



MT 26
International Conference
on Magnet Technology
 Vancouver, Canada | 2019

Contribution ID: 1303

Type: **Poster Presentation**

Wed-Mo-Po3.05-06 [33]: Research of Post-Assembly Magnetization of Large Surface-Mounted Rare-Earth Permanent Magnet Machines with Integrated Magnetizing Windings combining with Stator Windings

Wednesday 25 September 2019 09:30 (1h 45m)

With the power increasement of permanent magnet (PM) machines, the manufacture process and maintenance of irreversible demagnetization become increasingly difficult, which limits the magnetic field configuration design of large PM machines. Post-assembly magnetization method is the key to solve these problems and can improve the machine performance. One way is adding additional integrated magnetizing winding. The magnetizing coils are directly wound around the un-magnetized PMs, and mounted on the surface of the rotor together. The PM machine can be magnetized after completely assembly by energizing the magnetizing winding with a pulsed magnetizing current. However, it is not easy to obtain high enough magnetizing field while ensure the insulation and reinforcement of the magnetizing winding due to the limited space between adjacent PM poles. A hybrid magnetization method using additional integrated magnetizing winding combining with machine's own stator winding for a megawatt PM wind generator is presented in this paper. The parameters of the magnetizing winding are designed. The parameters of the magnetizing circuit and the discharge sequence and field proportion of the magnetizing coil and stator winding are optimized to obtain the minimum magnetizing field required for saturated magnetization. The impact of inverse eddy current in PMs and the coupling effect between magnetizing winding and stator winding are analyzed. The problem of weakness of local magnetizing field caused by stator slotting is solved by using magnetic slot wedges. The simulation results show that the magnitude and uniformity of the composite magnetizing field meet the requirements, the ampere turns required is reduced compared with the method of using additional magnetizing winding only. Moreover, the temperature rise and stress of the magnetizing winding are acceptable. It is indicated that the large surface-mounted PM wind generator can be post-assembly magnetized with the magnetization method proposed in this paper.

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Session Classification: Wed-Mo-Po3.05 - Generators I