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## Hybrid System Technology

### — Developing smaller, lighter, and higher output products —

There's no doubt about it – Hybrid vehicles consume less fuel than conventionally powered vehicles and they emit lower carbon dioxide emissions. But did you know they offer improved performance? Because hybrid vehicles use a combination of an internal combustion engine and an electric motor, the electric motor can assist the engine when it needs more driving power, like when climbing a hill.

Since the introduction of the first Toyota Prius in 1997, DENSO has offered several hybrid vehicle components, including power control units (PCU), battery monitoring units, hybrid electronic control units (ECU), DC-DC converters, and electric compressors. Because hybrid vehicles involve more components than a conventionally powered vehicle, it is critical to reduce the size, weight, and cost of each part.

DENSO offers a variety of technologies related to engine, motor and battery control, high-voltage and high-current semiconductor technologies, and cooling technologies to control the temperature in semiconductor devices operating at a high voltage. By combining these technologies, DENSO provides smaller hybrid vehicle products with a higher performance.

As hybrid vehicles increase capability and performance, PCUs are required to be made smaller, lighter, and with a higher output. DENSO has developed a PCU that is equipped with a unique cooling structure that significantly improves cooling performance for power semiconductor devices that constitute the PCU. Compared to DENSO's conventional product, the new PCU has an improved power density of 60 percent and is 30 percent smaller and 20 percent lighter. To achieve this, the company applied its know-how in cooling and electronics technologies from its in-house development and production of radiators and semiconductor devices. This PCU is installed in the Lexus LS600h and Lexus RX450h.

DENSO will continue to utilize its wide range of expertise to develop innovative technologies for high-performance hybrid vehicle products that are smaller and lighter, while also contributing to the widespread use of hybrid vehicles.

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