

Design and Development of a Scuffing Load Capacity Tester for Comparison of a Novel Plant Based Lubricant with Standard Lubricants

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Abstract

Gear life is reduced due to the poor scuffing load capacity of gear oil and it caused to reduce the efficiency of power transmission. This paper describes a method to test the scuffing load capacity with Aluminium gears. In order to test the scuffing load, back to back test rig tester was designed and fabricated. Aluminium was chosen as the test gear material since it has a lighter weight and natural anti-corrosive material. The main parts of the scuffing load tester include, oil sump, shafts, motor, load application unit, test gears, temperature measurement unit, etc. The testing lubricant is poured into the oil sump and the load is applied to the testing gear and allowed to run 20 minutes. The steps continue with load increments until the scuffing appearance observed visually.

The developed tester was used to test the scuffing load capacity of a newly developed palm oil based lubricant which has a viscosity of 69.3 Cst at 40 °C. For comparison SAE30 engine oil also tested with the same developed machine. Apart from this weight loss of the testing gear and temperature variation of lubricants also measured. According to the test results, scuffing observed in Aluminium gear at 5th and 7th load stage for developed palm oil and SAE30 engine oil respectively. Where 5th and 7th stages represent the applied torques 17.5 Nm and 24.5 Nm respectively. Compared to the SAE30 engine oil, developed palm oil has lower scuffing load capacity. This variation of scuffing load capacity was caused high depreciation of the gear tooth and increased lubricant temperature in developed palm oil compared to SAE30 oil. However, as future works the scuffing load capacity of industrial oils (such as H68) are to be measured and compared. The developed tester is most suitable for comparing the different lubricant behaviours.

Keywords: Scuffing, Scuffing Load, Aluminium, Gear Lubricant