



# We are developing new products that pursue the ideals of concern for the environment, safety and compactness to swiftly meet diverse customer needs

To provide new value and functions more quickly than our competitors and to respond to diverse customer needs, AISIN is fortifying its product development, targeting three specific themes: concern for the environment, safety and compactness.

## Concern for the environment: focusing on hybrid technologies and new energies

As the world's automakers vie in fierce competition over development, hybrid vehicles have become a particular focus of attention. To capitalize on the excellent opportunities these circumstances generate, AISIN is enhancing its lineup of products for hybrid vehicles. These include hybrid transmissions, regenerative brake system\*1, electric pumps and dampers for hybrid vehicles\*2.

### Major Hybrid Vehicle Related Products and Systems

#### Hybrid Transmissions

- Dedicated hybrid transmissions with built-in motors (Jointly developed with Toyota Motor Corporation)

#### \*1 Regenerative Brake System

- In these hydraulic brakes, energy generated as the motor spins is converted to electrical energy and stored. This energy is coordinated with the application of the regenerative brakes to maximize braking power.

#### \*2 Damper for Hybrid Vehicles

- The damper works between the motor and engine to mitigate shock during deceleration.

#### Heat Management Systems (Under Development)

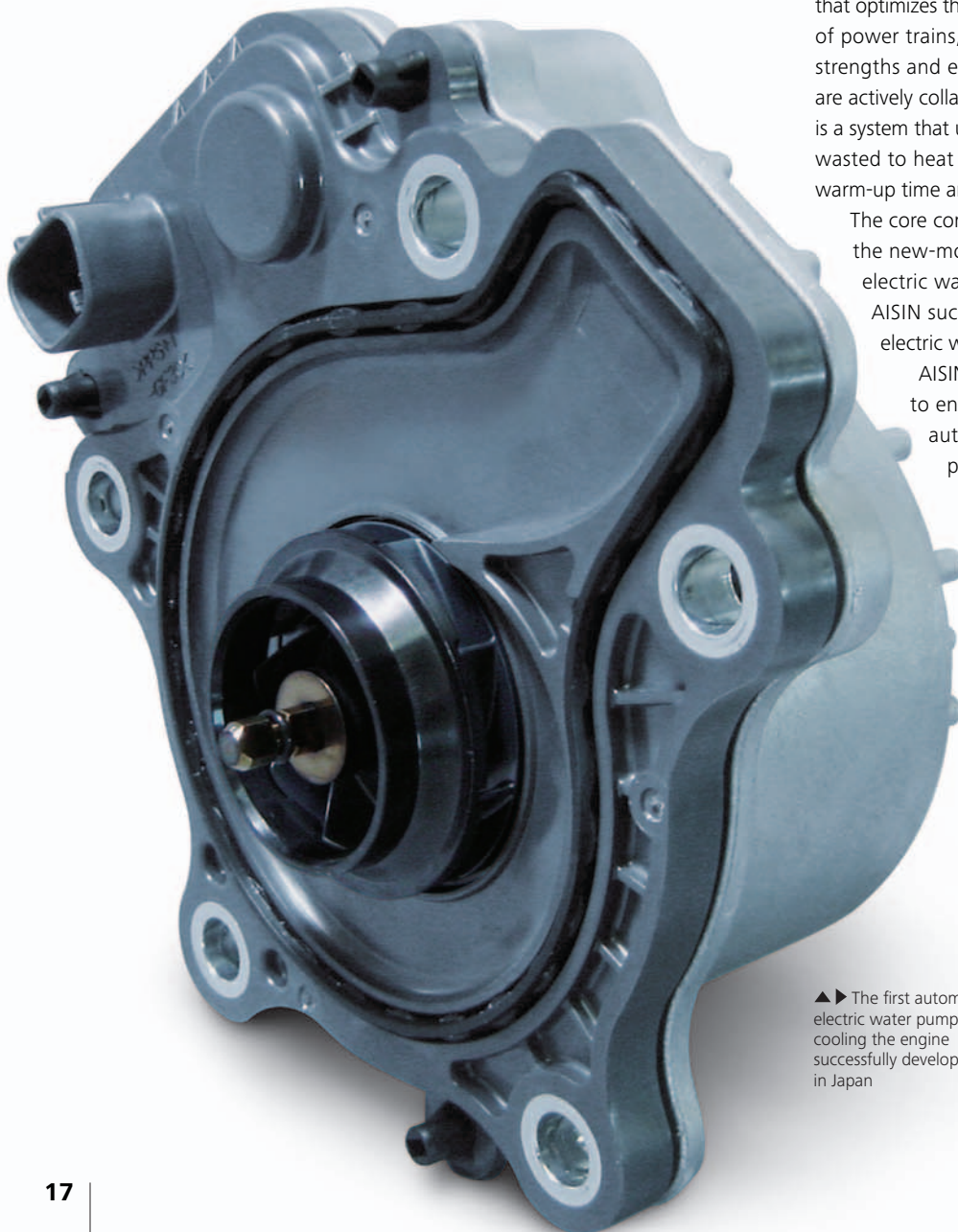
- System to optimize the use of heat throughout an entire vehicle and improve fuel efficiency

In addition, we are developing a Heat Management System that optimizes the heat usage throughout the vehicle. In the field of power trains, where AISIN can leverage its accumulated strengths and expertise, the various companies of the Group are actively collaborating in development projects. One example is a system that uses engine exhaust heat that had hitherto been wasted to heat the engine and transmission, which shortens warm-up time and raises fuel efficiency.

