



# Automotive Gasoline Direct-Injection Engines

*Fuquan Zhao, David L. Harrington, Ming-Chia Lai*

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This book covers the latest global technical initiatives in the rapidly progressing area of gasoline direct injection (GDI), spark-ignited gasoline engines and examines the contribution of each process and subsystem to the efficiency of the overall system. The focus is both on the fundamental processes of mixture preparation, combustion, and emissions formation, and the practical issues related to engine system development, such as cold start, deposits, oil dilution, and aftertreatment systems. Information on direct fuel injection, spray formation, entrainment, and mixing, combustion and emissions is presented within an organized framework of current state-of-the-art hardware and processes. Including discussions, data, and figures from many technical papers and proceedings that are not available in the English language, Automotive Gasoline Direct-Injection Engines will prove to be an invaluable desk reference for any GDI subject of direct-injection subsystem that is being developed worldwide.

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The new technologies such as high-pressure, common-rail, gasoline injection systems and swirl-atomizing gasoline fuel injections are discussed in detail, as these technologies, along with computer control capabilities, have enabled the current new examination of an old objective; the direct-injection, stratified-charge (DISC), gasoline engine. The prior work on DISC engines that is relevant to current GDI engine development is also reviewed and discussed. Way back when Gasoline direct injection (GDI) was first used in 1925 on the Hesselman engine. Jonas Hesselman designed the engine to start on gasoline and then switch over to run on diesel or kerosene. But in 1952, Bosch developed the first automotive direct injection system that actually ran on gasoline. Mercedes Benz wasn't far behind in 1955 with the first direct injection sports car, the 300SL. Due to its high cost, few automakers adopted GDI to be used in mass-market cars. GDI sort of disappeared from the automotive scene until its comeback in late '90s models of Mitsubishi, Toyota, Nissan. Enhance every gasoline direct injection module design with the right semiconductor solutions from Infineon - your automotive partner. Learn more now. Achieving highly precise engine control demanded by today's high-end engines is only possible with gasoline direct injection. By and large the biggest challenge is processing more and more data in shorter time intervals, with an increasing proportion of model-based control. With Infineon you can achieve all this and more. Our microcontrollers feature outstanding computing performance and even set the benchmark in the industry. Also, we offer a virtually complete chipset for all your gasoline direct injection application needs.

The Concept Gasoline Direct Injection Engine. The most important challenge facing car manufacturers today is to offer vehicles that deliver excellent fuel efficiency and superb performance while maintaining cleaner emissions and driving comfort. Growing awareness of global warming as a big threat to the environment, has added yet another dimension to this challenge. In order to prevent global warming, the reduction of CO<sub>2</sub>, one of the greenhouse gases, is called for. The Gasoline Direct Injection technologies are products efforts to maximize fuel economy, and thereby minimize environmental impact at an accessible price by harnessing the GDI's inherent advantages.