

## REVIEW OF OPERATIONS BY SEGMENT

# AUTOMOTIVE

### Thermal Systems

#### RESULTS

Thermal Systems sales grew 7.7% year on year to ¥894 billion. This increase was driven by three main factors: robust demand in Japan due to rising production of vehicles for export, success in expanding sales in North America, and higher production at Toyota and other Japanese automakers in Europe. Major new orders during the year included HVAC units for two PSA Peugeot-Citroën models in Europe.

#### MAIN PRODUCTS

- Climate Control Products  
Air conditioning systems for cars, buses, and construction equipment, truck refrigeration units, and air purifiers
- Engine Cooling Components  
Radiators, cooling fans, inter coolers, oil coolers, front-end modules, and cooling modules

#### NEW PRODUCTS

- World's first ejector cycle refrigeration system for truck refrigeration units
- World's first plasmacluster ion generators for vehicles, developed with Sharp Corporation, that eliminate airborne bacteria
- World's first electric compressor for the Toyota Prius HEV that operates even when the vehicle is stationary
- Car air conditioner heat exchangers with a surface coating that helps to prevent the adherence of unpleasant odors
- World's first coolant heat storage system employing a stainless steel vacuum tank, developed with Tiger Corporation for installation in the 2004 Toyota Prius HEV in the North American market

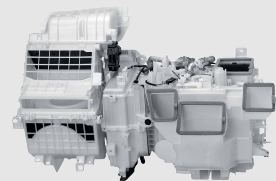
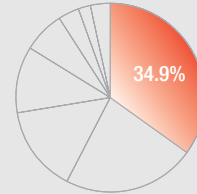
#### OVERVIEW

The past year was an eventful one for Thermal Systems. In Europe, a manufacturing facility in the Czech Republic, primarily supplying components to the Volkswagen and Daimler Chrysler groups, and another in Turkey, began production to meet growing demand from automakers in the region, while new manufacturing companies were established in the United States and Spain. In the expanding Chinese market, DENSO continued to put the groundwork in place for a locally based manufacturing network.

In the year ahead, Thermal Systems plans to raise sales of clean air filters and pollen filters. Another goal is boosting sales of non-fluorocarbon refrigerant air conditioners, as well as air conditioners and radiators developed specifically for compact cars. As ever, finding further cost savings, while reinforcing DENSO's renowned reputation for quality, will be an enduring theme in the new fiscal year.

Technology research and development will target a number of areas crucial to ensuring DENSO's thermal products maintain and extend their competitive lead: further enhancing the cooling capabilities of thermal components; developing products tailored to the requirements of hybrid electric vehicles and low heat-source vehicles; improving cabin air quality, and designing more compact air conditioning units.

PERCENTAGE OF  
NET SALES



AIR CONDITIONING UNIT



ELECTRIC COMPRESSOR



FRONT-END MODULE

## Powertrain Control Systems

### RESULTS

Powertrain Control Systems sales rose 12.9% to ¥581 billion, supported by stronger year-on-year sales in all main product fields. Diesel engine-related products, system control components, such as integrated air fuel modules, variable cam timing (VCT) components and transmission control components, as well as discharge lamp ballasts, were particularly strong performers. Highlights of the year included new supply contracts with Ford for common rail diesel injection systems, and with Audi for VCT components.

### MAIN PRODUCTS

- Diesel Engine-Related Products  
Diesel engine management systems and their constituent components (common rail diesel injection systems, supply pumps, injectors and others)
- Gasoline Engine-Related Products  
Gasoline engine management systems and their constituent components (fuel injectors, fuel pumps, VCT components, throttle bodies, air flow meters, ignition coils, exhaust gas sensors, ceramic substrates, and others)
- Transmission Control Components  
Automatic transmission (AT) control valves, and AT solenoids
- Components for Hybrid Electric Vehicles (HEVs)  
Integrated starter generators (ISGs), inverters, DC-DC converters, and battery ECUs

