

Applications of The Magnetic Fluid on Shaft Seals

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ABSTRACT

The idea is utilizing the characteristics of the magnetic fluid to position the magnetic fluid in the place of seals. When a magnetic field is applied, the magnetic fluid is attracted by the field and moves to the strongest field location. The potential energy of the magnetic fluid due to the influence of magnetic field is able to sustain the pressure difference on both sides of the seals and thus the function of seal can be achieved. The main objective of this research is to study the feasibility of using oil-based magnetic fluids for the replacement of conventional seals in the design and manufacture of oil seal and shaft seal subsystems. In this project, the suitable oil-based magnetic fluids is chosen. The dependency of its mechanical properties on the variations of magnetic field strength and the concentration of fluid will be measured in order to understand the methodology to control its mechanical properties. Next, the influence on the ability of seal to sustain the pressure difference between two sides of seals due to variations of the design parameters will be studied systematically. The use of the magnetic fluid as oil seals or shaft seals has the following characters : high seal level, no friction loss generally occurred in conventional seals, no contamination due to friction, no need for the accurate surface publishing, no high temperature and noise due to friction, longer usage life and low maintenance. However, because the magnetic fluid is a new, advanced materials and also magnetic fluid seal is a new type of seal, there is little knowledge and technology accumulated. Thus, the works of this project are concentrated on the design parameter variation and the establishment of the corresponding database of magnetic fluid seals instead of the manufacture of the product.

Keywords : magnetic fluid ; shaft seal ; oil seal

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