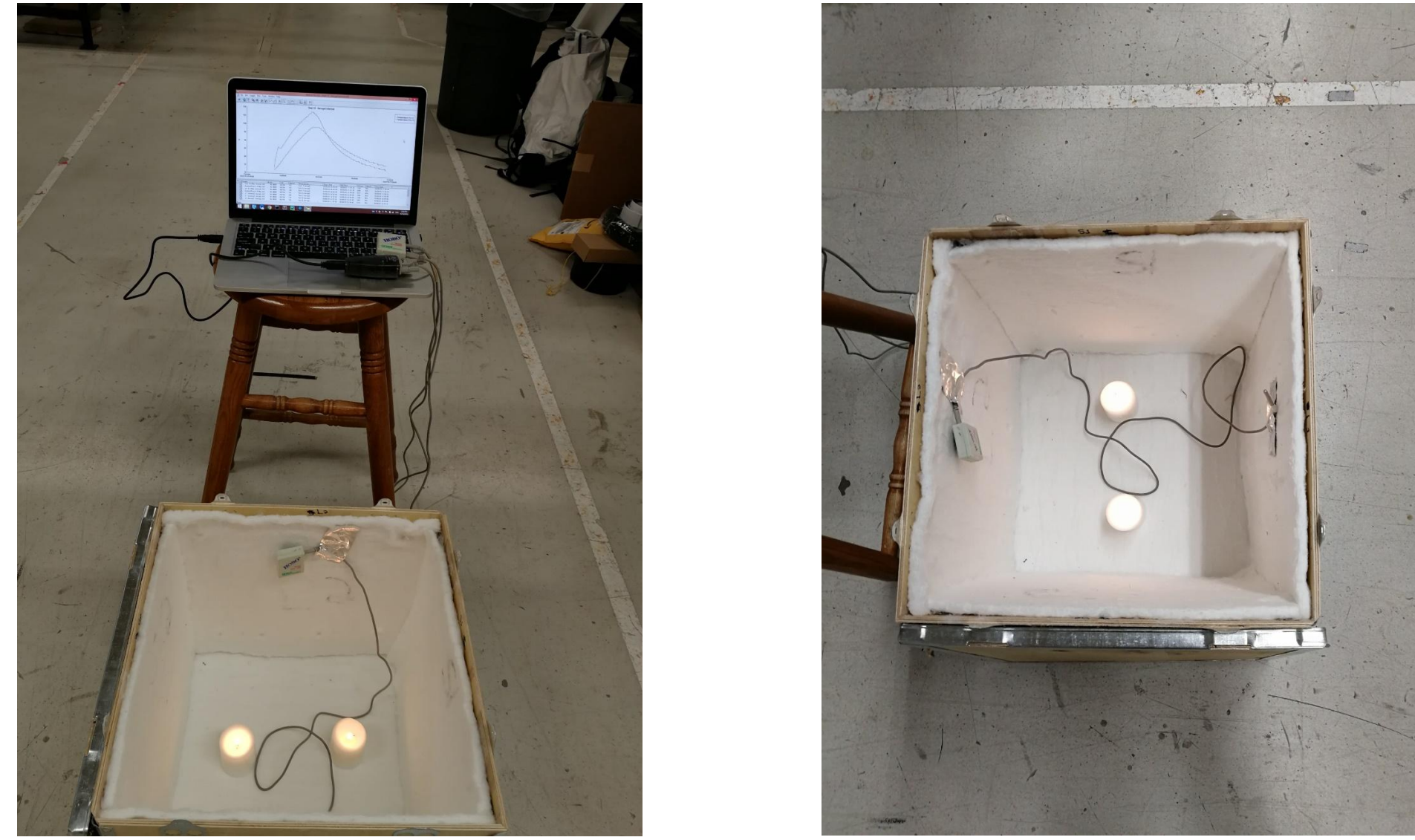
Design of Testing Apparatus



Sensors

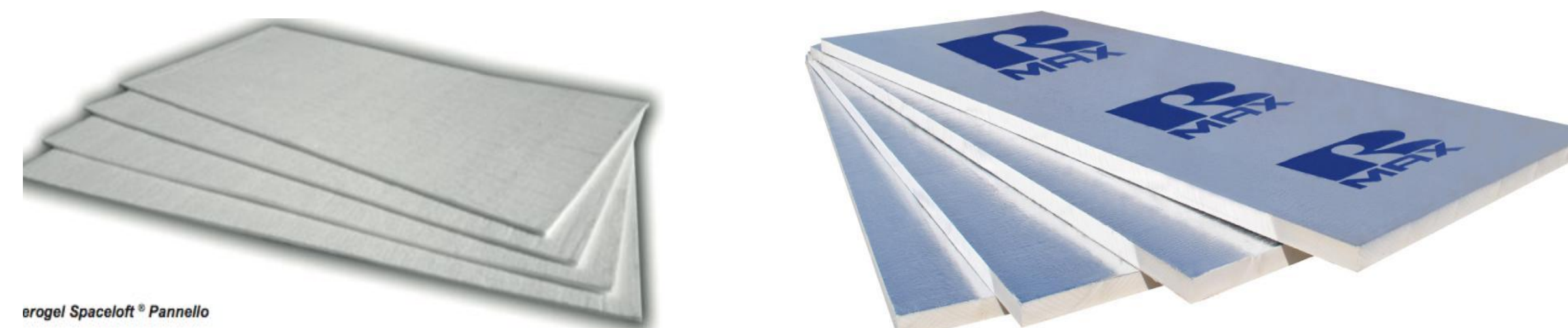


Experimental Setup



- Boxcar 4.3 data acquisition system integrated the laptop with the temperature sensors.
- Test equipment interchangeable for different insulations.
- Heat source within the box.
- HOBO sensors for recording temperatures from the interior and exterior surfaces, as well as interior and exterior air temperatures.

Testing Materials



Aerogel, Cameron's Carpet, R_max Thermosheath

Project Conclusions

- Figure 1 depicts a comparison of the temperature profiles over time for aerogel and R_max.
- Figure 2 illustrates a comparison of temperature decay over time for various insulation types. The upper curve indicates a more effective insulation.
- Figure 3 demonstrates comparison of the temperature decay rate for the different insulations. The lower slope indicates a more effective insulation.

