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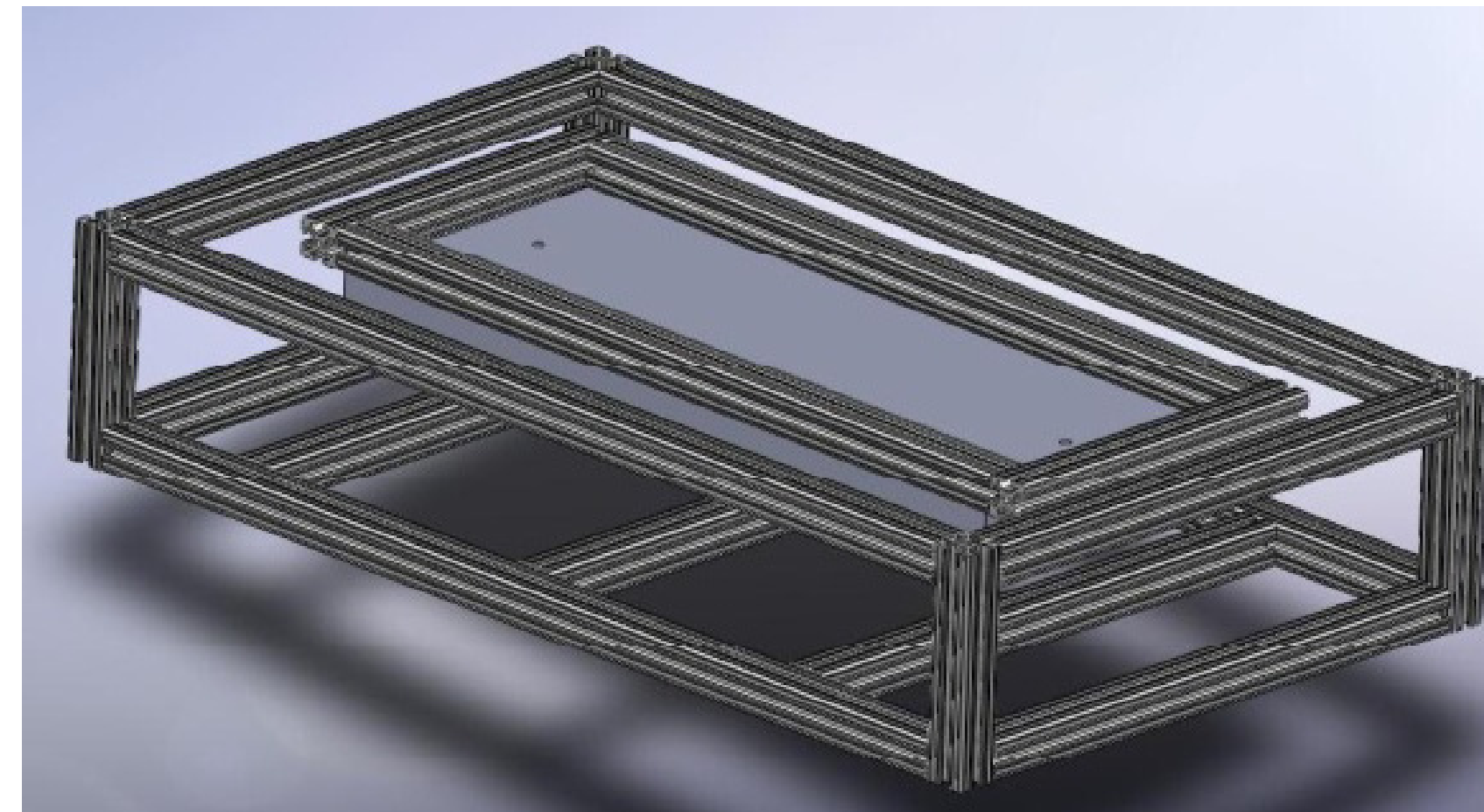
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INTRODUCTION

- ◆ High temperature LCM processes are gaining popularity as lowering viscosity is necessary for processing many new high strength resin systems.
- ◆ Observation has shown that the thermal conductivity of fabric and resin cannot be predicted simply with a rule of mixtures.
- ◆ The goal of this project is to investigate how the thermal conductivity of the fabric and resin depends on the resin flow velocity.
- ◆ First an experimental set up which provides one dimensional heat flow is constructed.
- ◆ The combination of thermocouples and an IR camera produces reliable data to quantify the thermal conductivity of the fabric and resin.
- ◆ Various resin flow velocity are studied.

DESIGN REQUIREMENTS

- ◆ The design has to be able to insulate a mold of dimensions 12"x 28"
- ◆ Must be properly insulated to ensure one dimensional heat flow.
- ◆ The heater should produce a 25° C temperature difference between the top and bottom of the mold.



