

Recent Progress on CORC® Cable and Wire Development for Magnet Applications

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Abstract – Advanced Conductor Technologies has been developing high-temperature superconducting Conductor on Round Core (CORC®) cables and wires wound from REBCO coated conductors for use in high-field magnets. Magnet applications on which the conductor development is focused on include compact fusion magnets that operate at currents between 50 and 100 kA at fields of 12 – 20 T and accelerator magnets that operate at currents exceeding 10 kA and engineering current densities (J_e) of over 600 A/mm² at 4.2 K in a background field of 20 T.

Here, we outline the latest progress on CORC® cable and wire development. We'll discuss the latest results of the 6-around-1 cable-in-conduit-conductor (CICC) based on CORC® cables developed for fusion magnets and discuss methods to increase the CORC®-CICC flexibility that would allow bending to diameters in the order of 1 meter. The latest results on CORC® wire development for accelerator magnets will be discussed, including in-field measurements of CORC® wires that have demonstrated a projected J_e at 20 T of more than 400 A/mm².

The next step in CORC® cable and wire development is underway, which is their incorporation into high-field demonstration magnets. Here we outline the latest results of high-field insert magnet development using CORC® cables and wires. Several magnet programs will be discussed, including those focused on the development of accelerator magnet inserts for canted-cosine theta (CCT) and Common Coil magnets that would generate 5 T in a 10 T background field within the next 2 – 3 years.

Keywords (Index Terms) – High-temperature conductors, coated conductors, high currents cables, CORC cables, fusion magnets, accelerator magnets.

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