Gasoline Systems
Controlled valve operation CVO

BOSCH
Invented for life

Controlled valve operation CVO

Customer benefits

- Worldwide manufacturing available
- Improved functionality of the injection system
- Improved injection accuracy over lifetime, specifically for small amounts (> 1.5 mg/injection)
- Extended usable quantity range with larger DFR (dynamic flow range) supports turbocharging, downsizing, high boost, and flex fuel operation
- New possibilities for the development of combustion processes
- Stabilization of metering; “allowances” can be reduced
- No additional sensors required for analyzing valve opening times

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. This improves combustion chamber cooling and enables higher engine efficiency due to higher compression, resulting in increased fuel efficiency and torque.

Task

Future combustion processes (e.g. for Euro 6) call for the use of high pressure even with small loads and multiple injections. These help to avoid soot generation which is caused by wall and piston wetting. These processes require very short injection times and minimized metering tolerances over the vehicle’s lifetime.

Function

Bosch has developed a mechatronic approach for controlling the high-pressure injection valve which substantially reduces these metering tolerances and thus enables series application: CVO (controlled valve operation). CVO determines the actual opening time of the injector and compares it with the set value. As soon as a deviation is detected, an adjustment function sets in to minimize fuel metering tolerances.

Each valve behaves differently over its lifetime. Adjusting the individual control speed enables metering tolerances to be substantially reduced, especially with small amounts. The change in metering tolerances caused by aging can also be limited since CVO adapts to constant usage drift. Therefore the quantity of fuel injected can be maintained stable to a large extent over the valve’s lifetime.

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