

CHAPTER I

INTRODUCTION

Grease is served as the same purposes of lubricating oils, to minimize friction between moving surfaces. Advantages for the use of grease in bearing of a spindle motor are that (i) grease tends to stay in bearing and dose not drip out, whereas lubricating oils require more effective and expensive seals, and (ii) when corrosion contaminants enter the bearing cavity, grease protects the metal surface better than does oil.

In Thailand, grease for the high quality bearing used in the spindle motor for production of computers has been imported. Typically, grease contains base oils (70-90 % wt/wt), a thickening agent and other additives. Base oils may be mineral or synthetic oils.

Typically, base oils used for the commercial grease are synthetic oils due to excellent oxidation stability, shear stability and thermal stability. However, synthetic oils are more expensive than mineral oils.

In bearing application, the sodium complex grease has been used for more than 20 years because of a small amount of splashing grease. However the sodium complex soap has poor dispersibility in grease, and causes poor noise and torque when lubricated in bearings. In addition, the soap has strong water absorption property that results in the grease harden with time and deteriorate fluidity in the bearings to cause insufficient lubricity.

Nowadays, the lithium grease is used for multipurpose bearing when low noise and low torque are required [1]. However, when lithium grease is used for bearing of a spindle motor, it is liable to splash and stick on the recording media or the disk head of hard disk drives (HDD).

To inhibit the splashing, the grease is used together with a magnetic seal. However, the magnetic seal is expensive, therefore the cost of products is high. As a result, the lithium grease having an appropriate consistency is necessary to improve the antisplashing property.

US. Patent 5,714,444 disclosed the lithium grease with excellent antisplashing property [2]. It has been found that a penetration range from 190 to 250 could control splashing amounts of grease at room temperature and at 70 °C which was the highest operating temperature of the bearings used for computers.

Aims of this research

The aims of this research are to prepare the high quality lithium grease for a spindle motor and to study the properties of prepared greases such as oxidation stability, work stability, heat resistance and corrosion preventive properties.

In this study, lithium grease was prepared from trimethylolpropane (TMP) ester oil and paraffin oil as base oil and lithium stearate as thickener. Three types of additive, comprising of zinc dialkyldithiophosphate (ZDDP), molybdenum dialkyldithiocarbamate (MDTC) and diphenylamine (DPA) were separately added to the grease composition to improve oxidation resistance.

The ratio of base oil and thickening agent, giving the prepared lithium grease with penetration number 220-250 (NLGI number 3) was selected because low splashing amount of particle, low noise and low torque property. Then the properties of the prepared lithium grease and the commercial lithium grease were tested following standard methods of JIS K-2220 and ASTM.