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### HTS CroCo - a Strand for High Direct Current Applications

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High temperature superconductors (HTS) are discussed as energy-efficient solutions for applications needing high direct currents beyond 10 kA e.g. for large high-field magnets or busbar systems in industrial electrolysis plants. *REBCO* coated conductors are promising materials due to their excellent electrical performance at both, high fields and high temperatures. A number of high-current cable concepts based on REBCO tapes were developed such as the Roebel cable, co-axially wound tapes and several stacked-tape arrangements, among them the HTS CrossConductor (HTS CroCo), a stacked-tape conductor with high current density developed at KIT.

In this presentation, the conceptual design of high-current HTS cables based on HTS CroCo strands is discussed and the realization of a 35 kA demonstrator made from twelve HTS CroCo strands is presented. The demonstrator was tested successfully at  $T = 77$  K, reaching the target performance 35 kA DC current at 77 K and even for a constant-current operation at 36 kA for more than 30 minutes limited by the copper connections, not the superconducting cable. Currents and voltages were measured over all twelve strands individually during the parallel operation in the cable. The measured data allow the experimental validation of the modeled current distribution calculated, based on the individual characterization of the twelve strands. The use of such cables for example in aluminum electrolysis will be discussed as a potential application.