The core components of the Heat Management System for the new-model Toyota Prius, launched in May 2009, are electric water pumps to cool the inverter and engine.

AISIN successfully developed Japan's first automotive electric water pump for engine cooling.

AISIN is also involved with products that contribute to environmental conservation outside the field of automotive parts. Notably, we are aggressively pursuing the development of parts that utilize renewable energy. The development of dye-sensitized solar cells, inspired by photosynthesis in plants, is one such example. These batteries use a pigment that creates electricity by absorbing light and an electrolyte that



▶▶ The first automotive electric water pump for cooling the engine successfully developed in Japan

conducts electricity. They feature lower environmental load during production than conventional solar cells that use silicon. Furthermore, the freedom that dye-sensitized solar cells afford in terms of color and form at low cost raises their potential for a broad range of applications, such as electrical power generating wall panels. Currently, we are progressing with demonstration tests en route to commercialization.

Fuel cell cogeneration systems for home use, realizing energy consumption and CO<sub>2</sub> emission reductions, are another ongoing development theme for AISIN. Currently, these units are undergoing trial use in general households to verify their reliability and durability. In addition to ongoing work on polymer electrode fuel cells (PEFCs), in March 2009 we commenced joint development of solid oxide fuel cells (SOFCs) with Osaka Gas Co., Ltd., Kyocera Corporation and Toyota Motor Corporation. As a result of their high proportion of power generation efficiency to total efficiency, SOFCs are expected to find applications in homes with relatively low thermal demands where their environmental and economic benefits can still be utilized.



Dye-sensitized solar cells



Fuel cell cogeneration systems for home use

### Safety: Reinforcing pre-crash safety zones

AISIN is developing products and systems that contribute to ensuring safety in various driving scenarios, at startup, while running, and when parking.

Specifically, we are bolstering our development of pre-crash safety systems. We have already developed and begun supplying a Driver Monitoring System, which detects and warns drivers if they take their eyes off the road or close their eyes, and Pre-crash Intelligent Head Restraint, which alleviates whiplash injuries in the event of collision from behind by adjusting the headrest position immediately prior to impact. During fiscal 2009, we supplemented these products through the development of a Pre-crash Seat Back System, which returns the reclined seat backs of the rear seats automatically to an optimal position immediately before crash impact. This system was adopted in the Toyota *Crown Majesta*, which was launched in March 2009.

In addition, we are striving to expand applications of our surroundings monitoring systems, a product of AISIN's advanced image processing technology. We are radically improving functions to enhance safety and convenience, such as through blind spot monitoring and pedestrian detection, and promoting the development of systems that contribute to accident prevention and mitigation of injuries if they do occur.

### Major safety products and systems

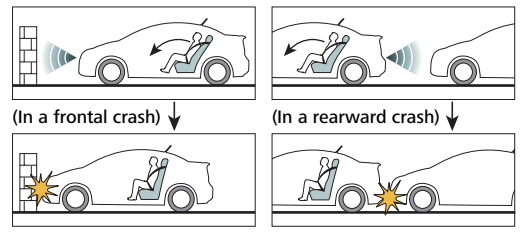
#### At Startup

- Front Monitor and Side Monitor, which can detect obstructions in the vicinity of the vehicle

#### While Running

- Electronic Stability Control (ESC) to maintain vehicle stability automatically in the event of skidding
- Navigation System Coordinated Braking Control Function, which provides a voice warning to the driver in the event that the vehicle is not slowing down on approaching a stop line.
- Pre-crash Safety System to minimize damage when collision with another vehicle or a pedestrian is predicted

To minimize injury, the seat is returned from a reclining to an upright position immediately before crash impact.



#### When parking

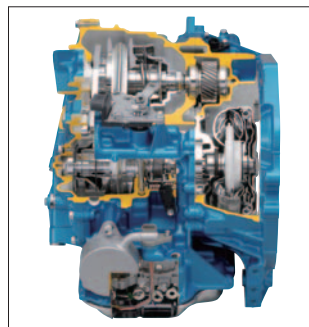
- Back Guide Monitor and Intelligent Parking Assist to help check for obstacles behind the vehicle

### Compactness: Developing sophisticated, compact products

The reduction of vehicle body size and weight is integrally linked to lowering environmental impact by improving fuel efficiency and cutting the materials used in production. Consequently, it is a target issue for all automotive enterprises. AISIN is developing various parts that serve to minimize vehicle size and weight for compact cars.

Our newly developed New Structure Small Torque Capacity CVT is more compact by placing the differential gears in the front, in contrast to conventional configurations, maintaining a spacious car interior even for vehicles of less than three meters in length. In addition, installation of ESC, which contributes to traffic accident prevention by preventing skidding in the event of accidents, will become mandatory for general-purpose vehicles in the United States from 2012. The trend toward equipment standardization is growing in other regions also, and the Compact and Lightweight ESC developed by AISIN realizes the world's smallest and lightest system of this type. Moreover, our New Generation Seat Slide reduces seat weight while maintaining the strength levels of its predecessor.

These new products are all mounted on the Toyota *iQ* compact car, which was launched during 2008, contributing to its small, lightweight design.



New Structure Small Torque Capacity CVT