

Progress report on ECAL for SBS

Thermal Expansion of Glass Blocks for ECAL

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26/07/2017

Introduction

Who am I?

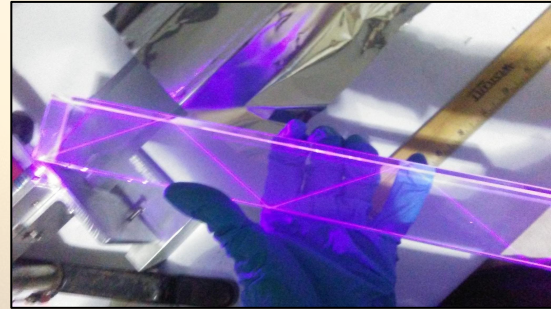


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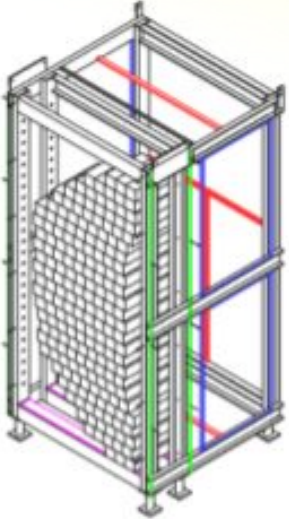
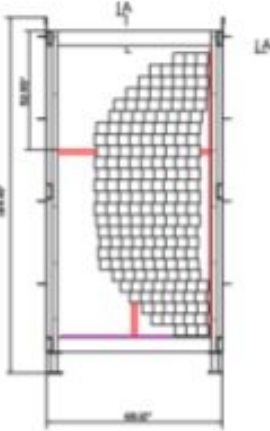
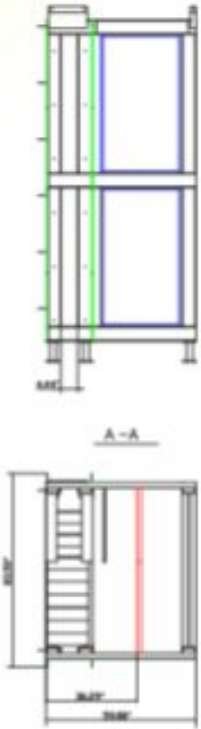
What am I doing here?

- Development and execution of procedures for production and quality testing of glass blocks for ECAL.



ECAL - Structure

LOCATION SM IN ECAL

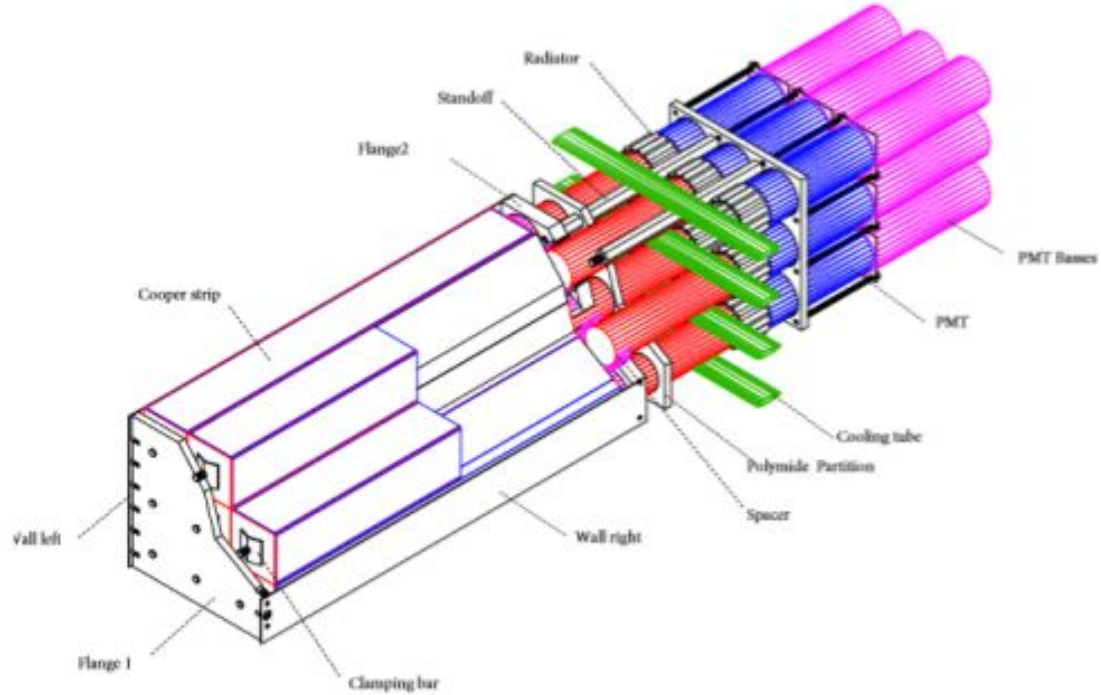


NOTE

- 1 In Ecil are collected 192 Super Modules, 118 for LG 42.5x42.5x340mm and 74 for LG 40x40x400mm
- 2 Each SM consist of 9 LG
- 3 The drawing shows only location of SM

