VARIABLE INTAKE VALVE LIFT ON A PORT FUEL INJECTED ENGINE AND ITS EFFECTS ON IDLE OPERATION

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ABSTRACT: Reducing fuel consumption is a prime objective in the automotive industry in order to meet legal and customer demands due to the increasing price of oil. Variable valve actuation offers many opportunities for improving the spark ignition engine's performance in areas such as fuel economy and pollutant emissions.

This study presents a variable intake valve lift (ViVL) mechanism, used to enhance fuel economy in the area of idle operation and low part loads, which are the ones most frequently encountered in a vehicle's operation time. Currently, this mechanism is self-regulated thanks to a hydro-mechanical system and allows a continuous intake valve lift variation during engine operation.

Our studies revealed that the ability to control valve lift does indeed offer the ability to control intake air mass but also has the added benefit that it improves the fuel-air mixing process and controls air motion. This is particularly important at idle and low part loads when low lifts are to be used for improving the fuel economy or for achieving the required power.

The paper focuses on the experimental results obtained when approaching idle operation with different configurations of the intake valve timing system. Results indicating the potential of the ViVL system for fuel economy improvement, as well as results regarding the in-cylinder pressure evolution are presented in this paper.

Last but not least, the paper also presents a so-called Sleep&Start strategy, which can be seen as an alternative to the Stop&Start micro-hybridization solution. In other words, once a ViVL system has been installed on an engine, it should be used in every possible way in order to obtain a high benefits/cost ratio.

KEYWORDS: fuel economy, variable intake valve lift, combustion, idle operation

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