ENGINEERING SPECIFICATIONS

- ◆ Thickness of the insulation needed can be approximated by assuming the heat flow through the insulation is sufficiently smaller than through the mold.:

$$i_{Mold} \gg i_{Ins} \rightarrow \frac{i_{Ins}}{i_{Mold}} \approx 0.001$$

- ◆ Using assuming insulation thickness is calculated as:

$$d_{Ins} = \frac{\frac{d_{Mold}}{k_{Al}} + \frac{d_{Glass}}{k_{Glass}}}{0.001 * R'_{Foam}}$$

- ◆ According to approximation, 2 inches of insulation is sufficient, so 4 inches was used.

FINAL CONSTRUCTION

- ◆ IR Camera and thermocouples measure temperature.
- ◆ Scale measures resin flow rate.



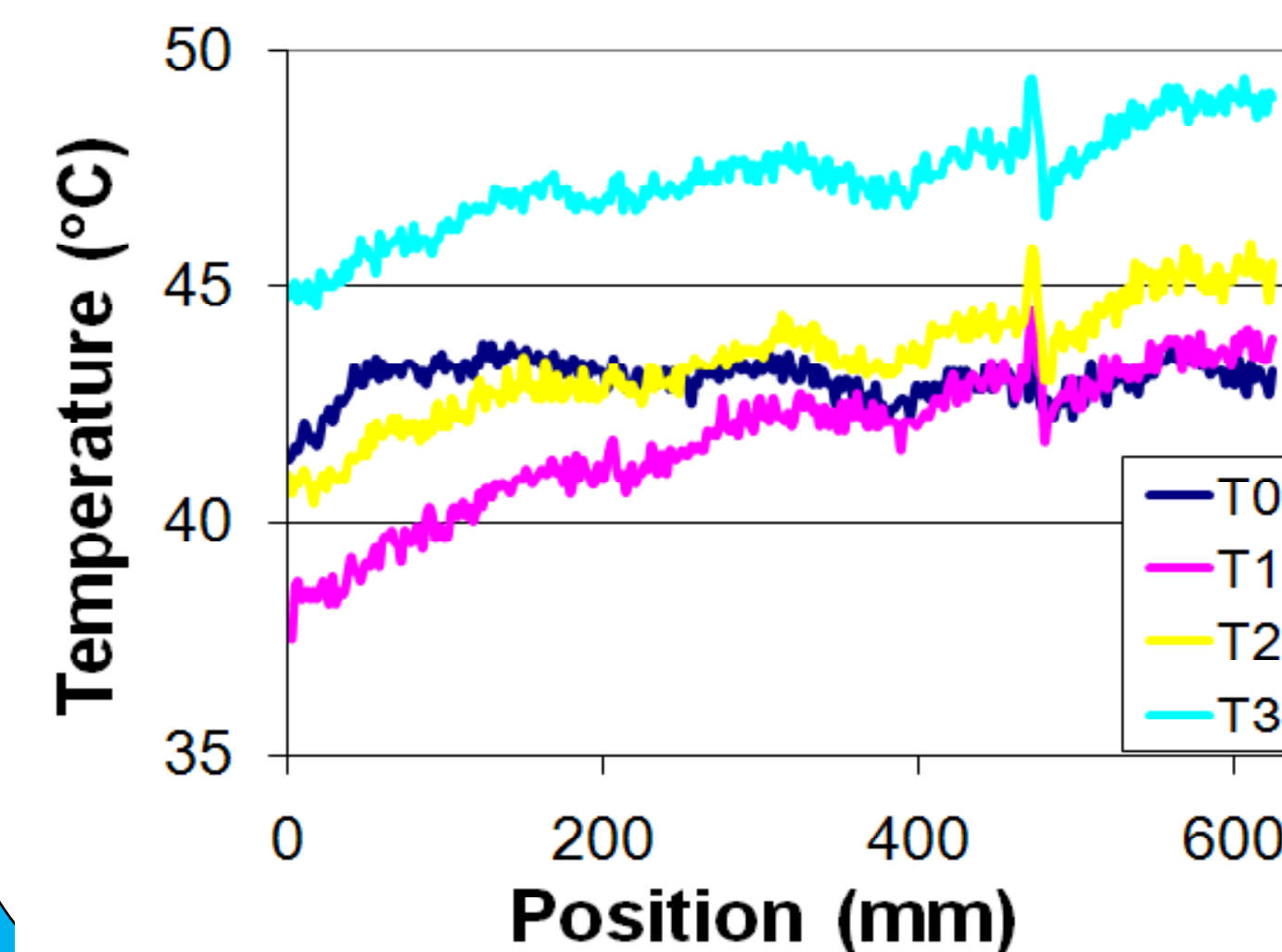
KEY DESIGN FEATURES

- ◆ Two multimeters measure the power delivered to the heater.
- ◆ VARIAC provides analogue control of heat input.



PRELIMINARY RESULTS

- ◆ Mold is able to reach Steady State Temperature Distribution at time = T3



FUTURE STUDIES

- ◆ Create test parameters which ensure steady state temperatures are developed.
- ◆ Develop analysis technique for determining thermal conductivity under various conditions.
- ◆ Continue experimentation to increase understanding of thermal conductivity.

ACKNOWLEDGEMENTS

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