

Temperature Controlled Containers for Agriculture and Agri-Food Canada

Design Status Update

Project Based Pro Practice II - ENGN 3720

Presented on: 13-MAR-2020

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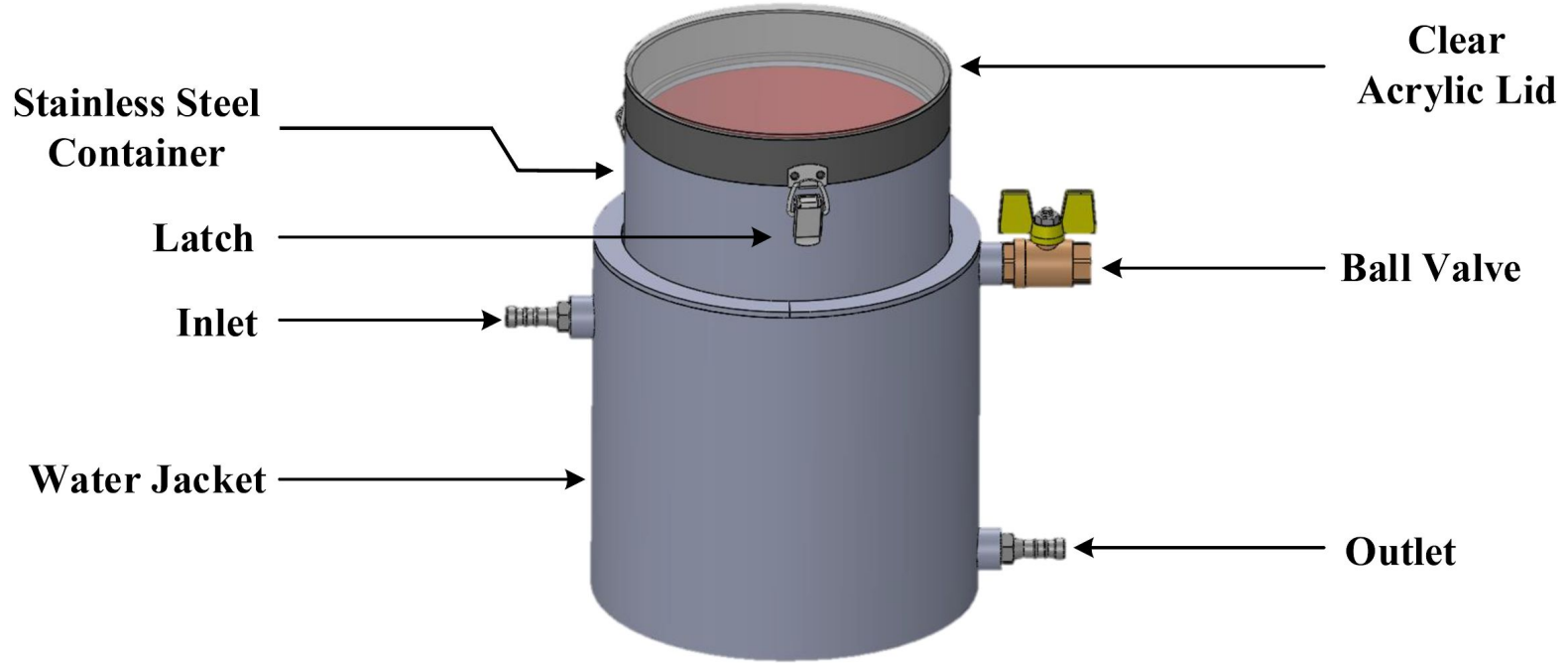
Agriculture and
Agri-Food Canada

