Contribution ID: **867** Type: **Poster Presentation**

C1Po1F-09 [42]: The Thermo-Electric Design of the Electric Current Feeders of the HL-LHC Triplet Magnets

Monday 22 July 2019 09:00 (2 hours)

The HL-LHC Project currently undertaken by CERN that provides an upgrade to the existing LHC accelerator, is designed to increase the luminosity of the colliding particle bunches by a factor of at least five.
Part of this upgrade will require the replacement of the existing groups of three superconducting LHC triplet magnets situated on each side of the ATLAS and CMS detectors with similar groups of four higher field HL-LHC triplet magnets of a new design that exploit coils manufactured with cables in Nb3Sn superconducting alloy.
The HL-LHC triplet magnets require separate electric current feeders linking their cold masses to their cryostat vacuum vessels, thermo-electrically optimised and specifically designed to separately feed their quench protection, beam tuning and instrumentation systems with electric current.
The HL-LHC instrumentation feedthrough system is similar, though containing a larger cable inventory, to that mounted on existing cryo-magnets in the LHC accelerator whereas the quench protection and beam tuning systems, both present new requirements calling for a substantially different design approach.
The quench protection system requires a sinusoidal pulse at about 6Hz peaking at 3000 A and decaying exponentially to close to zero in about 2 seconds.
Beam tuning requires a 35A peak continuous sinusoidal input with a period varying between 60 and 30 s and must withstand occasional simultaneous single current pulses rising to 4000A and decaying to zero in about 0.5 seconds.
Installed in a highly activated zone of the LHC, all three systems, designed to be maintenance-free, consequently exploit only natural heat convection to prevent the formation of condensation at their warm ends.
This paper describes the functional design and thermo-electrical optimisation achieved for each of these current feeder systems.

Author: Mr PASDELOUP, Florian (CERN)

Co-author: Mr WILLIAMS, Lloyd Ralph (CERN)

Presenter: Mr PASDELOUP, Florian (CERN)

Session Classification: C1Po1F - Superconducting Magnet Systems I