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## **Mon-Mo-Po1.09-08 [104]: Structure and Electromagnetic Characteristics according to Pole Piece Supporter Material of Magnetic Gear**

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Magnetic gear which is capable of non-contact transfer torque has replaced mechanical gear and has advantages of high-efficiency and improved reliability. Common electrical devices, such as motors and generators, have a single air gap. However, there are two air gaps in the magnetic gear, and a laminated structure called a pole piece is arranged between the two gaps at regular intervals in the circumferential direction. This structural feature causes difficulty in mechanical earth of the pole piece. In this paper, two methods of supporting the pole piece are presented.

Model 1 was made of non-magnetic metal as the material of the pole piece supporter and Model 2 was made of epoxy. Model 1 was easy to fabricate and mechanically robust, but it was confirmed that eddy current loss occurred in metal pole piece supporter. The higher the rotation speed, the higher the loss exponentially and the lower the output and efficiency. On the other hand, Model 2 had no eddy current loss, but was not mechanically robust, and was damaged during the experiment due to circumferential torque and vibration acting on the pole piece.

This paper presents information on the advantages and disadvantages of the pole piece supporter according to the materials. Through the result, it is possible to consider materials suitable for the pole piece supporter according to the torque and rotation speed of the magnetic gear. Each model was designed with 3D-FEM to improve analytical reliability. An opinion is also presented on the torsional stiffness of the pole piece, which was mentioned as one of the causes of the decline of analytical reliability in previous studies.

Specific design and experiment contents are disclosed through the full paper.

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