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Hi-Lumi LHC Twin Aperture Orbit Correctors Magnet Assembly & Cold Test

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Abstract—The Large Hadron Collider (LHC) upgrade, called High Luminosity LHC (HL-LHC) is planned for the next decade. A wide range of magnets and new technologies are currently under development. One of these systems will be a set of twin aperture beam orbit correctors positioned on the approaches to the ATLAS & CMS experiments. This twin aperture magnet system comprising 16 magnets, approximately 2 m long, with large 105 mm clear aperture coils. Each aperture will independently deliver 5 T.m integral field, between apertures the field vectors are rotated by 90° from each other, and individually powered.

This paper presents the sequence of component developments to produce a cost-performant, canted cosine theta (CCT) model magnet. We describe the challenges encountered during the manufacture of the coil formers with their helical canted coil winding process which places a number of insulated wires into the CNC 3.5 axis machined slots. We describe the: pressurized impregnation process, multiple jointing to connect inner and outer sets of wires within the confines of the coil assembly, magnet assembly into support structure and yoke. Finally we present the quench performance and, initial magnetic field measurements of this novel coil configuration.

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