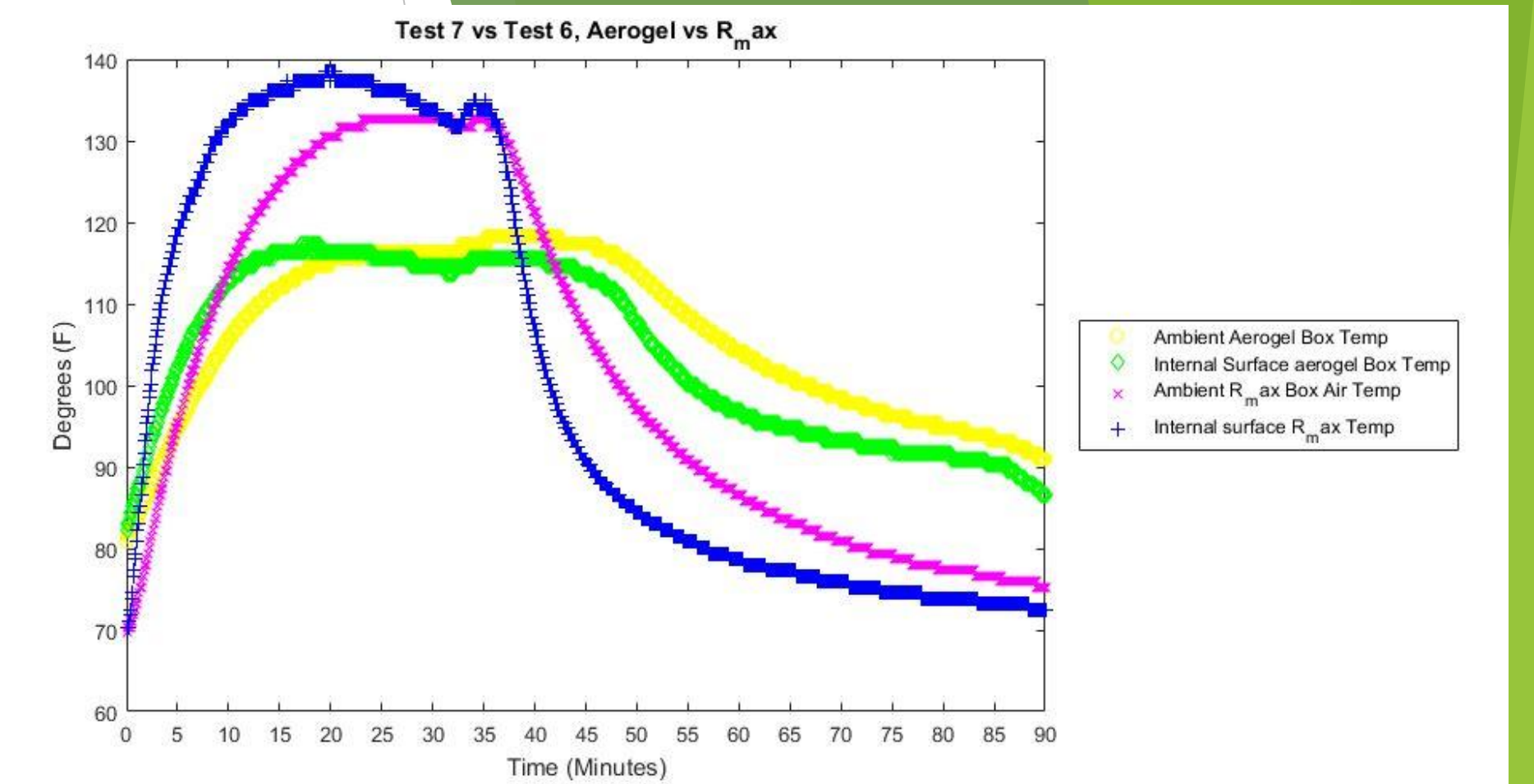


Figure 1

