

Quality is DENSO's lodestar and the lifeblood of the automotive component industry. That's why our unwavering commitment to "Quality First" is critical to DENSO's survival. But DENSO isn't just about superior levels of quality. We are *reaping the benefits of* a range of initiatives covering the entire compass of our operations. These efforts, which build on our renowned strengths in technology, engineering excellence, and our innovative approach to problem solving, seek to propel DENSO to a new level of dominance in the automotive component industry.

# REAPING THE BENEFITS OF ...

With the needs of automobile manufacturers always in mind, DENSO is putting in place a global network capable of supplying competitively priced, high-quality systems and components anywhere in the world. We are achieving this by giving greater consideration to customer location, the technological complexity of products, supply chains, logistical costs and regional laws and regulations. Our ultimate goal is to build a supply network in which all work is conducted in optimal locations. During the year under review, DENSO established new manufacturing facilities in Europe, Asia, and Mexico. These efforts also go hand in hand with our strategy to grow sales.

## ... A GLOBAL PRESENCE



» Production line for power window motors

## THE DENSO GLOBAL NETWORK



### BRINGING ITS-RELATED PRODUCTS TO MARKET IN JAPAN

In Japan, as many manufacturing activities move overseas, we are focusing more on the development and production of advanced on-board equipment that incorporates complex electronic components, semiconductors and software. And with rising interest in intelligent transport systems (ITS) from both the public and private sectors in Japan, we are enhancing our product development capabilities in this area.

In the year ended March 31, 2002, we developed and unveiled a range of ITS-related products. These include a navigation computer for high-resolution displays (800 x 480 pixels), launched in October 2001, and NAVISTANT, a product that enables handheld Personal Digital Assistants (PDAs) to be used as car navigation systems. The NAVISTANT package, released in April 2002, includes a sensor unit, global positioning system (GPS) antenna, and software.

DENSO is also targeting the market for Electronic Toll Collection (ETC) systems,

introduced in Japan in March 2001. Our compact ETC on-board unit, the smallest in the industry, has been earning high marks since its launch in March 2001. We added another product to our ETC unit lineup in May this year, incorporating a new voice guidance function. This allows more flexibility in mounting the unit. And we are about to start production of an on-board communication module that uses a mobile link to download information from external sources. These are just some examples of how DENSO is channeling resources into developing a wider range of ITS-related products, initially for the Japanese market, and then for subsequent rollout on the global market.

Reflecting DENSO's increasing focus on these products, the ITS business division was made independent of the Electronic Systems Group in January 2002. Our automotive business structure has been revamped and now consists of six key groups—Thermal Systems, Powertrain Systems, Electronic Systems, Electric Systems, Small Motors, and ITS.

### ON THE ROAD TO HIGHER SALES IN NORTH AMERICA

In the Americas, our sales expansion strategy in the North American market and the weakening yen helped to boost regional net sales by 37.6%. This figure represents sales over a 15-month period due to the change in fiscal year-ends at overseas subsidiaries. But even on a 12-month basis, sales in the region grew 9.5%. This growth was also due to efforts to create closer relationships with our major customers, seen in higher sales to both General Motors Corporation and Ford Motor Company. Meanwhile, North American customers continued to recognize DENSO's commitment to producing high-quality and technologically advanced systems and components: DENSO was awarded the GM Supplier of the Year Award for the second time and the respected Chairman's Award from J.D. Power and Associates. DENSO was the first automotive component supplier to receive the latter award.

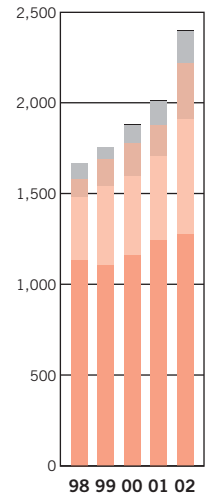


**AN ETC ON-BOARD UNIT WITH  
VOICE GUIDANCE FUNCTION**

**SALES BY  
GEOGRAPHIC SEGMENT\***  
(billions of yen)

■ JAPAN  
■ THE AMERICAS  
■ EUROPE  
■ ASIA & OCEANIA  
■ OTHERS

\*Based on Customer Location



In the aftermarket, we are aiming to boost sales of DENSO's starters and alternators, products that have consistently held leading global market share, by broadening sales channels in our remanufacturing business.

