

## Recent Progress of Superconducting Induction Heater with HTS magnets in Korea

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**Abstract**— Large-scaled induction furnaces for non-ferrous metal billets operated at commercial frequency have an energy efficiency of only 50~60% due to the considerable loss from the copper coils used to generate the magnetic fields. Efforts to improve their efficiency are hampered by physical limits. A DC induction heating using HTS magnets has been suggested for achieving higher energy efficiency. A 10kW-class prototype for an HTS DC induction heater was developed in 2013. Changwon National University and TECHSTEEL will have completed a project to develop a 300 kW-class superconducting induction heater (SIH) with HTS magnets in 2017. This project was supported by the Korean government. In the operation of an HTS magnet, ensuring thermal stability against uneven quench is the most important factor. The metal insulation winding method using stainless steel allows the HTS magnet to maintain a great thermal stability by distributing the quench energy evenly and minimize the charging and discharging time. In this paper, we are going to introduce a 300 kW-class SIH and its performance test results. The HTS magnets were fabricated and excited under the conduction cooling condition, successfully. Now, the SIH with the HTS magnets are being fabricated and tested to heat up the metal billets including both the ferrous and non-ferrous metal billets. The performance test results will be applied for the commercial product of SIH.

**Keywords (Index Terms)**— Induction heating, metal billet, superconducting magnet, HTS magnet.

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