

Investigation of wear mechanism in ball bearings lubricated by a bio-lubricant

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=9999920530933&lokasi=lokal>

Abstrak

Due to increased environmental sensitivity, renewable-based lubricants, and food grade lubricants are being considered potential alternatives to petroleum-based lubricants. Understanding of bio-lubricant in relation to abrasive wear is essential for using ball bearings in industrial implementation. This study focused on wear mechanism on ball bearings lubricated by bio-lubricants. Palm oil and coconut oils were used in this study. Coconut oils were made by two processes, namely dry and wet processing, resulting in three types of oil (virgin coconut oil [VCO], refined coconut oil [RCO], and hydrogenated coconut oil [HCO]). Full-scale bearing life tests were conducted with 300 N load with 2,840 rpm for 6 hours. Method of lubrication was circulating oil by using pump injection to the self-aligning ball bearings. The results show that the main wear mechanism, which impacted on the surfaces of inner race, outer race, and ball for different bio-lubricants, were abrasive and adhesive wear. It found that the abrasion rate was the least severe for VCO. The discrepancies of worn surfaces are thought to be as a result of the physical and chemical properties of bio-lubricants.