### NEW PRODUCTS

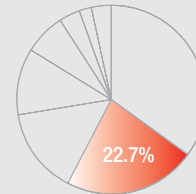
- Grand half (GH) fuel pump modules, 40% smaller and using 25% less power compared to conventional fuel pumps
- Filters for diesel particulate-NOx active reduction systems, developed with Toyota
- Japan's first evaporative leak check module to monitor the diameter of minute leaks in fuel tanks and delivery pipes of gasoline-powered vehicles
- Japan's first shift-by-wire actuator that replaces mechanical with electric gear shifting
- World's first electric combination valves; electrical valves that channel air during engine warm-up to the exhaust pipe to help catalytic converters rapidly reach their minimum effective operating temperature

### OVERVIEW

Powertrain Control Systems, together with the Thermal Systems segment, account for the majority of DENSO's consolidated net sales. This segment produces a comprehensive lineup of products for gasoline, diesel and, more recently, HEVs, encompassing the entire powertrain process. In the past year, significant steps were taken to further extend DENSO's global reach in the powertrain field, with a number of manufacturing facilities established, expanded or opening in all of the world's major automotive markets. In diesel engine-related products, common rail diesel injection systems performed well, buoyed by rising sales to Japanese automakers in Europe and Asia & Oceania, and a rise in demand in Japan from truck manufacturers due to stricter emissions regulations.

Looking ahead, DENSO plans to launch next-generation common rail diesel injection systems that use piezo injectors. These new products will further enhance diesel engine torque and reduce particulate matter in exhaust gas. Following the start of production of GH fuel pumps/pump modules in Japan in September 2003, DENSO plans to rapidly increase sales of these products globally when production begins in North America and Thailand. Powertrain Control Systems also will work to reduce operating costs through intensive production of key, high-end components in Japan, and the adoption of more advanced automated production lines.

### PERCENTAGE OF NET SALES



GH FUEL PUMP MODULE



FUEL INJECTOR



INTEGRATED AIR FUEL MODULE

## Electronic Systems

### RESULTS

Electronic Systems recorded a 9.6% increase in sales to ¥379 billion. Fueling this growth was strong domestic car production and rising use of electronic sensors, smart keys and other electronic components by automakers; in particular, instrument clusters, body electronics products, engine electronic control units (ECUs), and semiconductor devices such as integrated circuits (ICs) and sensors.

### MAIN PRODUCTS

- Body Electronics Products  
Instrument clusters, integrated climate control panels, smart keys, remote keyless entry controllers, rear and corner sonars, car security systems, and body ECUs
- Engine-related Components  
Engine ECUs
- Electronic Components and Devices  
Microcontrollers, hybrid ICs, relays, and semiconductor sensors

### NEW PRODUCTS

- Ignition status control modules, passive entry modules, receivers and passive entry keys used in passive entry and push-start systems (the first to be developed in Japan, allow the driver to start the engine at the touch of a button)
- Diesel particulate filter pressure sensors that detect the level of particulate matter in filters
- The world's first direct-mounted on-engine ECU, incorporating a ceramic circuit board (used in common rail diesel injection systems)

### OVERVIEW

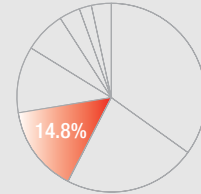
Electronic Systems performed well in the year under review, supported by rising vehicle production in Japan and overseas, and successful initiatives to expand sales. This segment is also benefiting from the growing volume of electronic devices used in cars.

Electronic Systems possesses a comprehensive R&D and manufacturing framework for a wide range of systems, components and semiconductor devices integral to the automotive electronics products of today. As electronic systems embedded in modern vehicles become increasingly complex and common, DENSO is capable of meeting customer needs for cutting-edge electronics across the whole vehicle platform, thanks to its extensive automotive knowledge base. Moreover, Electronic Systems' ability to develop systems and components concurrently makes it possible to react rapidly to demands from automakers.

