INFLUENCE OF WATER, RELATIVE HUMIDITY AND NITROGEN ENVIRONMENT ON FRICTION AND WEAR PERFORMANCE OF CuO/MoS2 HYBRID NANOPARTICLES IN RECIPROCATING SLIDING CONTACTS

Raaid Yassin [ab*], Ali Hassanpour [c], Ardian Morina [a]

*mnray@leeds.ac.uk

[a] Institute of Functional Surfaces (IFS), School of Mechanical Engineering, University of Leeds, Leeds LS2 9JT, UK.

[b] Design division, North refineries company (NRC), Ministry of oil, Iraq.

[c] School of Chemical and process Engineering, University of Leeds, Leeds LS2 9JT, UK.

KEYWORDS

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ABSTRACT

Water, either dissolved or free, as a contaminant in lubricants can affect the performance of lubricated tribological components. Water entering the lubricant as a contaminant can lead to corrosion of steel surfaces, viscosity reduction and can interact with the lubricant additives, in turn increasing friction and wear. In this study, the effect of water on the tribological performance of a lubricant containing CuO/MoS2 hybrid nanoparticles has been experimentally tested at different relative humidity and dry nitrogen levels. The experiments were performed in a pin-on-reciprocating plate test rig at a constant sliding speed and load. To understand how the water content and nitrogen environment affected the worn surfaces, post-tribological test sample surfaces were analysed using NPFLEX and SEM/EDX. The experimental results show that the water content and higher relative humidity level affect CuO/MoS2 tribofilm-forming ability, ultimately leading to higher wear and friction, whereas the dry nitrogen environment contributed to a significant reduction in friction and wear. It has been observed that higher water concentration contributes to an increase in oxygen concentration as oxide film in the wear scar, while it decreases under a dry nitrogen environment.