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Wed-Af-Or13-02 [Invited]: New Approach and Test Facility for High Field Accelerator Magnets R&D

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The traditional approach for developing high field magnet technology has been to build a new magnet with some variations in design parameters or in material. Building a high field magnet is time consuming and expensive. This limits the development and demonstration of a new design or technology and/or forces several changes to be made at the same time which limits the clear interpretation of the results. To overcome this limitation, BNL built and successfully tested a 10 T Nb3Sn dipole DCC017 with large enough open or clear space (31 mm wide and 338 mm high) so that a pair of racetrack coils could be inserted into this opening without disassembling the magnet. The motivation behind this design was to develop a program where the new coils (with a large range in width and height accommodated) would reside in a high field region in contact with the existing coils (just as any other magnet coils) and thus become an integral part of the magnet. This approach, therefore, makes each insert coil a new magnet test, but at a much "lower cost"and in a much "shorter turn-around time". This brings a paradigm shift from the conventional R&D approach and should encourage development and testing of innovative and so called, "high-risk, high reward"designs and technologies, as well as facilitate systematic studies of various coil parameters that requires a series of tests but were impractical because of the associated budget and time. The approach was successfully tested when the new HTS insert coils were installed and tested with the existing Nb3Sn coils to demonstrate an HTS/LTS hybrid dipole. The magnet and the facility are now becoming available for a wider use as a part of the US Magnet Development Program.

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