

REVIEW OF OPERATIONS BY SEGMENT

AUTOMOTIVE

THERMAL SYSTEMS

Results

Sales in Thermal Systems surged 26.1% to ¥870,676 million. This increase was primarily due to the effects of a change in the fiscal year-ends at overseas subsidiaries. The change caused 15 months of sales at these subsidiaries to be included in the year's results, raising sales in this segment by 15.4%. During the year, DENSO Thermal Systems S.p.A. became a consolidated subsidiary, accounting for 5.7% of the increase. The effects of a weakening yen raised sales by 4.6%, while orders for thermal systems for new models such as the Toyota Yaris in Europe also contributed to the rise.

Main Products

- Climate Control Products:
Air conditioners for cars, buses, and construction equipment
- Powertrain Cooling System Components:
Radiators, cooling fans, inter-coolers, oil coolers, integrated cooling modules

Overview

Car air-conditioning systems account for over 80% of sales in Thermal Systems. DENSO car air-conditioning systems have consistently held the top spot in the global market since 1990, and now boast a market share of around 24%. Europe, Asia, and South America, regions where car air conditioner use is still relatively low, are target markets. We see particular potential in Europe, establishing and enhancing manufacturing facilities in the Czech Republic and Italy in the year ended March 2002, to meet an anticipated increase in demand. During the period, DENSO made further progress in developing innovative and unique air-conditioning products—systems that consume less of the engine's power, are more compact, are highly functional, and use non-fluorocarbon refrigerants.

Highlights of the Year

- Development of an air-conditioning and heat-pump system using CO₂ refrigerant
- Development and mass production of an air-conditioning system with humidity control
- Development and mass production of an ultra-thin evaporator with a core width of only 38mm
- Development and commercialization of a front-end module
- Development of a four-seat independent air-conditioning system
- Magneti Marelli S.p.A. Thermal Systems Division acquired, renamed DENSO Thermal Systems S.p.A.
- DENSO Manufacturing Czech s.r.o. established to manufacture car air-conditioning systems
- GAC Corporation de Mexico S.A. de C.V. established to produce hoses and tubes for car air-conditioning systems and spot coolers

POWERTRAIN CONTROL SYSTEMS

Results

Sales in Powertrain Control Systems climbed 24.3% to ¥500,892 million. An additional three months of sales at overseas affiliates, owing to the change in their fiscal year-ends, caused sales to rise 9.9%. The effects of a weaker yen also gave a 3.9% boost to sales. In North America, developments such as full-scale local production of stick coils, stronger sales of exhaust gas sensors and injectors, and the start of production of integrated air/fuel modules all helped to expand sales. Common rail systems were another strong performer. Sales of these systems jumped from 96,000 units in the year ended March 2001, to 283,000 units in the year under review.

Main Products

- Diesel Engine-Related Products:
Fuel injection systems and components
- Gasoline Engine-Related Products:
Engine management systems and components
- Transmission Control Components:
Shift control actuators, automatic transmission (AT) control valves

Overview

The Powertrain Control Systems Business develops and manufactures a wide variety of systems and products for both diesel and gasoline powertrains. The product lineup encompasses the whole powertrain process, from air induction through combustion and exhaust. Many products are contenders for first or second global market share in their categories. Fuel pumps, exhaust gas sensors, variable valve timing (VVT) units, and ignition coils are just some of the DENSO powertrain products that have consistently held leading global market shares. Looking ahead, the group is targeting the further development of gasoline direct injection and common rail systems to improve fuel efficiency and meet tougher emission regulations, as well as expand sales of these products. Moreover, the group will strengthen its supply structure, introduce new marketing technologies, and enhance its application engineering functions. These actions will create a support framework capable of rapidly responding to the demands of automobile manufacturers.

Highlights of the Year

- Development and commercialization of a 1,800-bar common rail system
- Development and commercialization of an integrated air/fuel module
- Development of a diesel particulate filter (DPF)
- DENSO exhaust gas sensors and ignition coils capture leading global market share
- Further investment in DENSO Manufacturing Hungary Ltd.
- DENSO Manufacturing Vietnam Co., Ltd. established to produce components for gasoline engines
- Siam DENSO Manufacturing Co., Ltd. established to produce components for gasoline and diesel engines
- Construction started on a new manufacturing facility for DENSO Mexico S.A. de C.V.

ELECTRONIC SYSTEMS

Results

Sales in the Electronic Systems Business jumped 15.5% to ¥410,067 million. An additional three months of sales at overseas subsidiaries caused sales to increase 8.4%. The effects of the weak yen added another 3.6% to the figure. Healthy sales of instrument clusters, demand for DENSO's engine ECUs with enhanced functions, and success in expanding sales to customers in Europe such as Volvo and Jaguar, all contributed to the overall rise in sales. Car navigation systems were particularly impressive performers during the year under review. The number of units sold in the year ended March 2002 surged to 414,000, up from 243,000 in the previous period.

Main Products

- Body Electronics Products:
Instrument clusters, smart keys, remote keyless entry systems, adaptive cruise control (ACC) systems
- ITS Products:
Car navigation systems, electronic toll collection (ETC) on-board units and antennas, advanced vehicle operation systems (AVOS)
- Electronic Components and Devices:
Engine ECUs, hybrid ICs, sensors

Overview

As cars are equipped with more sophisticated electronic systems, component manufacturers have to clear higher technical hurdles.

DENSO is now required to develop electronic devices such as semiconductors and sensors, and create highly accurate, complex control system technology. In its Electronics Systems Business, DENSO not only has the in-house technological expertise to develop semiconductor products, but also the know-how and resources in software development to meet the needs of individual customers. The ITS field is one example of these all-round strengths. Here, we are involved in development across the board, from component hardware through application software and infrastructure.

