



Influence of Soot Contamination in API CI-4 Engine Oil on Four-ball Metallic Wear using Electron Microscopy Image Analysis

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Abstract. Engine lubricant has an important role to decrease friction and wear of moving parts in the engine. However, Soot contaminated in engine oil could change chemical and physical properties that affect the lubricant oil operation. Soot particles were simulated using carbon black in order to eliminate the effect of metallic ash and unburned hydrocarbon which contained in particulate matter. The carbon black was blended in CI-4 lubricating oil. Investigation of metallic wear was done by a four-ball wear test. The amount of wear was compared by measuring the wear scar diameter of the worn surface on the steel balls. Scanning electron microscope (SEM) and confocal laser scanning microscopy were used for characterizing wear scar and surface roughness, respectively. In addition, the evidence of lubricant additive elements was detected on the wear surface by Energy Dispersive X-ray analysis (EDX). This research found that engine oil with soot contamination could lead to increases amount of abrasive wear by 83% and has approximately 1.1 % larger wear scar diameter.

Keywords: Engine Lubricant, Soot, Wear Mechanism