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Mon-Mo-Po1.06-06 [68]: A Saddle-shaped Post-assembly Magnetizing Coil for a 300 kW 2-pole High-speed Permanent Magnet Rotor

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Post-assembly magnetization is usually used in manufacturing process of high-speed permanent magnet(PM) rotors. This paper reports the optimization and test of a saddle-shaped post-assembly magnetizing coil for a 300kW 2-pole high-speed permanent magnet (PM) rotor. The required magnetizing space is 85 mm in diameter and 200 mm in length. A saddle-shaped coil structure is proposed, which effectively improves the coupling performance between the coil and the rotor, and reduces the magnetic field energy by 61% in comparison with the existing triple-coil structure. During the magnetizing process, eddy currents are produced in the coil and rotor reinforced structure and permanent magnet block. The influence of eddy currents on the magnetizing magnetic field and the electromagnetic force acting on the coil structure is analyzed. By optimizing the coil structure and pulse width, the effect of eddy current on the magnetizing magnetic field is reduced to less than 1%, and the power supply energy required for the magnetizing coil is optimized to the minimum. The saddle-shaped coil was fabricated and tested and has generated transverse magnetizing field of 6 T / 25 ms in the required space. The 300 kW 2-pole high-speed PM rotor has been successfully magnetized after assembly. The measured residual magnetic flux density agreed well with the theoretical calculation.

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