Cooling Tests of the GEM Prototype Ian Crotty

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1. Worst case scenario, all heat is transferred into the cooling circuit. This is done with an electrical load applied directly to the cooling pipe. Either flat resistors on soldered tabs to the pipe or resistive wire wound around the pipe. This will give the greatest ΔTemp across the chambers in a 20deg Sector (2 SMs) and so an idea of the difference in operating temperatures.
2. Detailed study of the Real GEM with VFATs and OH. Will be used to optimize the thermal circuit to obtain the best cooling of the electrical loads, namely VFATs & OH board.

Require isothermal conditions, real cooling cicruit conditions.

1. Full Test in the CMS HE nose mockup to be built in 904. This will include convective currents engendered by the GEM (and its neigbours ). Full services to ensure the details of unions & connectors and cable bending radius. Study the assembly techniques for piping with all cables etc present.

***Worst case scenario***

A simple test to get the cooling study up and running. Obtain the cooling station, perhaps on loan, to ascertain the required performance. Set up the temperature measurement & data logger.

The cooling cicuit does not need to be the version for the GEM but simply the length and diameter are required. The pipe is isolated to ensure full heat transfer to the cooling medium (water).

Schematic of the test

Flow Rate [kg/s]

Cooling station

T1

T2

List of equipment and facilities required.

* Cooling station
* HE flange with Brackets and CSC on a wall.

Cooling station spec;

0 – 40degC

Cooling capacity <1kW

Precision <0.1 degC

Wooden mockup of the HE nose area