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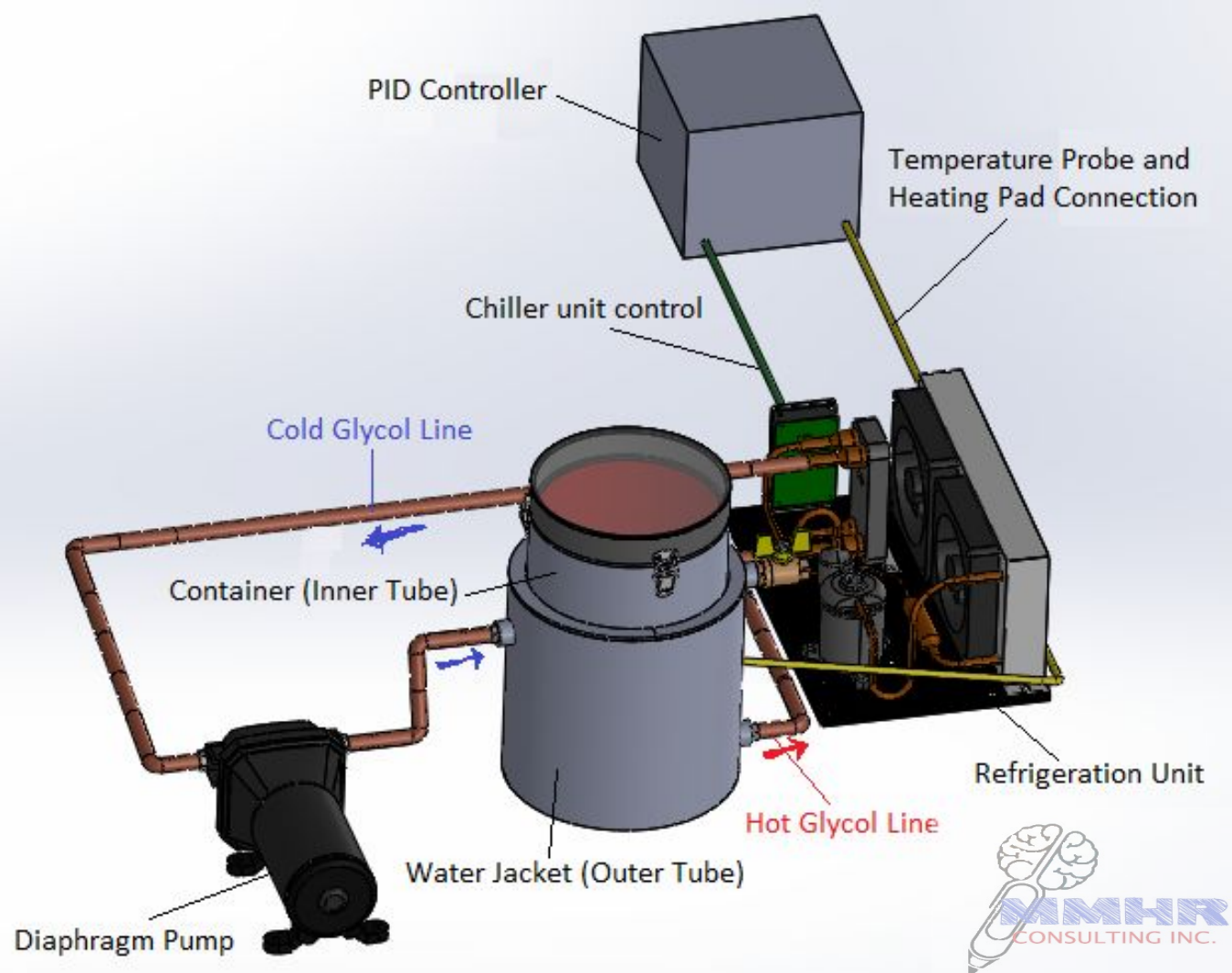
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Build Status - Container



