Supermodule Heater Test

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March 16, 2023

Contents

- Objective
- Test steps
- DSG-designed heater block
- Heater block installation
- Results
- Post-test observation
- Conclusions

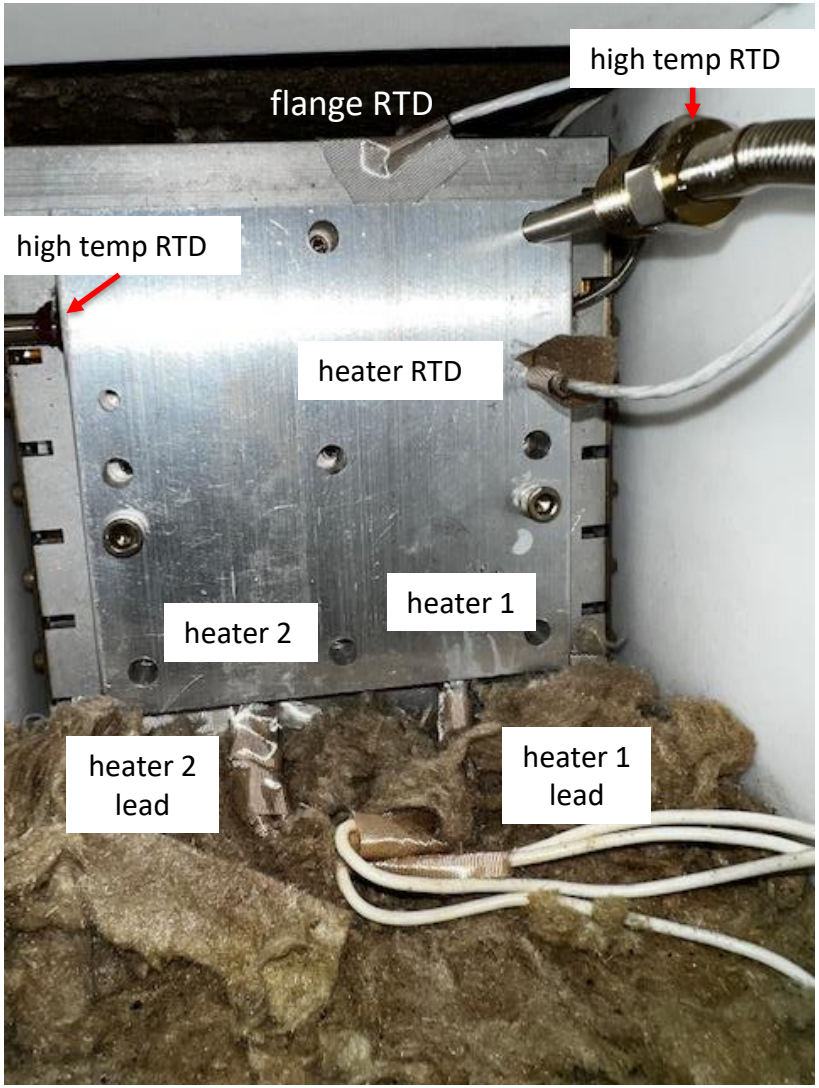
Objective

1. Determine if cartridge heaters provide adequate power to heat the ECAL supermodule crystal face to 220°C
2. Measure the temperature at different locations on the module
3. Test the controls and equipment needed to power and monitor the heater system

