

## Application Potential of Round Wires/Cables Made from CC Tapes

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**Abstract** – General requirement for AC or pulsed magnetic field coils is low inductance. This usually requires using a cable instead of a single conductor. One of the concepts applicable for coated conductors is Conductor on Round Core cable (CORC). This solution offers advantages for insulation and winding technology, but it exhibits also interesting electromagnetic properties. We have investigated round wires/cables from different points of view in experimental and theoretical manner. Our research regards the fields of mechanical properties, in-field critical current, AC loss and cooling conditions. In this contribution we summarize the main findings of these studies. Mechanical properties of coated conductors and degradation of critical current under deformation are the main factors limiting the cable architecture. On the other hand the arrangement of tapes has strong influence on its transport capacity because of intrinsic  $J_c(B)$  dependence of the superconductor. We present the analysis of critical current for cables in several applications. Round wire/cable offers very low transport AC loss and also reduced magnetization AC loss especially when striated tapes are used. In this contribution we show when it is plausible to use CORC cable and when it is worth to use other concepts. Probably the main drawback of CORC concept is its low engineering current density. Nevertheless the empty space can be used for cooling purposes. We studied this option and present the results of tests with liquid nitrogen circulating through the tube serving as the cable core. Interesting issue is the application of round cables in coils. We achieved promising performance with negligible degradation in model coils with diameters in the 150 – 350 mm range.

**Keywords (Index Terms)** – Coated conductors, CORC cables, critical currents, AC losses, electromagnetic and mechanical properties.