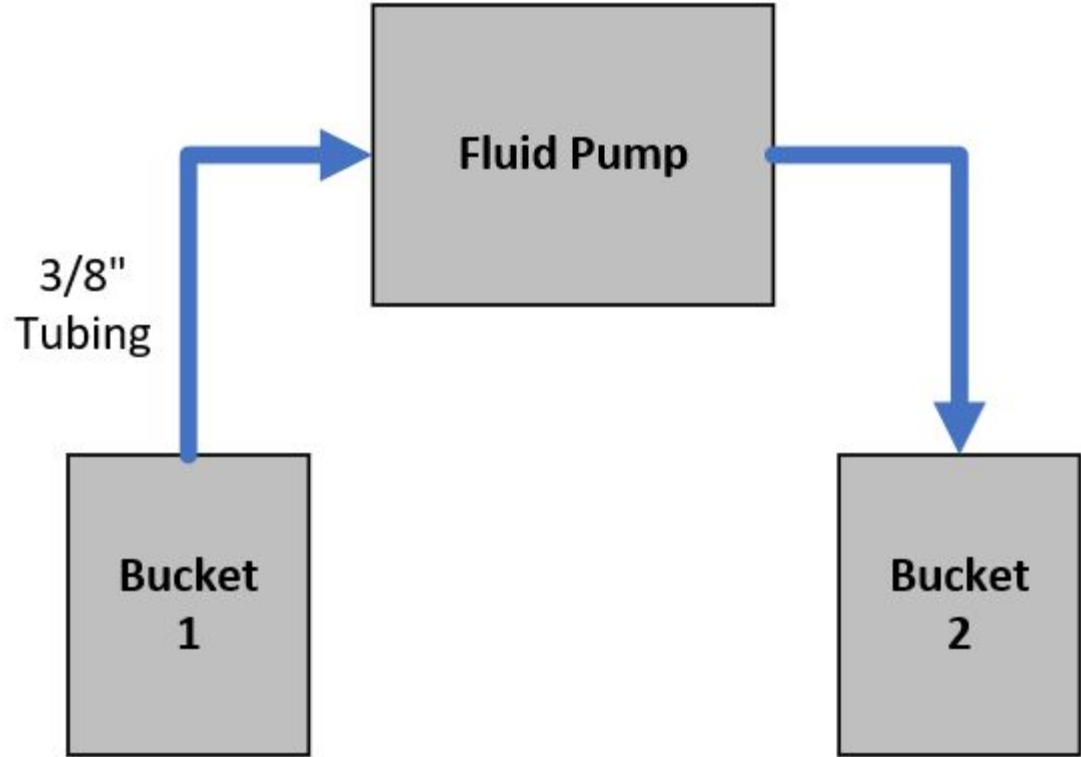
System Overview



Conducted Tests

Pump Flow Rate Test

