Optimization Study of Valve Timing Effects on Single-Cylinder SI Engine Performance

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ABSTRACT
The technical research and development for four-stroke motorcycle engine has been progress rapidly recently, but it is still time-consuming on setting optimal engine parameters. The engine performance is affected largely by intake and exhaust system design, we can improve the gas exchange efficiency of engine by changing to the engine optimum set of engine valve timing. It can well improve the torque, power and pollution of exhaust gas. This thesis adopted the Experimental Design Method (DOE), to study the valve timing effects of a four-stroke motorcycle engine. Experimental data were being collected and analyzed by DOE at wide throttle opening and different engine speed. The four output engine parameters including brake torque and power, volumetric efficiency and the concentration of carbon monoxide. These performance parameters were correlated with three input valve timing parameters, they are Intake and Exhaust Valve Opening, (IVO), (EVO) and Overlap Valve Angle (OLA). The multiple-objective optimization desirability function analysis were used to compare the results. The valve timing parameters calculated were validated by experiments and results shown proper trend and engine multiple objective specification can be attained by this study. The methodology used in this study can provide useful information for valve train system design and save research and development time and expenses.

Keywords: Valve Timing; Experimental Design Method.


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