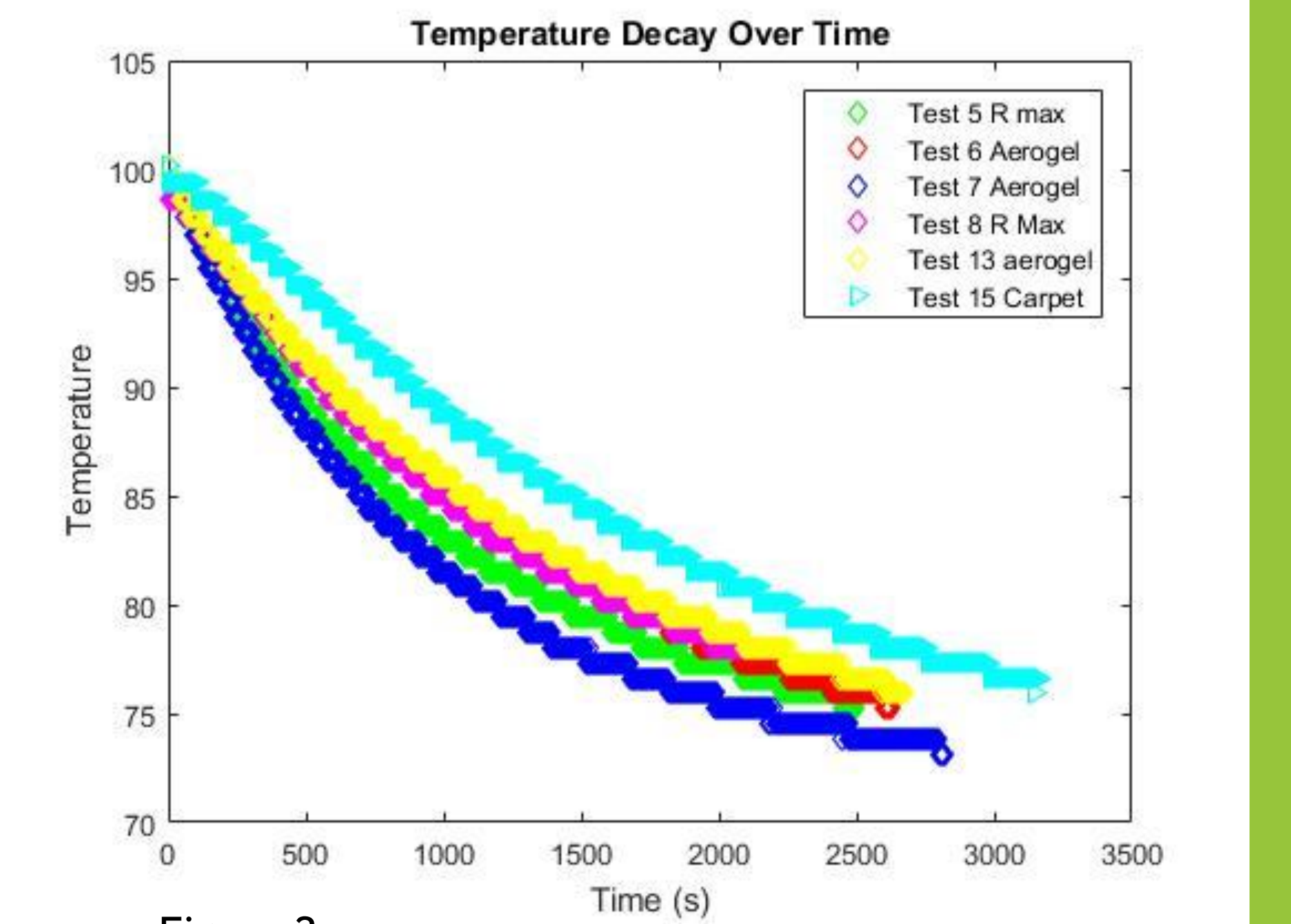


Figure 2

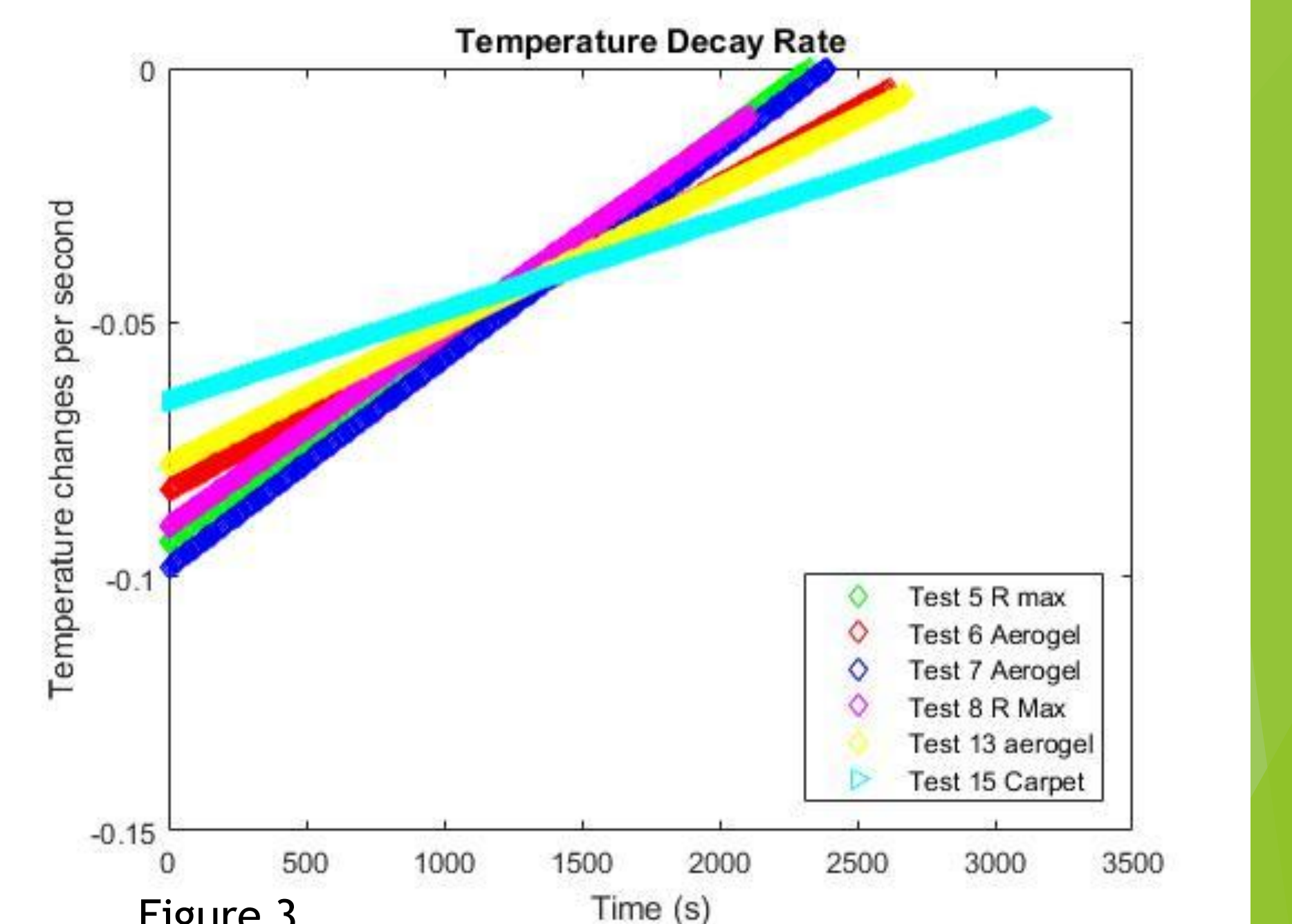


Figure 3

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