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Recent Development Trends of a 1.2 MW Superconducting Induction Heater using MgB2 NI Magnets

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In industries, there are many issues against the implementation of conventional heating furnaces. First, the government recently executed an environmental protection policy that requires industries to use better technologies against low efficiency and CO2 emissions, etc. Second, industries use old and inefficient technologies for heating metals with large capacity and low efficiency. Also, the work space is sometimes large, dirty, dangerous, and dull. Finally, engineers with various skills are required to operate advanced heating furnaces.
As one of the solutions to resolve these issues, the superconducting induction heater (SIH) with high efficiency has been developed using MgB2 magnets manufacturing technologies. These technologies include: applying superconducting wires to the magnet for SIH, securing the thermal stability of superconducting magnets, and fabricating large bore magnets for industrial applications, which would yield many positive contributions to metal processing industries.
In this paper, the recent development trends of a 1.2 MW SIH using MgB2 NI magnets described. And the novel design and experimental test results of MgB2 magnets were presented and discussed. Large bore MgB2 magnets were designed newly. The heating capacity was decided and the target magnetic flux density of the HTS magnets with iron cores selected for 1,200 kW heating power for an iron metal billets. The simulation results of the MgB2 magnet were analysed through the FEM analysis models. The experimental test and results of the MgB2 magnets were presented in detailed.
The largest MgB2 magnets in the world were fabricated and tested with outstanding operational results. These test process will be helpful for heating characteristics analysis of the various MgB2 magnets for commercialization. The related research will get the reference information of this study.

Primary author: CHOI, Jongho (Supercoil Co., Ltd.)

Presenter: CHOI, Jongho (Supercoil Co., Ltd.)

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