

## Tribological Behaviour Improvement of Lubricant Using Copper (II) Oxide Nanoparticles as Additive

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**Abstract :** Tribological properties that include nanoparticles are an alternative to improve the tribological behaviour of lubricating oil, which has been investigated by many researchers for the past few decades. Various nanostructures can be used as additives for tribological improvement. However, this also depends on the characteristics of the nanoparticles. In this study, tribological investigation was performed to examine the effect of CuO nanoparticles on the tribological behaviour of Syntium 800 SL 10W-30. Three parameters used in the analysis using the wear tester (piston ring) were load, revolutions per minute (rpm), and concentration. The specifications of the nanoparticles, such as size, concentration, hardness, and shape, can affect the tribological behaviour of the lubricant. The friction and wear experiment was conducted using a tribo-tester and the Response Surface Methodology method was used to analyse any improvement of the performance. Therefore, two concentrations of 40 nm nanoparticles were used to conduct the experiments, namely, 0.005 wt % and 0.01 wt % and compared with base oil 0 wt % (control). A water bath sonicator was used to disperse the nanoparticles in base oil, while a tribo-tester was used to measure the coefficient of friction and wear rate. In addition, the thermal properties of the nanolubricant were also measured. The results have shown that the thermal conductivity of the nanolubricant was increased when compared with the base oil. Therefore, the results indicated that CuO nanoparticles had improved the tribological behaviour as well as the thermal properties of the nanolubricant oil.

**Keywords :** concentration, improvement, tribological, copper (II) oxide, nano lubricant

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