

Abstract

Title: Advanced Nozzle Geometry Layout by Interlinking of CAE and Experiment

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ABSTRACT:

Regulated emissions, CO₂-values, comfort, good drivability, high reliability and costs, this is the main frame for all future powertrain developments.

In this frame, the diesel powertrain, not only for passenger cars but also for commercial vehicle applications, faces some challenges in order to fulfill the future European and current US emission legislation while keeping the fuel consumption benefit, good drivability and a certain cost frame.

FEV Motorentchnik has researched a new, advanced nozzle geometry concept for a 2000 bar Piezo injection system. It is investigated, how in combination with an appropriate charge motion concept the air-utilization of a modern direct injection Diesel engine can be improved by utilizing nozzles with different hole arrangements in dual-row configuration. The goal is to improve both, the part load emission behavior and the full load performance.

This poster details the interlinked approach of single-cylinder test bench investigations and numerical CFD simulation. This method proves to be the ideal tool to deal with the high degrees of freedom regarding nozzle layout and engine calibration. While the CFD simulation provides detailed information about spray-spray and spray-wall interaction, mixture formation and combustion characteristics the experimental investigations allow an effective optimization of the operating point and injection parameters to each new layout.

That way the prospects of the advanced nozzle geometry can be evaluated and proven in a systematic approach.