FORMULATION, DESIGN AND PRODUCTION OF COMMERCIAL FERRITES

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Introduction

The combination of strong magnetism and high electrical resistivity in soft ferrites has caused the materials to remain superior for high-frequency applications (Snelling, 1988). Additionally, as permanent magnet materials, hard ferrites are the most versatile and economical for many applications. For the soft ferrites, commercially and technologically, MnZn, NiZn and MgZn ferrites are the most important. Their use has been sustained by the electronics and telecommunications industry and substantially enhanced by the computer industry. However, as commercial items, ferrite products have to compete on the international market. Hence this project was undertaken to establish cost-effective technical procedures for manufacturing technologically and commercially important bulk soft and hard ferrite materials and components. The project also aimed to establish totally local expertise in producing high-quality ferrite products as measured by the international market standards.

Materials and Methods

It was first important to understand accurately how the various technological applications of ferrites were influencing market demands for ferrite components. Secondly, their market projections for the next 10 years were required. These two aspects were analysed and the results were used to dictate the project's R&D work direction. High-quality ferrite-core data detailed in technical catalogues of major ferrite manufacturers were studied and utilised to produce targeted sets of properties as standards. Lowest-cost material compositions were formulated and translated into products using lowest-cost laboratory ceramic processing methods. On attaining the standards set, trial production using industrial facilities were carried out until the targeted standards were finally achieved.

Results and Discussion

The R&D work carried out on NiZn and MgZn ferrite materials produced a range of materials immediately applicable for commercial production. Ferrite cores that can be manufactured from these materials include those for inductors, chokes and EMI suppressors. Two outstanding materials were produced. One was a NiZn ferrite with extremely low loss. The other was a NiZn ferrite capable of a high EMI noise suppression level. Very low-cost MgZn ferrites were also produced for EMI and other inductive applications. Work on MnZn, Ba and Sr ferrites has not been completed.

Conclusions

NiZn and MgZn ferrite materials have been produced which can be immediately translated into ferrite-core products in real manufacturing.

References

Snelling, E.C. 1988. "Soft Ferrites, Properties and Applications, Butterworth & Co. (Publishers) Ltd, London.

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