



Fig.A.8.1 Showing 12 magnets on the test insert

The scheme has been successfully tested and implemented for testing 12 magnets at a time (fig.A.8.3). The scheme allows measuring the contact resistance of all the magnets simultaneously thereby reducing total testing time further. With this, LHe consumption has been reduced by 25% and a throughput of 12 magnets/day has been achieved.

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A.9 The DAE-CERN Collaboration for the Testing and Evaluation of Super-conducting Magnets of the LHC

The DAE-CERN Collaboration for the LHC Project at CERN foresees up to nearly 100 man-years of manpower for the LHC Magnets test Programme. Under this protocol, Engineers and Physicists from India participate in the testing and qualifying the main dipoles of the LHC. The 1232 super-conducting main dipoles help in deflecting the 7 TeV beams in

the LHC. The Indian Collaborators will soon help in testing the ~500 Short Straight Sections (SSS) too, which house the focusing quadrupoles, apart from several super-conducting corrector magnets.

LHC employs superconducting dipoles to produce fields of 8.33 Tesla, which requires a current of 11850A, possible under the cryogenic regime of super-fluid helium at 1.9 K. Every magnet has to be “trained” before putting into the tunnel. This requires training of the magnets through a sequence of quenches. The “trained” magnets are normally expected to have “memory” meaning that they maintain their performance after testing & storage and before their installation in the tunnel.

An extensive test facility for both the dipoles and the SSS, is available in CERN. Apart from equipment for cooling and powering the magnets for training, SM18 has facilities for making extensive magnetic measurements, both when the magnets are cold or warm. The magnetic measurements include the measurements during LHC magnetic ramp simulation cycle as well as the so-called load line, and the field-angle measurements. SM18 Test Facility has six clusters, each with two test benches. Each bench is fed independently with a cryogenic feed box (CFB). The benches in a cluster share common electronics and the power source. This means that at any time only one bench in a cluster can undergo cold tests within the limits of cryogenic availability. A number of scientists and engineers from CAT have contributed to the magnet evaluation Programme. Dr. V. Chohan of CERN heads the SM18 Facility Operation for Cold Tests.

On the initiative and under the guidance of the operation team leader, a number of new features to aid operation have been brought in and significant improvements have been carried out over the past two years. Indian team members and CERN staff have been involved in these new features as well as carrying out these improvements, which have immensely helped in achieving a throughput of around 11-12 magnets every week. This performance is necessary to achieve the target date of 2007 for the start-up of the LHC. The whole process of Operation for magnet testing has undergone a renaissance from a crude manual data logging into a more efficient, sophisticated and highly automated testing management system in a rather smooth manner.

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