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ECAL - Super Module

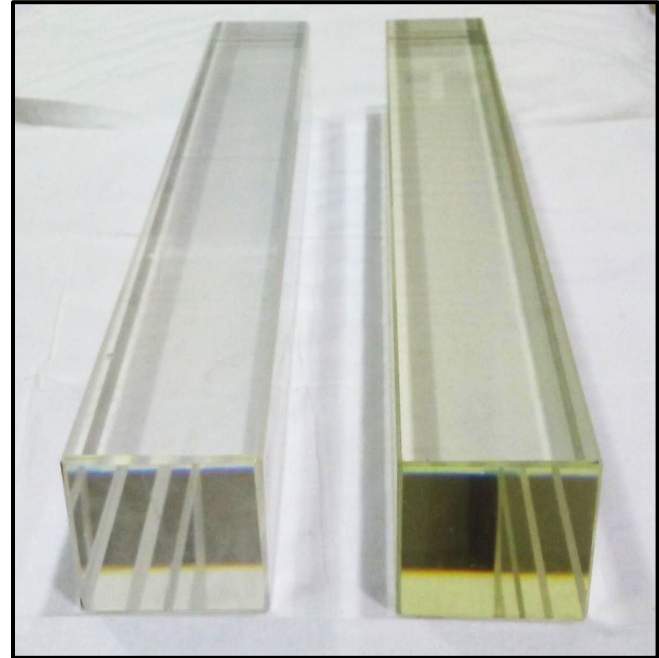


Materials used in ECAL structure

Material	Coefficient of thermal expansion (1e-6 / K)
Steel	11 - 12.5
Titanium	8.5 - 9
Aluminium	21 - 24
Glass	5 - 9
Acrylic	68 - 75

Materials used in ECAL structure

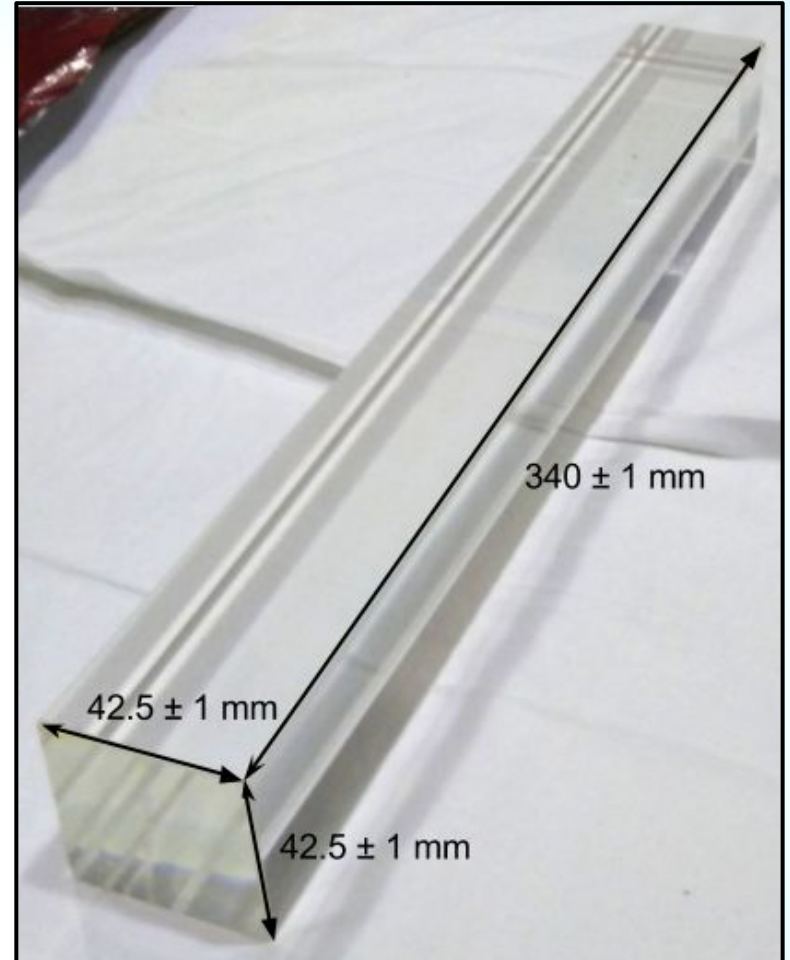
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Task : Measure thermal expansion coefficient of clear and yellow glass blocks.

