

## Design of the HTS Fusion Conductors for TF and CS Coils

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**Abstract** — The main electrical and mechanical requirements for the LTS fusion conductors of DEMO are retained as a starting point for the development of HTS fusion cables. Based on the HTS coated conductors technology, a flat cable design was proposed by CRPP (renamed to the Swiss Plasma Center (SPC)) using the strands made of twisted stack of tapes soldered into copper profiles. Analytical modelling of the cable geometry is developed and presented in this work. The model was used to estimate various properties of cable. Addressing the issue of bending strain and related performance degradation, optimization model of the cable properties was built, which allows to best fulfil the cable requirements. Design options are developed for both Toroidal Field (TF) coils operating at 63 kA, and Central Solenoid (CS) coils operating at 50 kA. Paying attention to the DC and pulsed operation of the TF and CS coils, proposals for the design of the forced flow HTS conductors are reported and discussed for each type of the coils.

**Keywords (Index Terms)** — HTS fusion cables, TF and CS coils.