

Automotive Equipments Business

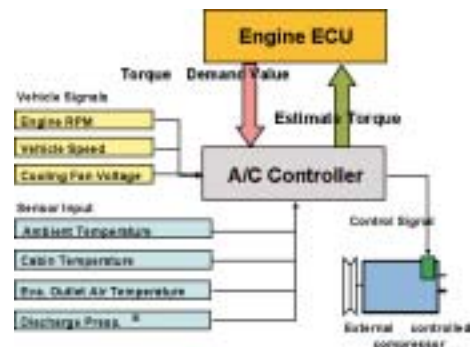
Product development work in the automotive equipments business focuses on two goals: cutting fuel consumption of cars equipped with air conditioners and devising compressor technologies that reduce the environmental impact of car air conditioners. With these goals in mind, we prioritize the following themes.

- 1) Development of energy-conserving products that feature lighter weight and higher efficiency and require less energy to operate
- 2) Development of resource-conserving products, such as by making products smaller and lighter, raising efficiency, using more standardized parts, and reusing various materials
- 3) Development of environmentally responsible products, such as by reducing CFC leaks, using new types of refrigerants, and complying with restrictions on hazardous substances
- 4) Development of products made using energy-conserving processes, such as by using fewer parts and improving the ease of processing and assembly

When performing design reviews during the product development process, we are using a fixed set of assessment rules in order to create products that reflect environmental issues.

Air Conditioner with External Control Variable Displacement Compressor

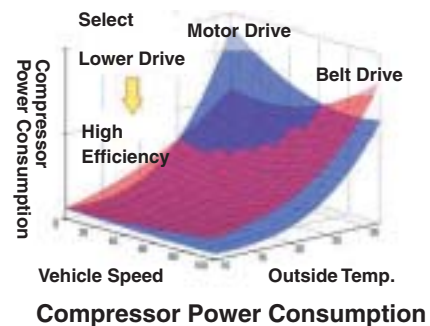
Technologies that cut energy consumption are one key to developing environmentally responsible products. Sanden is working quickly to create more of these technologies. One example is a car air conditioning system with an external control variable displacement compressor. This technology lowers fuel consumption when driving with the air conditioner on. In conventional systems, power used to propel the vehicle is wasted during acceleration and high-speed driving due to the method used to maintain a constant evaporator outlet air temperature. With this new technology, the air conditioning system precisely controls the compressor according to driving conditions, the outdoor temperature, and the vehicle's cabin temperature. Unnecessary compressor operation is minimized. The result is lower fuel consumption when operating the air conditioner.



Air Conditioner for Hybrid Automobiles

Sanden has developed a car air conditioning system designed specifically to match the requirements of hybrid vehicles. Equipped with two scroll hybrid compressors, the system is capable of operating in three drive modes: belt drive powered by engine torque; an internal electric motor; and simultaneous belt/internal motor drive. By switching among these modes depending on driving conditions and the external temperature, the system optimizes control efficiency to cut power consumed by the compressor.

Overall, this optimal control system maximizes comfort and prevents fogging while lowering energy consumption by half compared with conventional car air conditioners.



The Enhanced HFC134a Compressor

Most open compressors are driven by the vehicle's engine. As a result, they require shaft seals and sealing materials, from which tiny amounts of HFC134a escape into the atmosphere, directly contributing to global warming. We are developing technologies and materials that can minimize the amount of HFC134a that escapes from the compressor. We are also working on technologies to make compressors more energy efficient.



Electric Compressors

Electric compressors powered by their own motors offer a number of advantages. First of all, there is no problem when the vehicle is idling because the compressor is not linked to the engine. Since compressor performance is not affected by variations in engine speed, energy consumption can be cut by precisely meeting the demand for cabin cooling. Furthermore, refrigerant leaks are greatly reduced because electric compressors have no shafts or seals as conventional open compressors do.

