FRICION MODIFIER/ANTI-WEAR BEHAVIOR UNDER BOUNDARY LUBRICATION CONDITIONS: PART II – SURFACE CHEMISTRY

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ABSTRACT
In Part I of this study, sixteen friction modifier and antiwear compounds were run in pin-on-disk experiments to determine the steady state friction values resulting from boundary layer film formation. Measurements were also taken to determine the rate of wear. In Part II of this study, the end-of-test parts were analyzed to determine the surface chemistry responsible for friction and wear values found in Part I.

Four different base oils were run to look for differences in boundary film formation resulting from base oils alone. The base oils from Group I-IV. range from mineral oil to fully synthetic and are representative of base oils commonly used in lubricant formulation. The sixteen friction modifier and antiwear compounds were blended in a 100N Group III base oil for this study. The antiwear compounds were combined with the base oil alone. Certain friction modifiers required a dispersant to keep them in solution.

Surface chemistry results range from very little film formation found for the friction modifiers to the formation of phosphate and sulfide antiwear films several hundred angstroms thick for certain antiwear compounds. Film generated with compounds containing molybdenum were also run and generated molybdenum and sulfur containing antiwear films.