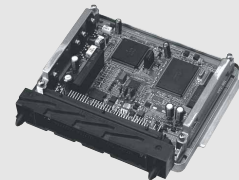
The primary challenge that lies ahead is how to respond to the growing complexity and sheer volume of electronic systems needed in cars today. Electronic systems' strategy is to form alliances with electronics companies to further reinforce its R&D capabilities.

New product themes will cover traditional areas for DENSO: the environment, safety, standardization, and modularization. At the same time, there will be a focus on other areas, such as how to make cars easier to use for the growing number of senior citizens. Efforts in the years ahead will focus on linking engine ECUs to other on-board automotive systems to optimize vehicle performance; improving instrument cluster visibility and increasing the amount of display data; enhancing vehicle security and usability with new body electronics products; and developing more compact semiconductor sensors.

### PERCENTAGE OF NET SALES



INSTRUMENT CLUSTER



ENGINE ECU



INTEGRATED CLIMATE CONTROL PANEL

## Electric Systems

### RESULTS

Electric Systems posted an 8.8% increase in sales to ¥293 billion. This was mainly the result of robust sales in Japan due to higher domestic car production and strong global sales of driving control and safety products. Growth was driven by demand for increasingly advanced side airbags and side-curtain airbags linked to rollover detection and other systems, and by sophisticated anti-lock brake systems (ABS) that incorporate vehicle stability control (VSC) capabilities.

### MAIN PRODUCTS

- Engine-related Components  
Starters and alternators
- Driving Control and Safety Products  
Airbag sensors and ECUs, ABS actuators and ECUs, laser radars and ECUs for adaptive cruise control (ACC) systems, millimeter-wave radars and ECUs for pre-collision systems

### NEW PRODUCTS

- Video sensors for lane departure warning systems
- Passenger occupant sensors for airbag systems

### OVERVIEW

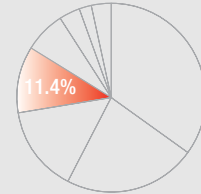
In the past year, the first year of DENSO's current three-year management plan, this segment posted strong sales. Efforts to further reduce expenses, such as paring back the cost of components by promoting global procurement and working more closely with suppliers, were also a key part of our activities during the year under review.

Overseas, Electric Systems began volume production of segment conductor alternators in North America, primarily for supply to local plants operated by Honda Motor Co., Ltd. and Toyota. In Spain, we began the manufacturing of ECUs for electric power steering systems, and in China, volume production of airbag ECUs got underway.

The Electric Systems business segment has earned a global reputation as a reliable supplier of an extensive lineup of quality automotive components. Although it has established a solid presence in numerous markets, the segment will have to tackle a number of issues in the year ahead to preserve and enhance its position. In particular, priority will be placed on achieving further improvements in cost-competitiveness; driving forward the development of next-generation components, such as electric power management systems and belt-drive starters, and increasing Electric Systems' presence in China, South Korea and Brazil.

Looking further into the future, R&D programs involving electric systems will move away from individual starter and alternator components to the design of starting, generating and charging systems. In driving control and safety systems, research themes will shift from passive warning systems to devices that actively assist drivers in braking and steering to avoid collisions.

### PERCENTAGE OF NET SALES



SEGMENT CONDUCTOR (SC) ALTERNATOR



MILLIMETER-WAVE RADAR



PRE-COLLISION ECU

## Small Motors

### RESULTS

Small Motors recorded a 5.7% increase in sales to ¥182 billion. Higher sales were achieved as a result of strong demand from Toyota both in Japan and overseas, primarily for motors used in power sliding doors, power seats, and electronic power steering systems. Sales of components for export, particularly to North America, were also significantly higher than in the previous fiscal year.

