

Engine and Auxiliary Systems

Edited by
Prof. Dr. A.K.M. Mohiuddin



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3-Cylinder gasoline direct injection as opposed to 4-cylinder multi-port fuel injection for low fuel consumption and NO_x emission

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Abstract

The need for an engine that offers a low fuel consumption and good low-end torque grown for the past few years. The European environment protection agencies have drawn down the emission limits annually with emerging countries has started to adopt the Euro legislation. OEMs worldwide have strived to meet the stringent regulation that made them develop smaller engine capacity with high low-end torque. Furthermore, continuously increasing price of the fuel requires improving the engine efficiency. Electronic controlled Multi-Port Fuel Injection (MPFI) systems instead of fuel system with carburettor have been used since 1980. Development of small vehicle segments has started to look for alternatives to meet the consumption challenge. Therefore, adoption of gasoline direct injection (GDi) fuel systems new small engines hopefully can reduce hydrocarbon emissions by having fuelling and controls separated. Both 3-cylinder and 4-cylinder base engine configurations will be explored for the same engine capacity of 1.2 L. Improvements in hydrocarbon emissions, heat losses scavenging will be compared between the engines. Plus, factors of packaging and considerations will also be looked upon.

Keywords: gasoline direct injection, multi-port fuel injection, 3-cylinder, scavenging

Introduction

Dramatic fuel consumption reductions are necessary, both near-term and long-term. tailpipe emission standards are becoming increasingly stringent. Particularly interesting is sharp reduction in NO_x emissions and the trend toward elimination of relief in the Euro emissions standard for vehicles. Lower cost alternatives for reduced fuel consumption emissions are thus especially attractive for smaller vehicles. Recent development efforts have been published documenting the benefits and challenges of 3-cylinder gasoline direct in