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Mon-Mo-Po1.07-09 [84]: Design of SMC core in Axial-Flux Motor with 3D Printing

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The Axial Flux Permanent Magnet Synchronous Motor (AFPMSM), manufacturing 3 Dimensions are limited in few ways. 3D modeling is less mass-produced with high cost of unit production because stator must roll up the amorphous electrical steel plate or be molded. The study shows AFPMSM with 3D printing technique cannot be materialized in existing motor. Under the same conditions of motor design like size, amount of permanent magnet (PM), and winding used in power density of RFPMSM and new AFPMSMS. AFPMSMS includes comparative analysis of torque density between existing model produced by Soft Magnet Composite (SMC) core with molding techniques and model that contain stator shoe produced by 3D Printing technique. The Direct Drive Type motor for front-load washer was selected in this paper. Specifications of AFPMSM were determined in size, number of poles and slots, and amount of PM usage based on the existing RFPMSM. To increase precision, the study of axial direction Dummy analysis to consider the magnetic flux leakage in the axial direction to carry out when setting up 3D finite element method. A stator core and double-sided PM rotor type which can increase the torque density efficiently by using more PM at the same size of selected among the types of AFPMSM. The shapes could bring a high torque density because of the difficulties of stacking the stator, the free shape form of 3D Printing was suitable for this study. Specifications Design of AFPMSM with parameter analysis was made stator core shape, which is applied with 3D printing technique. Firstly, existing AFPMSM was comparative analysis with AFPMSM that stack a shoe on stator teeth with 3D Printing technique. Finally, new AFPMSM were combined of high directional electric steel plate and SMC core for better performance, and the feasibility of the study was verified through prototype test.

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