

THE EFFECT OF LPG INJECTION ON COMBUSTION, PERFORMANCE AND EMISSION CHARACTERISTICS OF A MPFI ENGINE

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ABSTRACT

This paper describes studies on a four cylinder multipoint port fuel injection gasoline engine retrofitted to run with LPG injection with respect to combustion, performance and emission characteristics. The findings of the experiments suggest that higher thermal efficiency and therefore improved fuel economy can be obtained from SI engines running on LPG as opposed to gasoline. The cycle-by-cycle variation of IMEP with LPG combustion can be reduced by advancing the idle ignition timing. The results of the study at wide open throttle conditions indicate that there is an increase in the brake thermal efficiency with LPG use in the engine at higher operating speeds when compared to gasoline at the factory set idle ignition timing of 5° bTDC. In addition the exhaust emissions of CO and HC are considerably reduced. However, emissions of NO_x are significantly increased at elevated engine speeds when running on LPG as opposed to gasoline. The results of LPG fuel operation at various idle ignition timings indicate that advancing the timing from 5° bTDC to 6° bTDC results in increased brake thermal efficiency, and reduced emissions of CO and HC, compared to retarding the idle ignition timing to 4° bTDC and 3° bTDC. However, advanced idle ignition timing has an adverse effect on NO_x emissions, which increase further.

KEYWORDS: GASOLINE ENGINE; LPG INJECTION; COMBUSTION; ENGINE PERFORMANCES; EXHAUST EMISSIONS; IDLE IGNITION TIMING