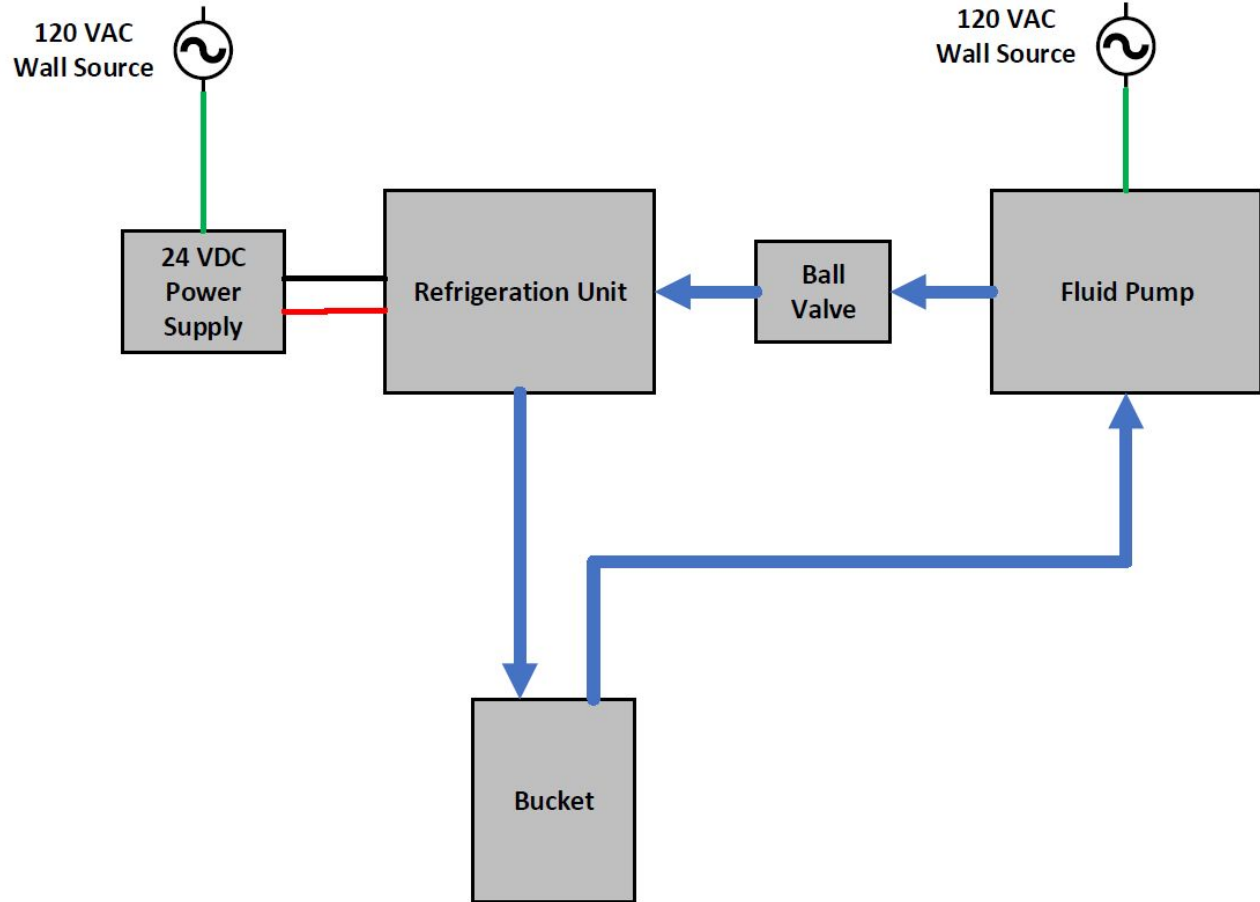
- Previous Pump (Higher Flow Rate)
- Purchased New Pump (Lower Flow Rate)