Test Steps

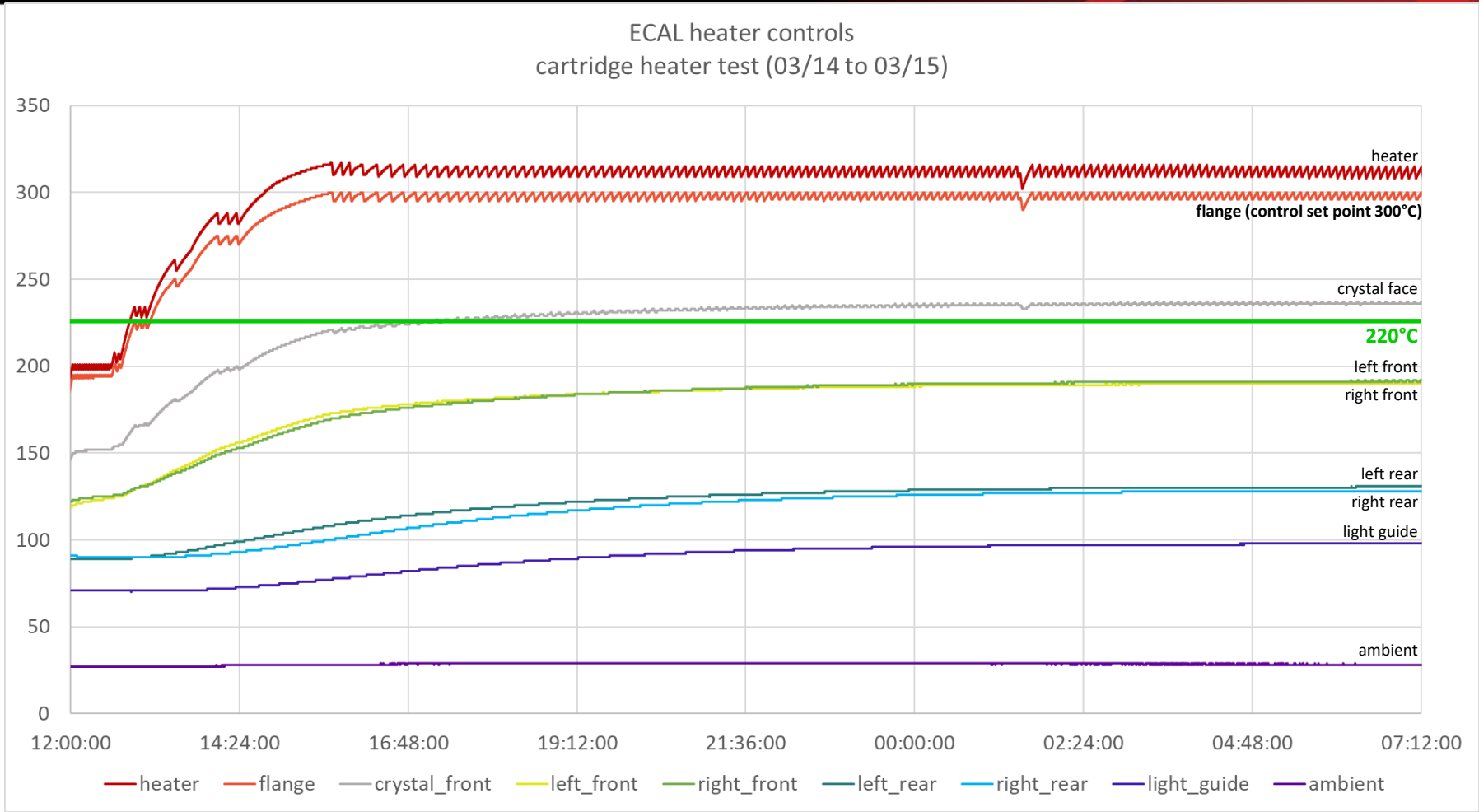
- Fabricate and install a heater block on the ECAL supermodule with two cartridge heaters
- Apply heat to the front flange until the crystal face reaches the target temperature (220°C)
- Record measurements over time at different locations
  - front flange
  - center crystal front
  - center crystal rear
  - ambient

DSG-Designed Heater Block



DSG-designed 4” x 4” x 0.5” aluminum block

Results



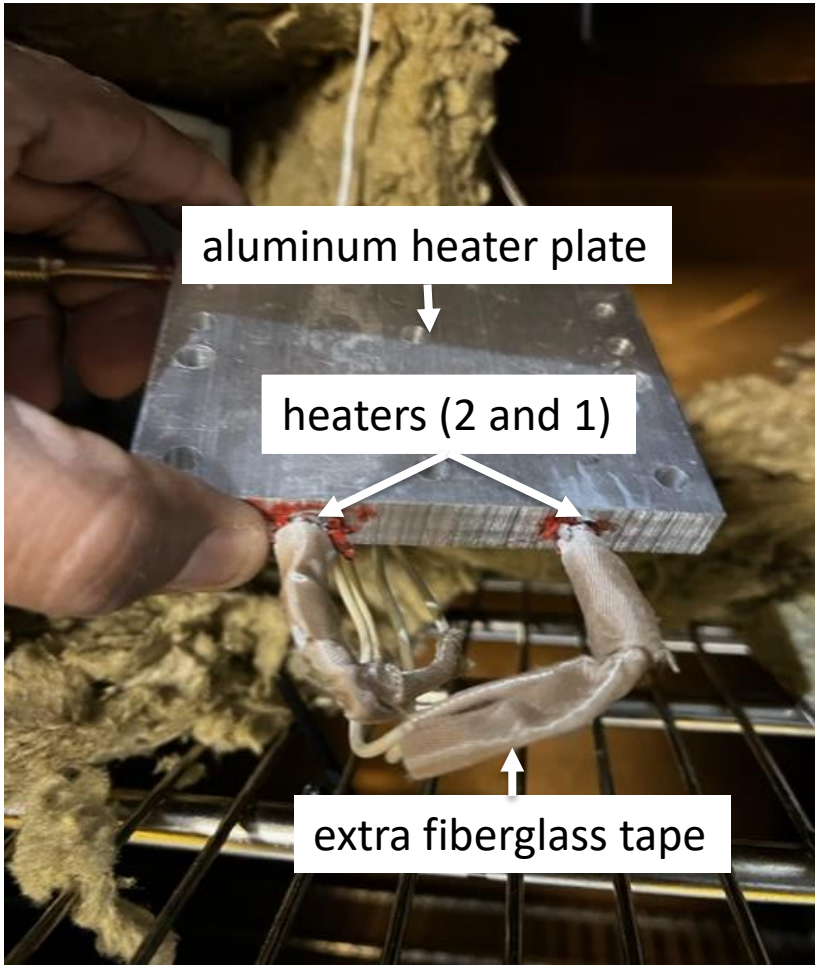
- The front flange temperature was used as the control set point—300°C (≤ 0.5%)
- The crystal face target temperature of 220°C was reached
- The heater temperature reached 315°C
- Input voltage is 21 VDC per heater, output 53 W per heater

