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As features of SMC cores produced by compaction of insulation-coated soft magnetic powder such as iron powder, the following three points are generally mentioned:

① Higher saturation magnetization compared with oxide sintered magnetic cores such as ferrite cores.
② Lower eddy current loss compared with laminated cores such as electrical steel sheet cores.
③ Three-dimensionally isotropic magnetic properties and ease of obtaining near-net shapes.

Some previous studies have suggested that reactors and inductors are suitable applications of SMC core because of features ① and ②[1], and in recent years, application of an axial gap motor using a SMC core has been reported, taking advantage of feature ③[2].

While examples of the abov252753249pplications(ar)12.8 e

expressed by the sum of hysteresis loss W_h and eddy current loss W_e, as shown in the following equation.

$$W = W_h + W_e \quad \cdots\cdots (1)$$

Where W_h is proportional to the excitation frequency, and W_e is proportional to the square of the excitation frequency[3]. In applications with low excitation frequencies below 1 kHz, such as motor cores, the effect of hysteresis loss on iron loss is larger than that of eddy current loss. Since the hysteresis loss of SMC cores is higher than that of electrical steel[4],

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influence on core iron loss was clarified. Finally, guide tion of dislocations with domain walls and obtained the following relational equation:

$$H_{c\_dis} = \gamma_{dis} \cdot \rho_d^{1/2} \quad \text{(6)}$$

Where H_{c_dis} is the contribution of a dislocation, ρ_d is the dislocation density and γ_{dis} is a coefficient deter-

decreases with an increase in the raw powder particle size, but because eddy current loss increases with an increase in the raw powder particle size, iron loss increases. From these results, it was found that increasing the raw powder particle size is effective for reducing W_{h_k}, but is inappropriate for reducing iron loss.

Next, the iron loss of the SMC cores made from raw iron powder D and its breakdown are shown in **F**ı **. 8**. In the range of annealing temperatures from 673 K to 873 K, W_{h_dis} significantly decreases with an increase in the annealing temperature, and as a result, iron loss decreases as the annealing temperature increases. However, W_{h_k} increases w98 Tmweases w98 Tmwez(E81m(i)0.6 (r)34.9 (49 n07)1.2 (7we)05-i( ) (ar)1298 (s)0.5e(w)0

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