### MAIN PRODUCTS

- Windshield wiper systems, windshield washer systems, power window motors, and other automotive motors

### NEW PRODUCTS

- Swivel motors for adaptive front-lighting systems (AFS). These systems automatically adjust headlight direction with the direction of travel to improve nighttime driving visibility
- Heat storage water pumps for HEVs and other vehicles with idle-stop capability. Using on-board batteries as their source of power when the engine is stopped, these components pump hot water from the radiator to the vehicle's heating system
- More efficient and compact next-generation windshield wiper motors
- Smaller, more efficient next-generation windshield washer pumps

### OVERVIEW

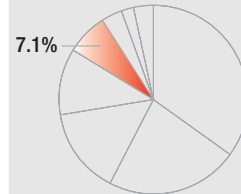
ASMO Co., Ltd., a DENSO Group company, manufactures DENSO's small motor components. The company, in conjunction with DENSO's respective automotive business segments, develops and designs a wide range of components tailored to meet growing automaker demand for electric motors worldwide.

A number of actions were taken during the year under review to raise DENSO's global presence in the market for small motor components. A new small motor plant in South Korea, operated by DENSO PS Corporation, was completed; work began on expanding an existing manufacturing facility in Indonesia, and a new company, scheduled to start producing small motors in May 2005, was established in the Czech Republic.

In the past year, Small Motors made good progress in expanding sales, primarily to Japanese automakers. As a Tier-2 supplier, the segment also boosted sales of headlight leveling motors, ABS motors and other small motors to Tier-1 suppliers.

Looking ahead, this segment plans to further enhance its presence in all key automotive markets. In addition to the existing approach of focusing on Japanese automakers, Small Motors also will work to win more orders from U.S. and European manufacturers. In line with this strategy, further steps will be taken to strengthen the supply framework in Europe and China, as well as other countries in Asia such as South Korea and Indonesia. R&D programs will continue to focus on developing components that make automotive systems safer and more convenient to use, while having a lower impact on the environment.

### PERCENTAGE OF NET SALES



WINDSHIELD WIPER SYSTEM



ELECTRIC POWER STEERING MOTOR



SWIVEL MOTOR

## ITS

### RESULTS

Sales jumped 53.4% year on year to ¥93 billion, supported by strong demand for car navigation systems from Toyota and Ford, and growing sales of ETC equipment. Sales of ETC equipment were driven by the launch of products priced to encourage more people to purchase the equipment, wider product choices, and Japanese government initiatives promoting ETC technology.

### MAIN PRODUCTS

- Car navigation systems, data communications modules, ETC on-board equipment, and advanced vehicle operation systems (AVOS)

### NEW PRODUCTS

- DVD car navigation system with voice-recognition capabilities for the Toyota G-BOOK telematics system
- World's first built-in ETC on-board equipment
- ETC on-board equipment with an integrated car navigation system, another world first
- Two ETC on-board equipment models using windscreen-attachable antennae, one providing voice support on ETC system status, and the other offering similar information using a buzzer

### OVERVIEW

The ITS business segment is responsible for car navigation products, ETC systems and other on-board communication equipment—product categories that were transferred from Electronic Systems. This realignment has resulted in a more focused organization that can better anticipate the needs of automakers and end-users in these rapidly growing market sectors.

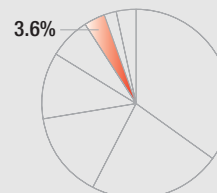
In the past year, ITS concentrated on creating car navigation products with integrated displays, and continued to work on the development of Toyota's G-BOOK. ETC on-board equipment continued to perform well; in March 2004, cumulative sales topped 1 million units.

In key developments, a joint venture—Advanced Driver Information Technology Corporation (ADIT)—set up with Robert Bosch GmbH of Germany, started operations in July 2003. ADIT is developing navigation system LSIs and multimedia-compliant software platforms, as well as carrying out research into map data formats. In December 2003, ITS and Toshiba Corporation jointly developed the world's first multi-operating system environment for car navigation systems. This environment provides single-chip support for both  $\mu$ TRON\* and Microsoft® Windows® Automotive. In January 2004, ITS and Toshiba Information Systems (Japan) Corporation successfully developed technology to operate Macromedia Flash Player™ software on  $\mu$ TRON, allowing users to view Internet video content. These successes culminated in the launch of the world's first after-market car navigation system incorporating Macromedia Flash Player™ software in February 2004.

