

October 2, 2020

Sumitomo Electric Industries, Ltd.

*This press release was originally published in Japanese on September 16, 2020

Sumitomo Electric Commences Mass Production of Powder Magnetic Cores for Axial Gap Motors to Create Thin and High-Performance Motors

Sumitomo Electric Industries, Ltd. has developed a powder magnetic core for axial gap motors, which are advantageous for creating thin and high-performance motors (in terms of output and efficiency). The Company started mass production and delivery of the product in August 2020.

With recent growing demand for light and high-performance motors, axial gap motors^{*1} are attracting more attentions due to their light weight, low thickness, and high power density, which have been achieved by adapting completely different structure from conventional motors (radial gap motors). In order to produce axial gap motors, high-quality magnetic cores^{*2} that suit their three-dimensional magnetic circuits are indispensable.

By utilizing our unique powder metallurgy technology, Sumitomo Electric has developed a powder magnetic core that helps to realize high-performance axial gap motors. In addition, the Company has newly developed an insulation coating technology to ensure the dielectric strength between the powder magnetic core and the copper winding, and has started the mass production and delivery of the insulation-coated powder magnetic core as an ideal component for axial gap motors.

In the future, Sumitomo Electric will continue to develop the market for powder magnetic cores for axial gap motors and contribute to the development of higher performance axial gap motors and equipment.

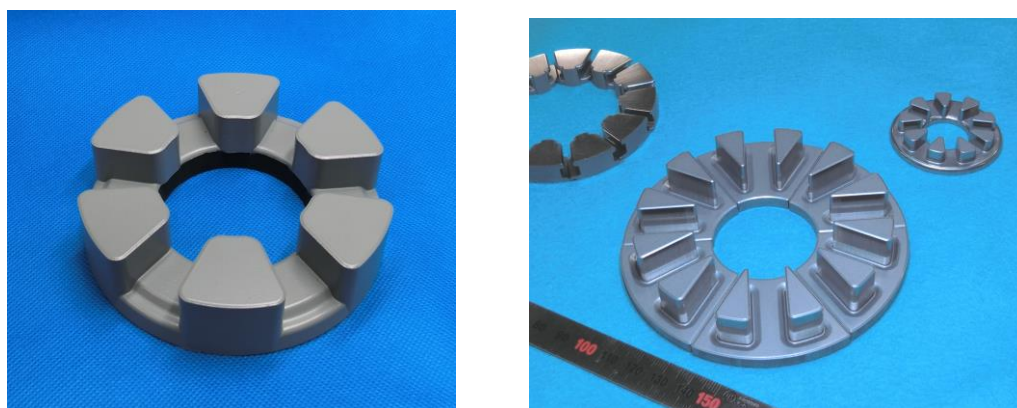
■ Features of the Powder Magnetic Core for Axial Gap Motors

A powder magnetic core is formed by die-pressing soft magnetic iron powder into a three-dimensional shape. Compared to magnetic cores made of electrical steel sheets used in conventional radial gap motors, it has great flexibility in terms of shape design and superior high-frequency characteristics, and has been put into practical use in various fields, such as automobile applications.

News Release

When using a powder magnetic core for a motor, it is usually required to provide an additional component to ensure the dielectric strength between the magnetic core and the copper winding. However, our unique insulation coating technology has made it possible to wind copper wire directly around the powder magnetic core and thereby reduce costs for additional components and assembly. This feature can increase the winding space, which contributes to the development of more compact and efficient motors.

In addition, the Company provides assistance for three-dimensional electromagnetic field analysis of axial gap motors based on motor specifications provided by customers



so that they can realize the advantages of the powder magnetic core for axial gap motors.

(Left) Insulation-coated powder magnetic core for axial gap motors (mass produced product)

(Right) Powder magnetic cores for axial gap motors (prototype)

*1: Axial gap motor:

Compared to conventional radial gap motors, axial gap motors are superior in power density and efficiency in the category of thin motors.

As shown in the table below, lighter weight and lower thickness can be achieved with performance kept at the same level as a conventional radial gap motor.

News Release

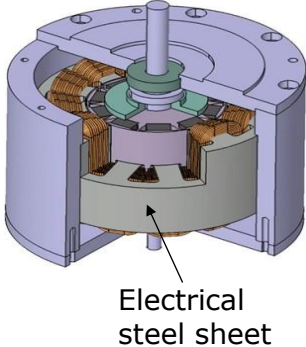
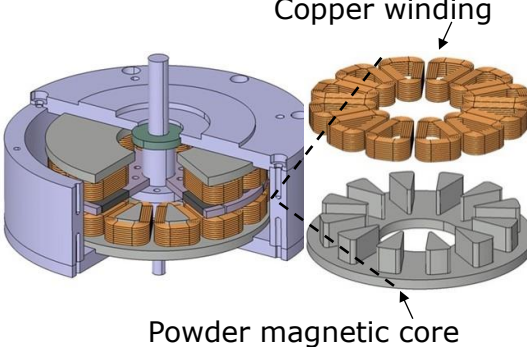
	Radial gap motor (conventional)	Axial gap motor
Structure (schematic diagram)		
Short axial length (mm)	83.0	35.0 (-58%)
Weight (kg)	3.2	1.6 (-50%)
Torque (N · m)	0.65	0.65 (--)
Maximum efficiency (%)	90.6	90.9 (+0.3%)

Table. Electromagnetic field analysis for an axial gap motor

- * This analysis is an example and does not show the relationship between all radial gap motors and axial gap motors.
- * Total length and weight are analysis values including the housing.
- * The schematic diagrams are images with partial cross-sectional views. They may differ from actual dimensions and structures.

*2: Magnetic core:

A magnetic core is a component around which copper wire is wound and used as a magnetic circuit to amplify the magnetic force. It is also called an iron core or core.

■ Reference

- Powder magnetic core (FMCM series)
https://global-sei.com/pmp/index_eng.html
- Development of powder magnetic core for axial gap motors
<https://global-sei.com/technology/tr/bn86/pdf/86-21.pdf>

Sumitomo Electric's Website : <https://sumitomoelectric.com/>