

Delphi e-Phaser

The Delphi e-Phaser is an electrically driven variable cam phaser (eVCP) that is designed for use in a wide range of engine applications to help manufacturers reduce engine emissions and improve fuel economy.

Variable cam phasing changes the timing of an engine's valve lift event to improve engine efficiency, enhance idle stability and help the engine produce more torque and power. Compared with conventional hydraulic cam phasing, Delphi's innovative new e-Phaser achieves faster response times and provides an increased phasing range. It also provides extended usage range under hot engine conditions (low engine oil pressure), under cold engine conditions, at zero rpm, and at low speeds during engine stop and cranking.

Delphi's e-Phaser is facilitated by a unique strain wave gear mechanism, driven by a 3-phase brushless DC electric motor.

► Benefits

- Provides reduced CO₂ emissions and fuel economy improvement due to oil pump downsizing, and extended usage range with high precision and faster control in transients.
- Reduces emissions at low temperatures through improved combustion after cold start. The e-Phaser's extended phasing range and fast transients contribute to further reduction of NOx emissions when using Miller and Atkinson cycles.
- Enables advanced combustion strategies, such as homogeneous charge compression ignition (HCCI), which can further reduce fuel consumption and NOx emissions.
- Extends phaser use range at low temperatures for improved start-stop (decompression) and increased torque and peak power.
- Compact size allows packaging flexibility for the manufacturer.
- The e-Phaser integrates a return spring for fail safe function.

► Availability

The Delphi e-Phaser is targeted for initial production in 2015. Development testing is complete and engineering samples are available to automotive engine manufacturers. Contact Delphi for engineering samples.



Delphi e-Phaser, showing electric actuator



Delphi e-Phaser, showing mechanical cam phaser

▶ Typical Applications

The Delphi e-Phaser is designed for a wide range of engine applications. It can be used in:

- Gasoline start-stop engines, including mild hybrid vehicle programs
- Gasoline direct injection (GDI) engines, including super ultra low emissions vehicle (SULEV) applications requiring low hydrocarbon emissions
- Premium spark ignited (gasoline) engines with port fuel injection (PFI) or direct injection
- 2-Step and 3-Step valve lift engines, and continuously variable valve lift engines with dual independent cam phasing and PFI
- Lean burn, spray guided GDI engines (HCCI engines) with 2-Step valve lift or continuously variable valve lift
- Lean stratified GDI engines
- Conventional gasoline engines
- Light duty diesel engines
- Turbo charged engines

The Delphi e-Phaser can also be used as an actuator in some continuous variable valve duration applications.

▶ Performance Advantages

The e-Phaser's strain wave gear mechanism provides superior performance versus competing systems, including fast phase rate, greater phasing authority, return spring for fail safe, and low power consumption.

The Delphi e-Phaser will also contribute to continued development of homogeneous charge compression ignition (HCCI) technology to help further reduce fuel consumption and NOx emissions. In conjunction with variable valve lift, it can help control part-load cylinder filling to smooth the transition between different operating modes, characteristic of HCCI engines.

▶ The Delphi Advantage

Delphi offers the benefits of more than 75 years' experience in valve train systems and its high quality conventional products have earned industry-wide respect. Our deep understanding of the combustion process and vast research and development capabilities have enabled continuing innovation. Delphi offers one of the industry's most comprehensive lines of valve train products and we support our customers at many levels, from components to valve train systems design and optimization.

As a global leader in engine management systems technology, Delphi can help manufacturers around the world meet emissions requirements, improve fuel economy and enhance performance. Delphi is a source for high value solutions and our systems approach is built into every product. Delphi's flexible engineering approach encourages collaboration. And, Delphi has a thorough understanding of automotive markets around the world and a global network of resources.