Glass blocks

- Any given side : ± 1 mm
- Range reflects the variability in actual size of blocks and not the precision of measurement.
- Blocks come in various shades of yellow



Tools used

- Industrial oven
- Thermometer & thermocouples (± 1 K)
- Depth gauge (± 1 μm)
- Insulation for glass blocks
- Rig to brace everything together

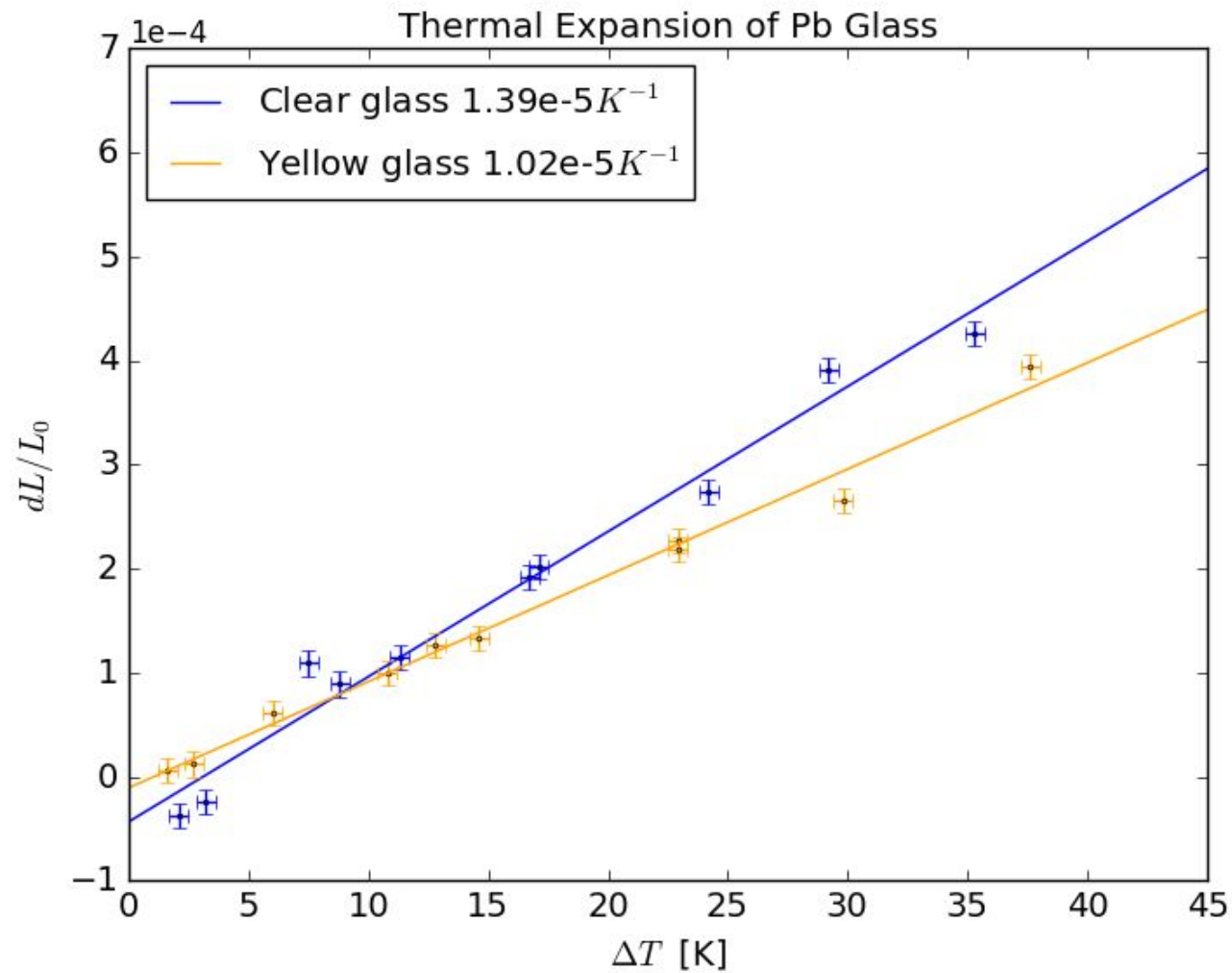
Length measurement rig

- Precision $\sim \pm 5 \mu\text{m}$
- Open at one end to allow expansion of the rig as it heats up.
- Minimizes areas where block contacts the rig to ensure repeatable results.
- Thermocouple attached to the rig to monitor temperature.



Procedure

- Wrap glass blocks in foil.
- Heat in oven at 90 °C for ~30 minutes (until temperature is sufficiently uniform).
- Take out of oven and measure the hot block immediately followed by a reference block. Take down temperature of the heated block and the rig for each measurement.
- Repeat measurements as the blocks cool down.



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