Press Publication Materials

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Akita University

Succeeded in developing a prototype high-flux plastic magnet rotor for ultra-high-speed motors for aircraft and automotive systems.

Akita University (President: Dr. Fumio Yamamoto) established the Joint Research Center for Electric Architecture to be operated jointly with the support of the Cabinet Office under the Subsidy for Regional University & Regional Industry Creation Project in April 2021.

The Center is promoting research and development with the main target of the aircraft system electrification market (motor, inverter).

The Center has now succeeded in developing a prototype high-flux plastic magnet rotor for ultra-high-speed motors for aircraft and automotive systems through joint research with IHI Corporation, and collaboration with local companies in Akita Prefecture(Miyakoshi Seiki Co., Ltd., Furuyamold Co., Ltd.,Kobayashi Industry Co., Ltd.) supported by the Akita Industrial Technology Center(Chief: Dr. Koji Saito).

High-flux plastic magnet rotor is a rotor for electric motor that maximizes magnet utilization efficiency. This is because the composite material of permanent magnet and plastic (composite material) is injection-molded, and at the same time, the powder magnet mixed with the molten plastic is magnetically oriented in the same way as the Halbach array (polar anisotropy).

It can be expected to significantly reduce machining in addition to high output (high efficiency), miniaturization and weight reduction.

Furthermore, by covering the injected plastic magnet with a high-strength carbon fiber composite material (CFRP) ring, we have achieved a structure that can withstand motor rotation speeds exceeding 100,000 rpm.

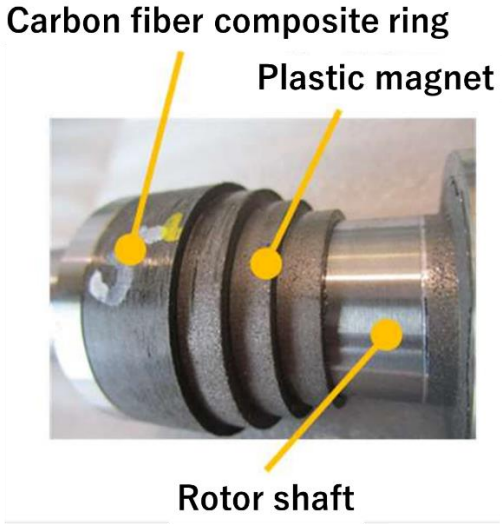

Figure 1. Plastic magnet rotor structure

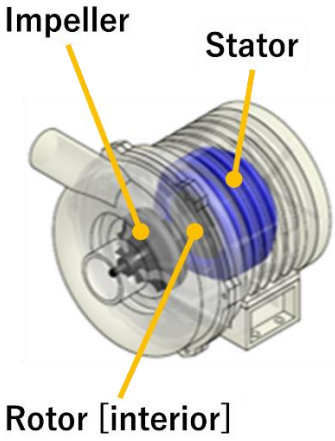

Figure 2. Ultra high-speed motor example

This prototype rotor achieved performance equal to or better than that of conventional sintered magnet rotors, in which 100% of the design magnetic force is occupied by magnets as a result of characterization in the Joint Research Center for Electric Architecture.

This achievement will also contribute to the reduction of rare earth usage. This is because magnets that are almost 50% plastic can achieve the same output as conventional products.

We will continue to bring together the technical capabilities of local companies and start studying mass production.

Additional prototyping to improve performance and the design of the ultra-high-speed Inverter for the rotor will be carried out from now on.

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