Conducted Tests

Refrigeration Tests

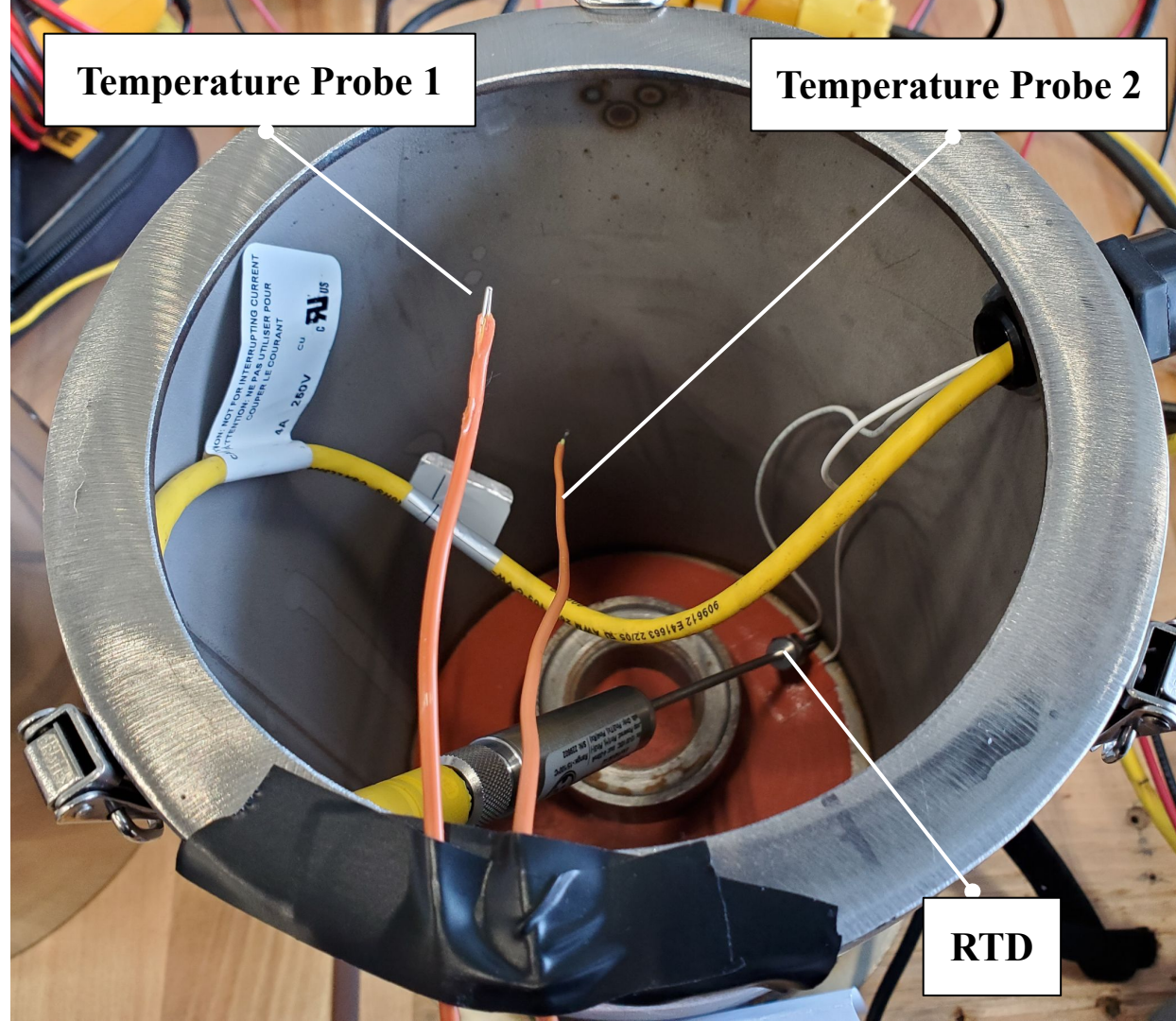
- Goal: Get the glycol to reach -5°C
- Speed Potentiometer set to $\sim 0\Omega$
- Needed a bypass to decrease the flow rate (old pump)



