

Full-scale R&D

Low-ac-loss and robust high-temperature-superconductor technology

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Summary :

The SCSC cable (Spiral Copper-plated Striated Coated-conductor cable) is our novel concept of high-current high T_c superconductor cable, in which copper-plated multifilament (striated) coated conductors are wound spirally on a metal core in multiple layers in order to reduce ac loss and to improve the robustness against normal transition. It is bendable to any direction.

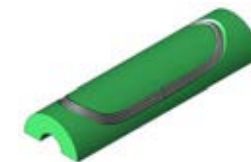
In the feasibility study phase of the project, we developed a reel-to-reel cabling machine and successfully fabricated a long piece (> 5 m) of SCSC cable. We confirmed high current capacity (1 kA at peak of ac current at 50 Hz) and ac loss reduction (the 1/10th as compared to a standard coated conductor) using short samples of SCSC cable.

In the full-scale R&D phase of the project, we aim to demonstrate low ac loss ($\sim 1/10$ th), high current capacity (~ 2 kA), and the applicability to coils with various shapes by using demonstrator coils.

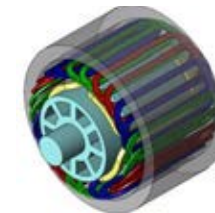
Outcome of the project will be used in the further R&D of electrical machines, which contribute to carbon neutralization, such as SC motor for aircraft propulsion and SMES (Superconducting Magnetic Energy Storage), which can enhance the introduction of renewable energy to a grid.



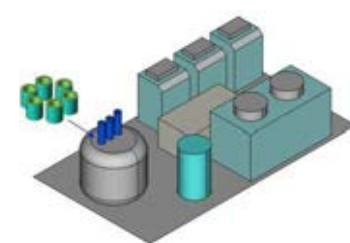
SCSC cable and cabling machine developed in feasibility study



Demonstrator coils in full-scale R&D



SC motor for aircraft propulsion



SMES