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청동 분말의 대체재료로써 Cu코팅 철분말(CFP)의 소결 오일레스 베어링 특성평가 Evaluation on Performance of Sintered Oilless Bearing with Cu-coated Ferrous Powder as an alternative of Bronze Powder

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Recent progress in electronic, automotive and machinery industries requires low-cost and high-performance oilless bearing which can replace conventional bronze powder materials. For this purpose, bronze-iron and copper-iron materials have been developed, but their wide use has been limited by the reason that are not so good as bronze-based materials in lubricating property.

Copper coated ferrous powders(CFP) have been recently developed as an inexpensive bearing material with high performance comparing with the bronze-based materials. In this study, CFP were produced by an unique process and bearing specimens were made by general P/M process using CFP. Various properties were evaluated in each step of the making processes as well as after assembled were investigated. Comparisons were also made between bronze and pure iron based systems together with CFP. The properties were tested in the PV value range of 75~1200 for CFP, CFP-Graphite (as solid lubricant), CFP-Sn-Zn, Cu-Sn, Cu-Sn-Graphite, Fe and Fe-Graphite.

The result shows that CFP material has the same or slightly higher bearing performance than that of bronze-based materials in all the test ranges. The properties of iron-based bearing material were also superior to those of the other materials in the heavy loaded region. In the case of graphite addition as a solid lubricant, lubricating property of CFP showed nearly the same level as that of bronze. However in case of adding strengthening additives such as Sn and Zn, the starting current was relatively low, therefore this bearing material is suitable for the motor application with intermittent motion.

Sintered strengths of CFP and with additives showed 15% and 17% higher than that of the bronze system. Dimensional changes (D/C) between die and sintered part were very small, so the final products after sizing had also high dimensional accuracy meeting the key requirement for bearings.

From this study, the oilless bearing using CFP was developed and evaluated. The new bearing met the requirements and the needs of oilless bearing successfully and then will be an alternative to replacing the bronze-based bearing.