

## 2025 JPMA AWARD

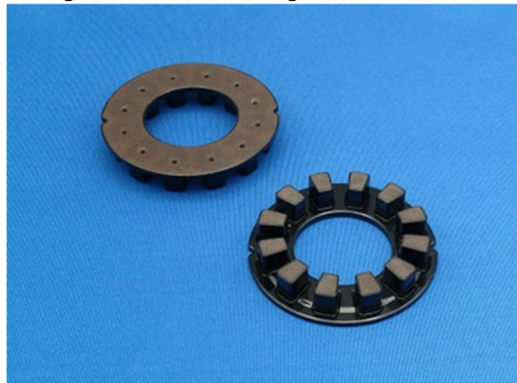
### DEVELOPMENT PRIZE

#### C Process Development

##### **C-1 Development of Soft Magnetic Composites Core with Ultra-thin, High-withstand-voltage Insulation Coating to Enhance the Motor Performance SUMITOMO ELECTRIC INDUSTRIES, LTD.**

This manufacturing method enables the production of low-cost Soft Magnetic Composites (SMCs) featuring a thin, uniform thickness insulation coating with a high withstand voltage.

Motors are devices that can efficiently convert electrical energy into mechanical power. As demand increases, motors are being incorporated into a wide range of applications. This has driven significant research and development efforts focused on enhancing motor efficiency and achieving smaller, lighter designs. This development has enabled the replacement of mainstream radial gap motors with axial gap motors that use SMCs as motor core materials, thereby achieving expansion of new sales channels.



This product's SMCs function amplifies the magnetic field generated by the coil, producing high rotational force in the motor. It also serves as a heat dissipation pathway, effectively dissipating the coil's heat. To meet these requirements, the developed SMCs insulation coating is significantly thinner than conventional insulating materials, such as insulation paper and resin bobbins. It enhances coil heat dissipation, ensures the coil space factor, mechanically fixes the SMCs to the motor housing, and enables a low-cost coating method. This is accomplished by compacting insulated soft magnetic powder, applying heat treatment to eliminate residual stress, and drilling holes for M2 screw fixation. Furthermore, using a reaction-precipitation type insulating paint enables a thin, uniform coating of 40 to 50  $\mu\text{m}$ , compared to the conventional coating thickness of 200 to 300  $\mu\text{m}$ .