Aachen Colloquium

Dynamic Downsizing for Gasoline Engines

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ABSTRACT

Gasoline engine downsizing is already established as a proven technology for reducing CO_2 emissions, with up to 25 % improvement having already been demonstrated. Although it is understood that excessive downsizing might have a negative impact on vehicle fuel economy, studies suggest there is potential for further downsizing benefits to be attained over the current levels.

For this project MAHLE has investigated a very high degree of gasoline engine downsizing. This has been achieved through the application of an advanced charge-delivery system that can provide an almost instantaneous supply of high pressure charge air across a broad engine speed range, enabling drivability to be enhanced. A 48 V architecture also enables the use of electrical machines and energy storage systems to reduce drive-cycle CO_2 through the recuperation of energy during deceleration events.

The eSupercharging concept described in this paper also provides the potential to enable greater ability to operate with low levels of valve overlap, to help minimize emissions at low engine speeds. The resulting engine layout achieves 193 kW from a 1.2 liter swept volume and 277 Nm torque is available from 1200 min-1, whilst excellent fuel economy and drivability characteristics are retained.