Lubrication behaviour of Coconut oil base Bio-Greases using different nanoparticles

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Researchers were driven to investigate an alternate biodegradable solution because of the significant environmental consequences and resource depletion caused by the usage of petroleum-based goods. The main goal of this study is to determine the tribological behaviour of coconut oil-based greases with h-BN (Hexagonal Boran Nitride), CuO (Copper Oxide), and GO (Graphene Oxide) nanoparticles added to them. Different grease samples were made with coconut oil as the base oil and lithium stearate as the thickening agent. In terms of oxidation stability and water resistance, lithium stearate greases shows better properties than the traditional soap-based greases. In the approach, nanoparticles are added to the base oil, after which the grease is synthesized. To make nano grease, nano particles in the required concentration i.e. 2 wt % are added to the base oil. The base oil and nano particle solution were sonicated for 4 hours in a bath sonicator. A hot plate magnetic stirrer was used to heat the base oil and nano particle solution to 80 ^{o}C after sonication. The solution was then thickened by using thickener. The oil, additive, and thickening mixture is heated to 180 °C, at which the base oil starts to become greasy. The suspension was kept at this temperature for about 15 minutes before being gradually cooled, which causes nano grease to develop.

A reciprocating tester [Universal tribometer, Rtec instruments USA] was used to examine the friction and wear of the mirror polished aluminium silicon – chrome steel tribo pair using various formulated grease. The sample was cleaned with acetone to remove any contaminants. The ASTM G-99 standard was used to conduct the tribo tests. The load tests were performed using a variable load (10 N – 50 N), with 2 mm stroke, 250 m sliding distance, and 50 Hz constant reciprocating frequency. The sliding distance test were performed using a variable sliding distance (250 m–1000 m), a 2 mm stroke, a 50 N load, and a 50 Hz constant reciprocating frequency. By stitching the surface area over a distance of a 2D profile, the WV of the disk's surface wear track was established (extracted using a 3D scar profile). The findings imply that adding h-BN, CuO, and GO to coconut-based nano grease has a significant impact on the attributes studied. When compared to h-BN and CuO, the inclusion of GO considerably enhanced tribological performance.

More results will be presented in the full length paper.

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