

SABAA HARITH KHUDHUR. STUDY THE EFFECT OF VARIABLE VALVE TIMING ON S.I.E PERFORMANCE. UNIVERSITY OF TECHNOLOGY. Department of Machines and Equipment Engineering. MS.C. Supervisor: Asst. Prof. KUTAEBA J. AL-KHISHALI and Asst. Prof. ADEL M. SALIH. 2012. 127p.

ABSTRACT

The present work has dealt with the effect of varying the overlap period by changing Intake Valve Open (IVO), Intake Valve Close (IVC), Exhausts Valve Open (EVO), and Exhaust Valve Close (EVC) timing on engine performance and exhaust gases emission, by changing the clearance distance between the rocker arm and valve stem.

Three valve overlaps (104° , 108° , and 112°) were investigated theoretically and experimentally.

The experimental work was conducted on the experimental research engine SI engine, single cylinder, 4 stroke, carburetor fuel system "Variable Compression "Varicomp" dual Diesel / Petrol cycles with Dynamometer test unit" type (GR0306/000/036A) Prodit, and made available for me by the Technical College, Baghdad. Under engine speed range was between (1400-2200 rpm) with compression ratios (CR=7 and 9) at constant brake torque ($T_b=7.5$ N.m) and commercial gasoline (Octane No.81) were used in this study. Whereas the theoretical part dealt with modeling of the same engine using the simulation and analysis engineering software "Lotus Engine Simulation" version (5.05). The same operating conditions were taken but at maximum load (by other words Wide-Open Throttle "WOT"). The results obtained experimentally

were compared with the simulation results in order to compare between the two cases.

From the experimental results, the reduction in overlap period (overlap=104°) with compression ratio (CR=9) shows the better compromises between the overall performance and exhaust emissions, where the results indicate an improvement in the volumetric efficiency (increasing by 12.58%), increasing the brake thermal efficiency by (5.65%), improvement in fuel consumption by (3%) and exhaust emission by about (4.45% for the HC and by 20.19% for CO).

The simulation results show that at full load "WOT" operation, the volumetric efficiency was increased with reduction in overlap period (overlap=104°) by (2.13% at CR=7) and (2.13% at CR=9), and decreased with increasing in overlap period (overlap=112°) by (2.29% at CR=7) and (2.33% at CR=9). While, the (bsfc) and brake thermal efficiency with changing the valve overlap were similar to those of the conventional overlap cases.

KEYWORDS:

internal combustion engine, variable valve timing, overlap, engine performance, wide open throttle, brake torque, spark ignition engine, lotus engine simulation.