ASIATRIB 2002 International Conference
JEJU ISLAND, KOREA

Proposed Title:

Comparison of Friction Modification Function of Lubricating Oils under Boundary Lubrication Conditions with Wide Speed Range from Ultra-low to Moderate

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Abstract

Friction control is a major important technology in boundary lubrication to minimize undesirable energy consumption. It is still necessary to carry fundamental investigation for understanding the performance of lubricating oils to control friction. In this study, a new type of cylinder-on-disk tribometer was developed, and friction characteristics of several lubricating oils under boundary lubrication conditions were studied with varying sliding speed from ultra-low (5μm/s) to moderate (17cm/s). Since the tribometer can measure friction at the several same positions on the disk specimen in every rotation, effect of sliding speed on the friction coefficient can be evaluated with the high accuracy. Several different base oils and additives were used to examine their function. In addition, the effect of surface texture on the friction was also investigated using two types of disk specimen having the isotropic small roughness and the anisotropic large roughness. When the cylinder specimen slides on the surface with the anisotropic roughness, sliding direction against the roughness orientation changes cyclically between transverse and longitudinal. Since the measuring positions were set at both the transverse and longitudinal positions, the difference in friction at both positions could be clearly identified. It is demonstrated that the surface roughness orientation affects the friction even under the ultra-low sliding speed where hydrodynamic action of the lubricating oils are believed ineffective.