Direct Injection Gasoline Engine

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Gasoline direct injection (GDI), also known as petrol direct injection (PDI), is a mixture formation system for internal combustion engines that run on gasoline (petrol), where fuel is injected into the combustion chamber.This is distinct from manifold fuel injection systems, which inject fuel into the intake manifold.. The use of GDI can help increase engine efficiency and specific power ...

Gasoline direct injection - Wikipedia

Dec 15, 2020 (The Expresswire) -- The increasing demand for fuel-efficient and low combustion engine is a key factor driving the gasoline direct injection...

Gasoline Direct Injecton Market: Coronavirus Impact - Key ...

The Gasoline Direct Injection Compression Ignition (GDCI) engine is one of the most promising technologies in this category. GDCI engines merge high compression-ignition efficiency with the low CO 2, NO x and PM emissions of spark ignition (SI) engines [143], [144], [145].

Gasoline direct injection engines A review of latest ...

Direct fuel injection is a very old idea Until the early 2000s, direct injection was mainly associated with diesel engines. However, gasoline direct injection isnt a new idea. The first engine to use direct injection was a V8 aircraft engine created by Leon Levavasseur in 1902 a hundred years before GDI became widely used in passenger cars.

EXPLAINED: Gasoline Direct Injection (GDI) - Still Running ...

How Direct Fuel Injection Works Gasoline engines work by sucking a mixture of gasoline and air into a cylinder, compressing it with a piston, and igniting it with a spark. The resulting explosion drives the piston downwards, producing power.

Understand Direct Fuel Injection and How It Works

Gasoline direct injection (GDI) is a fuel delivery system in gasoline internal combustion engines. The system represents the latest technologies in fuel injection and utilizes a high pressure common rail accumulator assembly which injects the fuel mixture directly into the engine's combustion chambers.

What is Gasoline Direct Injection? (with picture)

It's called direct injection, and it refers to how the fuel makes its way inside an engine's controlled-explosion room, better known as a combustion chamber. In a garden-variety gasoline engine with fuel injection, gasoline takes a more roundabout route than it does with the direct injection method.

How Direct Injection Engines Work | HowStuffWorks

Before we look inside the direct injection engine, let's view a quick second in the life of a standard gasoline engine (for a more complete look at the gasoline engine, check out How Car Engines Work). First, the fuel travels via pump from the fuel tank, through the fuel line and into fuel injectors that are mounted into the engine.

Direct Injection Basics | HowStuffWorks

Engine technology supplier Bosch says that direct injection can return a 15 percent gain in fuel economy while boosting low-end torque as much as 50 percent. Combining direct injection with other...

Pros and Cons of Direct Injection Engines - Consumer Reports

Gasoline Direct Injection (GDI) Engines - Development Potentialities 1999-01-2938 In this paper an estimation of efficiency potential of the engine process with G asoline D irect I njection (GDI) is presented as well as both the advantages and todays problems of different mixture preparation concepts for the GDI engine.

Gasoline Direct Injection (GDI) Engines - Development ...

What happens with the direct injection engine is youre squirting that liquid fuel into the cylinder, it gets on the cylinder walls and absorbs into the oil. What happens during the combustion event is the oil that is on the cylinder walls contains gasoline so it ignites and it burns off.

Solving Gasoline Direct Injection Issues: The facts and ...

Gasoline direct injection (GDI) can cause carbon buildup problems. It differs from traditional multiport fuel injection (MFI)in several ways. First, the tip of the fuel injector is located right in the combustion chamber, so the injector is subjected to very high compression and combustion pressures. Thats different than an MFI injector thats located in the intake manifold and subject to only manifold vacuum.

Carbon buildup in Gasoline Direct Injection engines ...

Gasoline direct injection (GDI) is a more advanced version of multiport systems, where fuel is injected directly into the combustion chamber instead of the intake port. Direct injection improves combustion efficiency, increases fuel economy and lowers emissions.

Direct Injection Engine vs. Port Fuel Injection

Gasoline direct injection (GDI): It is also known as petrol direct-injection engine and it is a fuel injection employed in latest four-stroke gasoline engines. In this technology, the gasoline gets highly-pressurized and than injected via a common rail fuel line directly into the combustion chamber of each cylinder.

Gasoline Direct Injection (GDI) | How GDI Works? | GDI ...

Direct injection (DI) compressed natural gas (CNG) engines are emerging as a promising technology for highly efficient and low-emission engines. However, the design of DI systems for compressible gas is challenging due to supersonic flows and the occurrence of shocks. An outwardly opening poppet-type valve design is widely used for DI-CNG.

Modeling of Direct-Injection of Compressed Natural Gas in ...

Bosch gasoline direct injection as the key to clean and economical engines: reduced fuel consumption and emissions, with enhanced driving dynamics thanks to ...

EN | Bosch gasoline direct injection - YouTube

As a result, gasoline direct injection (GDI); has a separate fuel injector, for each of the engine's cylinders. Because of this, the cylinder head is the new home for the fuel injectors. Consequently, allowing for direct access to the combustion chamber.

Gasoline Direct Injection (GDI) - New Technology Causes ...