Highlights of the Year

- Development of MP3 sound reproduction software for vehicle navigation systems
- Start of new services for the advanced vehicle operation systems (PATRACS) in Internet-based fleet management systems
- Commercialization of a connection kit linking Internet-compatible cellular phones to car navigation systems
- Commercialization of a navigation computer for high-resolution displays
- Mass production of a stepper motor-type movement for instrument clusters
- Commercialization of NAVISTANT, a package that enables handheld PDAs to be used as car navigation systems
- DENSO participation in the Internet ITS Project
- Start of an Internet-based service to issue Mapcodes, a location code for navigation systems

ELECTRIC SYSTEMS

Results

Sales in the Electric Systems Business grew 15.1% to ¥288,004 million. This was primarily due to changes in the fiscal year-ends at overseas subsidiaries and the effects of the weak yen, which accounted for 10.7% and 4.3% of the rise, respectively.

Main Products

- Starters and Alternators
- Components for hybrid electric vehicles (HEVs):
Integrated starter generators (ISGs), DC-DC converters, battery ECUs, oil pump motors, inverters and electrical current sensors
- Driving Control and Safety Products:
Airbag sensors and ECUs, anti-lock brake control system (ABS) actuators

Overview

With the shift to smaller, lighter, and more functional alternators and starters, progress is being made on standardization. This approach is also helping the Electric Systems Business to enhance cost competitiveness. In components for HEVs, DENSO developed and commercialized ISGs and a number of other products for different types of HEV systems. DENSO is leading the industry in

this field in product development. In components for car safety systems, we are gearing up development of next-generation airbag sensors and ECUs to better protect occupants in the event of a collision. These efforts go hand in hand with DENSO's continuing development of safety systems.

Highlights of the Year

- Development and commercialization of an ISG and oil pump motor for the Toyota Estima HEV
- Development and commercialization of an ISG, ECU integrated inverter, and magnetic clutch for the Toyota Crown Mild HEV
- Development and commercialization of a side impact sensor (SIS) for airbag systems, less than half the size of previous components

SMALL MOTORS

Results

DENSO's small motors business increased sales by 6.9% to ¥167,460 million. Falling automobile sales, overall, in the North, Central, and South American markets led to a 3.4% decline in sales. This was offset by the effect of accounting changes at overseas subsidiaries and the weaker yen, contributing increases of 6.8% and 3.1%, respectively, to the sales growth.

Main Products

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

Overview

DENSO's small motors are manufactured by group company ASMO Co., Ltd. ASMO's power window motors and washer motors boast leading global market shares in their respective product categories. DENSO is working to maintain its market-leading cost competitiveness in small motors and strengthen its overseas manufacturing network. Moreover, we are accelerating the development of light, highly efficient motors for emission control and fuel saving systems.

Highlights of the Year

- Start of production of small motors in Italy
- Development and commercialization of a convertible roof motor system

NON-AUTOMOTIVE

TELECOMMUNICATIONS

Results

With DENSO's shift of focus from its core cellular phone products to telematics, the telecommunications business is currently going through a phase of contraction.

This was reflected in the division's performance during the year ended March 2002, with sales decreasing 10.1% to ¥79,010 million.

Main Products

Cellular Phones

Overview

During the year, DENSO withdrew from the cellular phone manufacturing business.

Despite this move, we still see mobile communications as a vital area, and will continue research into this technology to keep pace with the car's increasing integration into information networks.

INDUSTRIAL SYSTEMS, ENVIRONMENTAL SYSTEMS, AND OTHERS

Results

Falling demand from overseas markets for industrial systems products was offset by new product launches and efforts to boost sales in the domestic market. These steps led to a rise in sales. In environmental systems, sales of DENSO's CO₂ refrigerant heat-pump water heater for household use beat expectations.

As a result, combined sales in industrial and environmental systems rose 11.6% year on year to ¥62,427 million.

Main Products

- Automatic ID Data Capture Devices:
Bar code handy scanners and terminals, QR code handy scanners and terminals, non-contact IC cards, security systems
- Factory Automation (FA) Products:
Industrial robots, programmable controllers
- Refrigeration and Air-Conditioning Systems:
Cooling systems for cellular phone base stations and CPUs, spot coolers and heaters
- Environmental Systems:
CO₂ refrigerant heat-pump water heaters, garbage disposers, automatic faucets

Overview

In industrial systems, DENSO is looking at the possibility of developing IT-enabled and wireless products in three key categories—automatic identification products, FA products, and control systems—by using our technological know-how acquired in developing and manufacturing advanced automobile systems and components. In environmental systems, DENSO is applying technologies developed for automobile systems to new products that meet the emerging needs of society. Based on demand from homebuilders, electric appliance makers, electric utilities, and other market segments, DENSO is bringing a range of

innovative products to markets outside the automobile industry.

Highlights of the Year

- **DENSO Industrial Systems Division becomes DENSO Wave Incorporated**
DENSO Wave Incorporated was formed in October 2001 after the spin-off of DENSO's Industrial Systems Division and its merger with two group companies, Systemkiki Co., Ltd., which sells automatic identification equipment, and DENSO Systems Corporation, a system engineering specialist
- Development and commercialization of an ultra-clean variant of DENSO's mobile robot for use in clean rooms
- Development and commercialization of a wireless bar code handy terminal, capable of handling a maximum 11Mbps of data
- DENSO's CO₂ refrigerant heat-pump water heater for household use wins a Climate Protection Award from the U.S. Environmental Protection Agency (EPA)
- Horizontal articulated robots capture leading global market share