Going forward, DENSO will adopt a new approach to car navigation systems. For several years, efforts have mainly targeted improvements in basic functions and communications capabilities. ITS is now focusing on how to integrate these systems with conventional on-board equipment and other automotive components. The goal is to incorporate more multimedia functions into navigation systems to further enhance driving comfort and convenience.

*\* $\mu$ TRON is a popular OS for embedded devices used in car navigation systems and other electronics products*

### PERCENTAGE OF NET SALES



CAR NAVIGATION SYSTEM



ETC ON-BOARD EQUIPMENT



DATA COMMUNICATIONS MODULE



# NON-AUTOMOTIVE

## Industrial Systems and Consumer Products

### RESULTS

Sales in this segment rose 0.6% to ¥54 billion. The demand for CO<sub>2</sub> refrigerant heat-pump water heaters was the key factor supporting sales. Sales of these water heaters were driven by a growing market for environmentally friendly products, thanks to Japanese government subsidies and rising environmental awareness among consumers.

### MAIN PRODUCTS

- Automatic Data Capture Devices  
Bar code handy scanners and handy terminals, QR code scanners and handy terminals, smart cards and reader/writers, radio frequency-identification (RF-ID) systems, and security systems
- Factory Automation (FA) Products  
Mobile robots, industrial robots, and programmable controllers
- Refrigeration and Air Conditioning Systems  
Cooling units for electronic equipment (mobile phone base stations, PCs, and others), KHPs, and spot coolers/heaters
- Consumer Products  
CO<sub>2</sub> refrigerant heat-pump water heaters, automatic faucets, and electrically powered kitchen systems

### NEW PRODUCTS

- Two new CO<sub>2</sub> refrigerant heat-pump water heaters for household use
- A space-saving CO<sub>2</sub> refrigerant heat-pump water heater with under-floor water tank unit
- The BHT-300 series of bar code handy terminals with upgraded capabilities

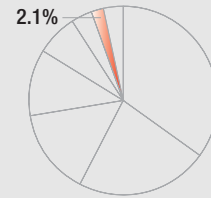
### OVERVIEW

Automatic data capture devices and FA products in industrial systems are developed and manufactured by Group company DENSO Wave Incorporated. Refrigeration and air conditioning systems, also an element of industrial systems, and consumer products, which until last year were called environmental systems, are handled by DENSO's Thermal Systems business segment. Many technologies that DENSO has originated and developed for automotive applications have been adapted for use in non-automotive fields, a process that has led to numerous groundbreaking products.

In the year under review, steps were taken to broaden the lineup of CO<sub>2</sub> refrigerant heat-pump water heaters and enhance performance. Two new versions entered production, a 4.5kW model with an industry-leading coefficient of performance rating and low operating noise levels; and a 6.0kW model employing the world's first ejector cycle system that improves heat pump efficiency. In other product categories, cumulative production of industrial robots exceeded 30,000 units, while businesses and products related to QR code, a two-dimensional code developed in-house that can hold several dozen to several hundred times more information than bar codes, continue to do well. Applications for this code are growing, and we hope to maximize its potential by moving into entirely new markets. Recent examples of new applications include car registration certificates, immigration systems, and data management at dispensing pharmacies.

In the year ahead, DENSO Wave will grow its data capture device and FA product business by continuing to actively move into new markets and by building its presence in existing fields. In industrial refrigeration and air conditioning systems and consumer products, DENSO will develop even more competitive products by further improving the three key elements of air conditioning systems—heat-exchange components, compressors and refrigeration cycle control. Based on the growing lineup of products, the aim is to further expand this business into international markets.

PERCENTAGE OF NET SALES



QR CODE  
HANDY TERMINAL



QR CODE



INDUSTRIAL ROBOT



CO<sub>2</sub> REFRIGERANT  
HEAT-PUMP WATER HEATER