Engines with gasoline direct injection produce the air-fuel mixture directly in the combustion chamber. Only fresh air flows into the intake port through the open intake valve. The fuel is injected directly into the combustion chamber by high-pressure injectors.

The process of fuel injection, spray atomization and vaporization, charge cooling, mixture preparation and the control of in-cylinder air motion are all being actively researched and this work is reviewed in detail and analyzed. 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. The fuel economy and emission data for actual engine configurations have been obtained and assembled for all of the available GDI literature, and are reviewed and discussed in detail. The types of GDI engines are arranged in four classifications of decreasing complexity, and the advantages and disadvantages of each class are noted and explained. Emphasis is placed upon consensus trends and conclusions that are evident when taken as a whole; thus the GDI researcher is informed regarding the degree to which engine volumetric efficiency and compression ratio can be increased under optimized conditions, and as to the extent to which unburned hydrocarbon (UBHC), NOx and particulate emissions can be minimized for specific combustion strategies. The critical area of GDI fuel injector deposits and the associated effect on spray geometry and engine performance degradation are reviewed, and important system guidelines for minimizing deposition rates and deposit effects are presented. The capabilities and limitations of emission control techniques and after treatment hardware are reviewed in depth, and a compilation and discussion of areas of consensus on attaining European, Japanese and North American emission standards presented. All known research, prototype and production GDI engines worldwide are reviewed as to performance, emissions and fuel economy advantages, and for areas requiring further development. The engine schematics, control diagrams and specifications are compiled, and the emission control strategies are illustrated and discussed. The influence of lean-NOx catalysts on the development of late-injection, stratified-charge GDI engines is reviewed, and the relative merits of lean-burn, homogeneous, direct-injection engines as an option requiring less control complexity are analyzed.

Direct injection enables precise control of the fuel/air mixture so that engines can be tuned for improved power and fuel economy, but ongoing research challenges remain in improving the technology for commercial applications. As fuel prices escalate DI engines are expected to gain in popularity for automotive applications. This important book, in two volumes, reviews the science and technology of different types of DI combustion engines and their fuels. Volume 1 deals with direct injection gasoline and CNG engines, including history and essential principles, approaches to improved fuel economy, design, optimisation, optical techniques and their applications. Reviews key technologies for enhancing direct injection (DI) gasoline engines Examines approaches to improved fuel economy and lower emissions Discusses DI compressed natural gas (CNG) engines and biofuels

Direct injection spark-ignition engines are becoming increasingly important, and their potential is still to be fully exploited. Increased power and torque coupled with further reductions in fuel consumption and emissions will be the clear trend for future developments. From today's perspective, the key technologies driving this development will be new fuel injection and combustion processes. The book presents the latest developments, illustrates and evaluates engine concepts such as downsizing and describes the requirements that have to be met by materials and operating fluids. The outlook at the end of the book discusses whether future spark-ignition engines will achieve the same level as diesel engines.

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 sub-system to the efficiency of the overall system.Including discussions, data, and figures from many technical papers and proceedings that are not available in the English language, Automotive Gasoline Direct Injection Systems will prove to be an invaluable desk reference for any GDI subject or direct-injection subsystem that is being developed worldwide.

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Progressive reductions in vehicle emission requirements have forced the automotive industry to invest in research and development of alternative control strategies. Continual control action exerted by a dedicated electronic control unit ensures that best performance in terms of pollutant emissions and power density is married with driveability and diagnostics. Gasoline direct injection (GDI) engine technology is a way to attain these goals. This brief describes the functioning of a GDI engine equipped with a common rail (CR) system, and the devices necessary to run test-bench experiments in detail. The text should prove instructive to researchers in engine control and students are recommended to this brief as their first approach to this technology. Later chapters of the brief relate an innovative strategy designed to assist with the engine management system; injection pressure regulation for fuel pressure stabilization in the CR fuel line is proposed and validated by experiment. The resulting control scheme is composed of a feedback integral action and a static model-based feed-forward action, the gains of which are scheduled as a function of fundamental plant parameters. The tuning of closed-loop performance is supported by an analysis of the phase-margin and the sensitivity function. Experimental results confirm the effectiveness of the control algorithm in regulating the mean-value rail pressure independently from engine working conditions (engine speed and time of injection) with limited design effort.

A single cylinder, air-assisted gasoline direct injection engine was used to investigate the factors affecting CAI combustion. CAI was achieved by residual gas trapping using low-lift short duration camshafts and early closing of the exhaust valves. The effects of EVC (Exhaust Valve Closure) and IVO (Inlet Valve opening) timings, spark timing, single and split injection timings, coolant temperature, compression ratio, cam lift and duration on emissions and CAI operation were investigated experimentally. Results show that EVC timing, compression ratio, cam lift and duration had significant influence on CAI combustion and emissions. Coolant temperature was revealed to have substantial impact on CAI combustion at coolant temperature below 65 degrees. Results also showed the importance of injection timing and especially split injection that enabled the extension of CAI range in both stoichiometric and lean conditions. Furthermore, CAI operation range was extended via fuel injection during recompression. All the above clearly suggest that optimising injection timing and using split injection is an effective way to control and extend CAI operation in a direct injection gasoline engine.