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

Contribution ID: **1238** Type: **Poster Presentation**

Mon-Mo-Po1.06-08 [70]: A Study on the NVH Characteristic Analysis of a Teeth-Concentrated Winding Motor

Monday 23 September 2019 09:15 (2 hours)

The vibration occurring in an electric motor can be largely divided into mechanical vibration due to nonaligned bearings and shafts, and electromagnetic vibration by the electromagnetic force. For existing industrial electric motors, the mechanical vibration associated with the life of the motor was the most important concern. However, in recent years, electric motors—such as the ones used for electric cars and hybrid cars—have high-torque density by using the rare-earth permanent magnet. Thus, the relative importance of electromagnetic noise and vibration is increasing. Electromagnetic vibration and noise affect people emotionally, so it has become very important to reduce vibration when designing a motor.

There are two types of noise due to the electromagnetic field of the motor. The first is the structure-born noise, which is transmitted through the bearings of the motor to the mechanical path, and the torque riffle is the source. Second, the radial-force of the motor is the source of the air-born noise propagated to the air by the stator or housing of the motor.

In a three-phase motor, the torque ripple is produced by making the sixth harmonic of the electrical frequency as the primary wave. The magnitude of torque ripple also depends on the number of pole-slot combinations, the shape of the rotor / stator, and the magnitude of current applied. In order to analyze the radial force, which is the source of air-borne noise, an analysis of time and space harmonic of radial force density is required.

In this paper, NVH characteristics of 8p12s, 10p12s IPMSM are compared and analyzed quantitatively and qualitatively. The NVH test also measured and compared the noise and vibration levels and frequencies of each motor.

Authors: JANG, Iksang (Hyundai Mobis); KIM, Won-Ho (Gachon University)

Presenter: KIM, Won-Ho (Gachon University)

Session Classification: Mon-Mo-Po1.06 - Motors I