

Design and Development of Engine Valve Train Wear Test Rig for the Assessment of Valve Train Tribochemistry

Authors : V. Manjunath, C. V. Chandrashekara

Abstract : Ecosystem authority calls for the use of lubricants with less effect on the nature in terms of exhaust emission, while engine user demands more mileage per liter of fuel without any compromise on engine durability. From this viewpoint, engine manufacturers require the optimum combination of materials and lubricant additive package to minimize friction and wear in the engine components like piston, crankshaft and valve train etc. The demands are placed for requirements to operate at higher speeds, loads, temperature and for extended replacement intervals of engine oil. Besides, it is necessary to accurately predict the lubricant life or the replacement interval to prevent lubrication and valve-train components failure. Experimental tribology evaluation of new engine oils requires large amount of time and energy. Hence low cost bench test is necessary for industries and original equipment manufacturing companies (OEM) to study the performance of lubricants. The present work outlines the procedure for the design and development of a valve train wear rig (MCR) to simulate the ASTM-D6891 and to develop new engine test for Indian automobile sector to evaluate lubricants for Indian automobile market. In order to improve the lubrication between cam and follower of internal combustion engine, the influence of materials or oils viscosity and additives on the friction and wear characteristics are examined with test rig by increasing the contact load at two different revolution speed. From the experimentation following results are made obvious. Temperature, Torque, speed and wear plots are used to validate the data obtained from the newly developed multi-cam cam rig (MCR) with follower against a cast iron camshaft. Camshaft lobe wear is measured at seven different locations on cam profile. Tribofilm formed using 5W-30 oil is evaluated and correlated with the standard test results.

Keywords : ASTM-D6891, multi-cam rig (MCR), 5W-30, cam-profile

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