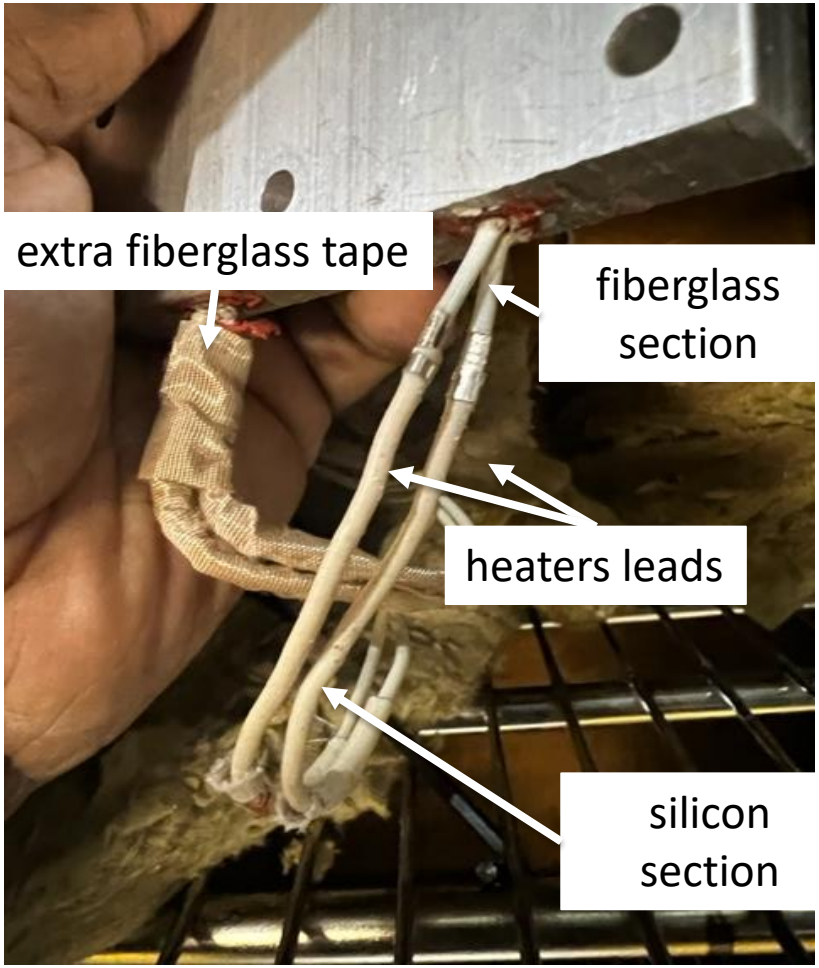
Post-Test Observation

- The cartridge heaters performed as expected using the DSG-designed heater block
- The heater leads look normal after +300°C
  - **A closer inspection will be completed after cooldown**
- The standard Omega PT100s worked without issue
  - All high temperature RTDs failed (rated for 500°C)

- **The target temperature (220°C) at the crystal face was achieved**
  - Heater temperature was 315°C
  - Flange temperature was 300°C

Post-Test Observations Cont.





Only minor discoloring of the first few inches of silicon jacket is observed, most likely caused from the adhesive from the extra fiberglass tape (added by DSG). The small section of fiberglass at the base of the heater remained unaffected at 300°C.

Conclusions

- The test validated the use of cartridge heaters
- The cartridge heaters produced up to 70 W with 24 VDC supplied
- The cRIO-based controls system running LabVIEW worked as expected

End