

## Design of Superconducting Magnets for a 600kJ SMES

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The research of Superconducting Magnetic Energy Storage (SMES) system using High Temperature Superconducting (HTS) wire has been actively progressed world widely. In this paper, Design of superconducting magnets for a 600 kJ SEMS was represented. In this research, basic constraint conditions in design of 600 kJ magnet are V-I loss (<1 W), inductance of magnet (<24 H), the number of Double Pancake Coils (DPC, about 10), The number of turns of DPC(<300), outer diameter of DPC(close to 800 mm) and total length of HTS wire in a DPC(<500 m). As a result of optimum design, we obtained design parameters of 600 kJ SMES magnet according to two operating currents, 360 A and 370 A, which are in the limited conditions without V-I loss. V-I loss of each operating current was calculated with design parameters and V-I characteristic of the HTS wire. As a result of calculation, V-I losses in operating currents of 360 A and 370 A were 0.6 W and 1.86 W, respectively. Even though all design parameters of the SMES magnet in case of operating current of 360 A were in the restricted conditions, V-I loss of SMES magnet showed a tendency to generate at local DPCs which are located the top and the bottom of SMES magnet more than that of the other DPCs. Therefore, additional research needs to reduce above problem in the future.

Keywords : SMES, HTS magnet