

A comparison of inlet valve operating strategies in a single cylinder spark ignition engine

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Abstract

This experimental work was concerned with comparison of inlet valve actuation strategies in a thermodynamic single cylinder spark ignition research engine equipped with a mechanical fully variable valvetrain on both the inlet and exhaust. The research involved study of the effects of the valvetrain on combustion, fuel economy and emissions when used to achieve variable valve timing alone and when applied together with early inlet valve closing for so-called unthrottled operation. The effects of such early inlet valve closure were examined using either fully variable events or by simulating two-stage cam profile switching. While fully variable operation enabled the maximum fuel savings over the widest operating map, it was apparent that two-stage switching mechanisms can provide an attractive compromise in terms of cost versus CO₂ benefit on engines of moderate to large capacity. However, from speed-load maps obtained in the current study it would appear that a wide range of inlet valve durations would be necessary to obtain fuel savings sufficient to warrant a system any more sophisticated than current variable valve timing mechanisms in future aggressively downsized gasoline engines.