



Contribution ID: 327

Type: **Oral presentation (15min)**

## **Development of high-temperature superconducting Conductor on Round Core magnet cables**

*Thursday 10 July 2014 15:00 (15 minutes)*

The next generation of high-field magnets are likely to incorporate high-temperature superconductors that are bundled into high-current cables. Conductor on Round Core (CORC) magnet cables, containing many RE-Ba<sub>2</sub>Cu<sub>3</sub>O<sub>7-δ</sub> coated conductors wound into multiple layers, are a promising candidate that will ensure a low magnet self-inductance, allowing for high current ramp rates during operation, and for a more straightforward magnet protection. An overview of the current status of the development of CORC cables for fusion and high-energy physics magnets at Advanced Conductor Technologies will be provided. The latest developments include the construction of a six-around-one CORC Cable in Conduit Conductor (CORC-CICC) for fusion magnet applications, capable of carrying a current exceeding 60 kA at 4.2 K and high magnetic field. The cable has been tested in a background field of 8 T at high currents and current ramp rates, while experiencing high transverse compressive operating stresses. Reliable, low-resistance CORC cable joints, enabling the construction of demountable fusion magnets, were also developed. Several viable approaches to make joints in multi-kA CORC cables will be discussed. CORC cables are also being developed for use in accelerator magnets, with the aim to increase the engineering current density of the cable at high magnetic field and a cable bending diameter as low as 6 cm. We are now able to wind CORC cables with a cable machine that is being developed at the University of Colorado, which allows for the production of long cable lengths. We'll discuss the added benefit of a higher CORC cable performance when winding CORC cables with a machine, due to a better control of conductor winding tension and tape spacing.

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**Session Classification:** Thu-Af-Orals Session 13

**Track Classification:** C-08: Fusion magnets and conductors