

Tokyo Motor Show 2007

## **Motor-Driven Electric Variable Valve Timing Control System**

Vehicles today need to achieve outstanding driving performance with improved fuel economy while reducing harmful substances in emissions. To help meet these requirements, DENSO, together with Toyota Motor Corporation, developed the world's first motor-driven electric variable valve timing control system for the Lexus LS460, launched in September 2006.

Variable valve timing control systems control the opening/closing timing of intake and exhaust valves, optimizing the airflow in and out of each combustion chamber in accordance with driving conditions. DENSO's electric variable valve timing control system includes a cam phasing mechanism connected to the intake camshaft, a brushless motor, and an electric drive unit (EDU) (Figure 1). Based on signals from the engine ECU (electronic control unit), the EDU operates the motor to control the cam phasing mechanism and directly adjust the opening/closing timing of intake valves.

Conventionally, this procedure is controlled hydraulically. As a result, this new system can control intake valve timing more precisely and widely, enabling higher engine output and lower fuel consumption. In addition, even under conventionally difficult operating conditions such as low engine temperature or low engine revolution, the new system precisely controls valve timing, reducing hydrocarbon in emissions and improving drivability.

DENSO introduced its first hydraulic variable valve timing system in 1997, and has contributed to the evolution of the system in the market. Currently, the majority of gasoline-powered vehicles are equipped with this system.

DENSO will continue its efforts to make variable valve timing control systems more efficient, more compact, and less expensive.

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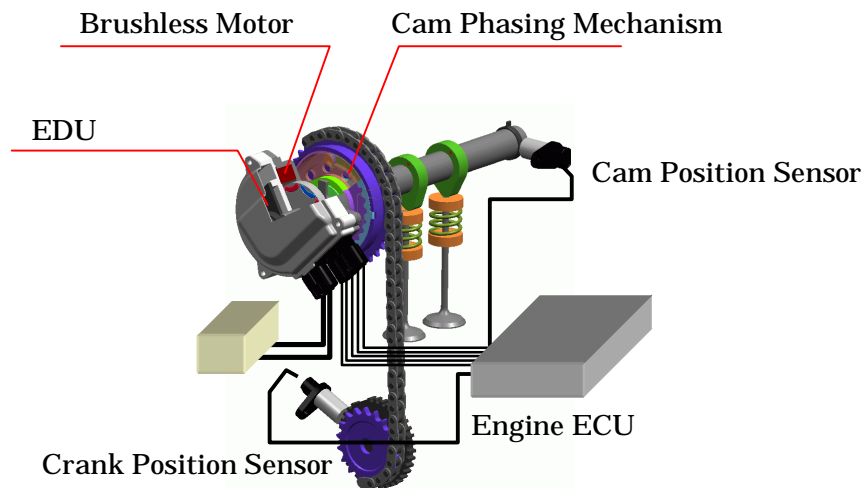


Figure 1. Structure of the motor-driven electric variable valve timing control system

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