Conducted Tests

Heating Tests

- Different probe positioning



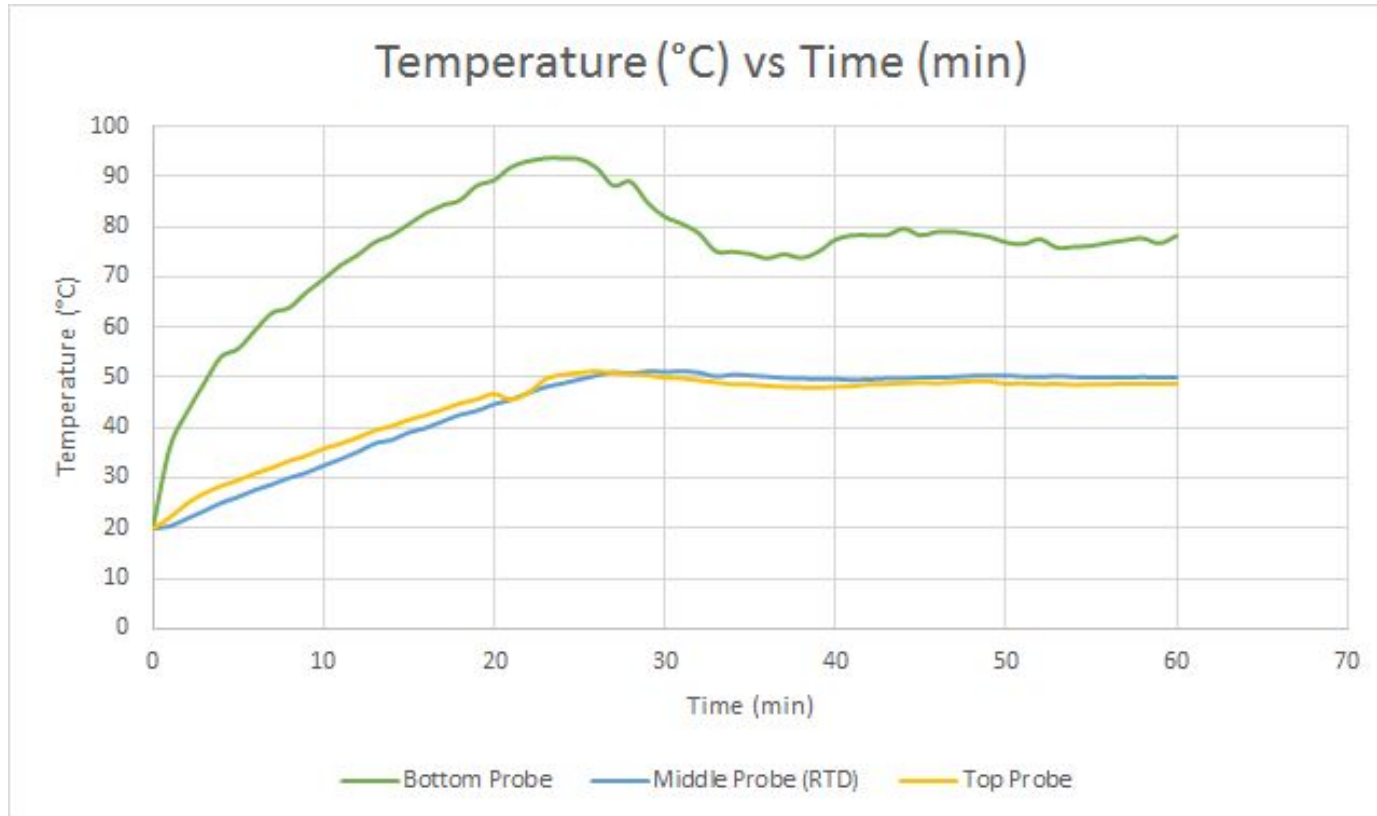
Conducted Tests

Calibration Test

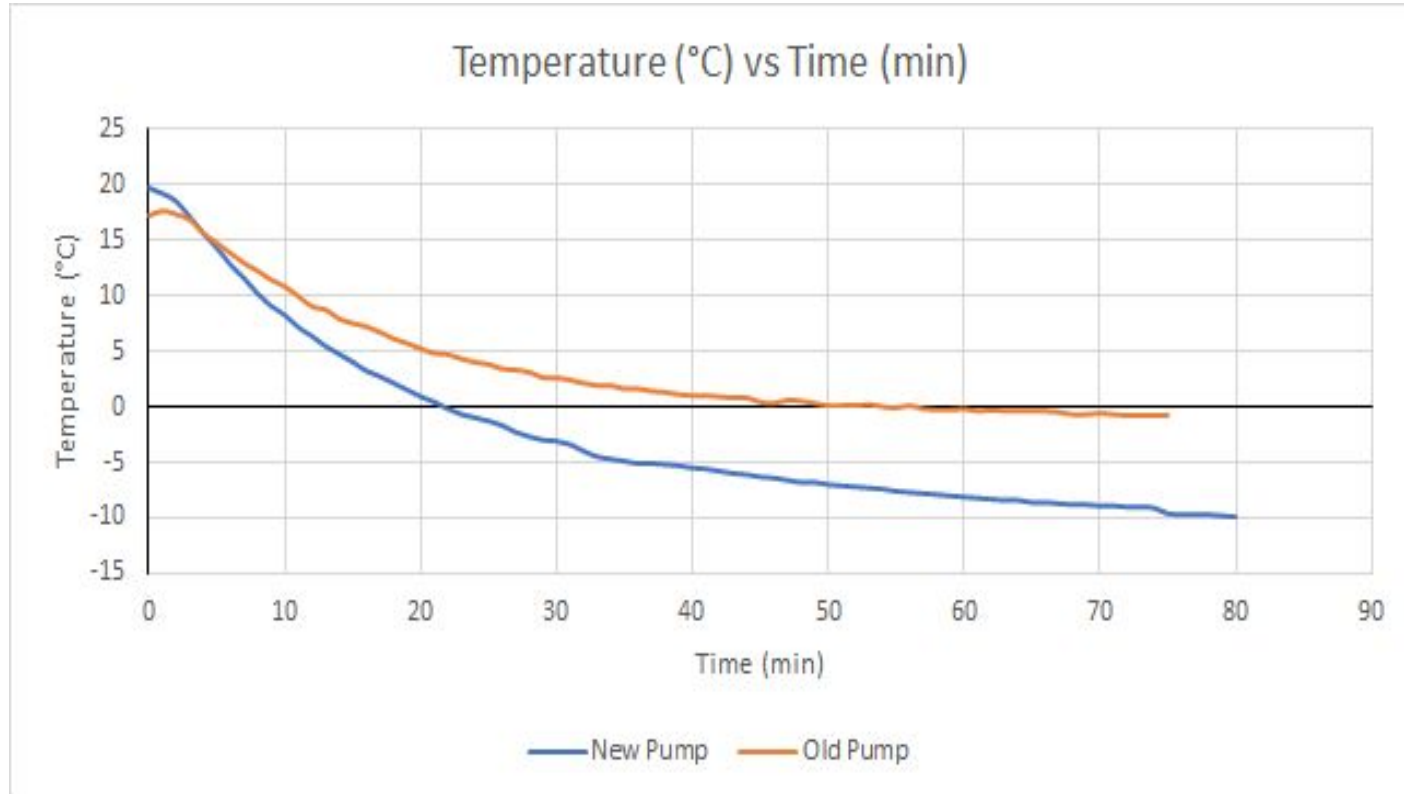
- Freezing point: $0\text{ }^{\circ}\text{C}$
- Boiling point: $100\text{ }^{\circ}\text{C}$



Test Results (Heating)



Test Results (Cooling)



Continued Testing

- Water Jacket Heating & Cooling
- PID Temperature Control System
- Complete System Integration



Bill of Materials

Bill of Materials for Main Components		
Product	Quantity (Unit)	Cost Per Unit
Heating Pad	1	\$80
Liquid Chiller Unit/System	1	\$690
DC Power Supplies (12V & 24V)	1	~\$73
PID Temperature Controller	1	~ \$320
RTD Temperature Probe	1	\$55
Inner Tube (Container)	1	~ \$69
Water Jacket	1	~ \$40
Water Jacket Piping Supplies (Tubing, Insulation, Valves, Fittings, etc.)	1	~ \$68
Glycol	1	~ \$23
Water Pump	1	~\$15
Miscellaneous (Wires, Rubber Sheet, Acrylic Sheet, etc.)	1	~\$57
Total Cost:		~\$1,490

Next Steps

- Purchase final materials → 16th March 2020
 - Enclosure parts
 - Miscellaneous hardware
- Build an enclosure around the refrigeration system → 18th March 2020
- Completion of tests → 24th March 2020
- Modifications → 27th March 2020
- Final Presentation/Report → 31st March 2020
- Design Expo → 22nd April 2020

Questions

