

Gasoline Systems

Scavenging with gasoline direct injection



BOSCH

Invented for life

Scavenging



Customer benefits

- ▶ Reduction of fuel consumption/CO₂ output by up to 15%: scavenging facilitates a reduction of engine displacement (Extreme Downsizing)
- ▶ Fun-to-drive by eliminating the turbo lag
- ▶ Quick response due to high low-end torque
- ▶ Comprehensive Bosch expertise in systems with scavenging

Gasoline direct injection contributes to the further reduction of fuel consumption and emission. Engines with gasoline direct injection generate the air-fuel mixture directly in the combustion chamber. Only fresh air flows through the open intake valve. The fuel is injected directly into the combustion chamber using high-pressure injectors.

Task

Bosch has developed a system approach that eliminates the turbo lag and offers dynamic driving with high torque even at low engine speeds. Scavenging leverages the synergies from gasoline direct injection, variable camshaft adjustment and turbocharging.

Function

Scavenging controls the valves so that at low engine speed they are opened simultaneously for a moment. This creates a strong dynamic pressure differential between the engine's intake and exhaust sides, which draws large amounts of fresh air into the combustion chamber and purges the residual gases more efficiently. The electronic engine control Motronic utilizes this effect by optimally adjusting the charging and combustion control process.

Closing the intake valve early at low engine speed with later injection leads to a substantial increase in charging since less air is pushed back into the intake port. This effect is made possible thanks to camshaft adjustment which is controlled by Motronic.

The higher mass throughput increases the efficiency of the exhaust-gas turbocharger. Its operating point is shifted to a higher charge speed level with much higher charge pressure. Below 2,000 rpm, the torque increase at full load can be increased so much that the responsiveness is on par with larger-displacement engines. Compared with port-fuel injection engines with the same power output, fuel consumption can be reduced by up to 15%.

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