Coefficient of Friction and Specific Wear Rate Prediction Model Using Response Surface Methodology for Waste Cooking Oil Blended Lubricant

A.K. Amirruddin1 , K. Kadirgama2 , M.M Noor1 , M.Samykano1 , D. Ramasamy2 , M.M.Rahman1 ,*

1 Automotive Engineering Research Group (AERG), Faculty of Mechanical Engineering, University Malaysia Pahang (UMP), Pekan, Pahang, Malaysia

2 Automotive Engineering Centre (AEC), University Malaysia Pahang (UMP), Pekan, Pahang, Malaysia deva@ump.edu.my

Abstract.
Response surface methodology with Box–Benhken (BB) design of experiment is utilized to discuss about the development of first and second order model for coefficient of friction (COF) and specific wear rate (SWR) for engine oil treatment added with waste palm oil blended with SAE40. The designs utilize the factors (rotational speeds (200 RPM to 300 RPM), volume concentration and applied loads (2kg to 9kg)) with the response (COF and SWR), evaluated using piston ring-liner contact tribology tester. Other than that, the effect of the factors can be investigated from the equation develop. The contour plot also can be generated to predict the COF and SWR at any experimental zone. The model generated shows that the COF and SWR increases when load, speed and volume concentration are increased. The second-order is more accurate compare with the first order for COF while first order model is more accurate for wear rate. The COF increases with load to cause more wear.

Keywords: Tribology,COF,RSM,Piston