**AIR-CONDITIONING SYSTEMS AND  
DIESEL TECHNOLOGY IN EUROPE**

In Europe, DENSO is ramping up production and enhancing sales with a focus on air-conditioning and diesel engine management systems. In air-conditioning systems, the European automotive market has considerable growth potential. In 2001, around 19 million cars were sold in Europe, but only about half were equipped with air conditioners. This compares with the North American market, which is approximately the same size as the European market. There, almost all cars come fitted with air conditioners. The figure in Europe is forecast to rise to as much as 65% by 2005. Until recently, DENSO had primarily focused on air-conditioning systems for luxury cars. But with this projected rise in demand across all market segments,

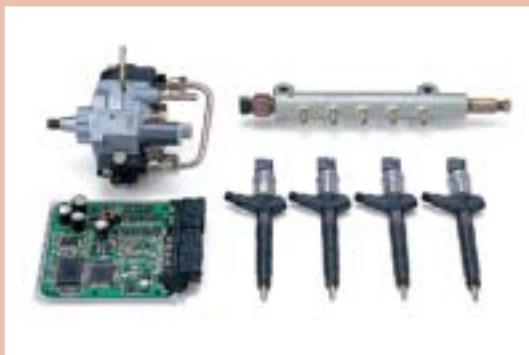
we are broadening our range of products, especially for compact cars, and extending our geographic reach across the continent.

More specifically, we have set up sales and marketing bases in Germany and the U.K. to support our existing manufacturing facilities in the U.K. We are also extending our European manufacturing network. The Thermal Systems Division of Italian automotive components supplier Magneti Marelli S.p.A., acquired in March 2001, was renamed DENSO Thermal Systems S.p.A. (DNTS), in August 2001. With the European automotive market heavily tilted toward compact cars, the rationale behind this move is to use DNTS' expertise in compact-car air-conditioning systems to strengthen our manufacturing capabilities and boost sales in this important product category. In another initiative, in July 2001, we established DENSO Manufacturing Czech s.r.o. in the Czech Republic, to manufacture car air-conditioning systems. These steps, aimed at augmenting our supply network in the European market and the reputation for technological leadership



**DENSO MANUFACTURING  
HUNGARY LTD.**

### **A 1,800-BAR DIESEL COMMON RAIL SYSTEM**



associated with the DENSO name, are seeing results—we have already inked a deal to supply Volkswagen AG with air-conditioning systems for its Passat. Also, thanks to aggressive efforts to foster our customer base, we have captured an 18% share of the market for car air-conditioning systems in Europe. Our work doesn't stop there; we plan to boost this to 28% by 2005.

Compared to other regions, the popularity of fuel-efficient diesel passenger cars is high in Europe—35% of cars on European roads have diesel engines. This figure is projected to climb to 45% by 2006. The automotive industry in Europe is currently gearing up for the EURO 4 emission regulations that come into force in 2005. In response, DENSO has developed a 1,800-bar common rail system to reduce harmful emissions from diesel cars. Deals have already been signed to use the system in vehicles manufactured by several automobile manufacturers. Full-scale production of components for the system will start in Hungary, at DENSO Manufacturing Hungary Ltd., in 2003.

Hungary has also been chosen as a base for the production of components for gasoline engines. These moves mark a concerted effort by DENSO to increase sales of components for both diesel and gasoline engines to automobile manufacturers in Europe.

### **ENHANCING ENGINE MANAGEMENT PRODUCTS IN ASIA**

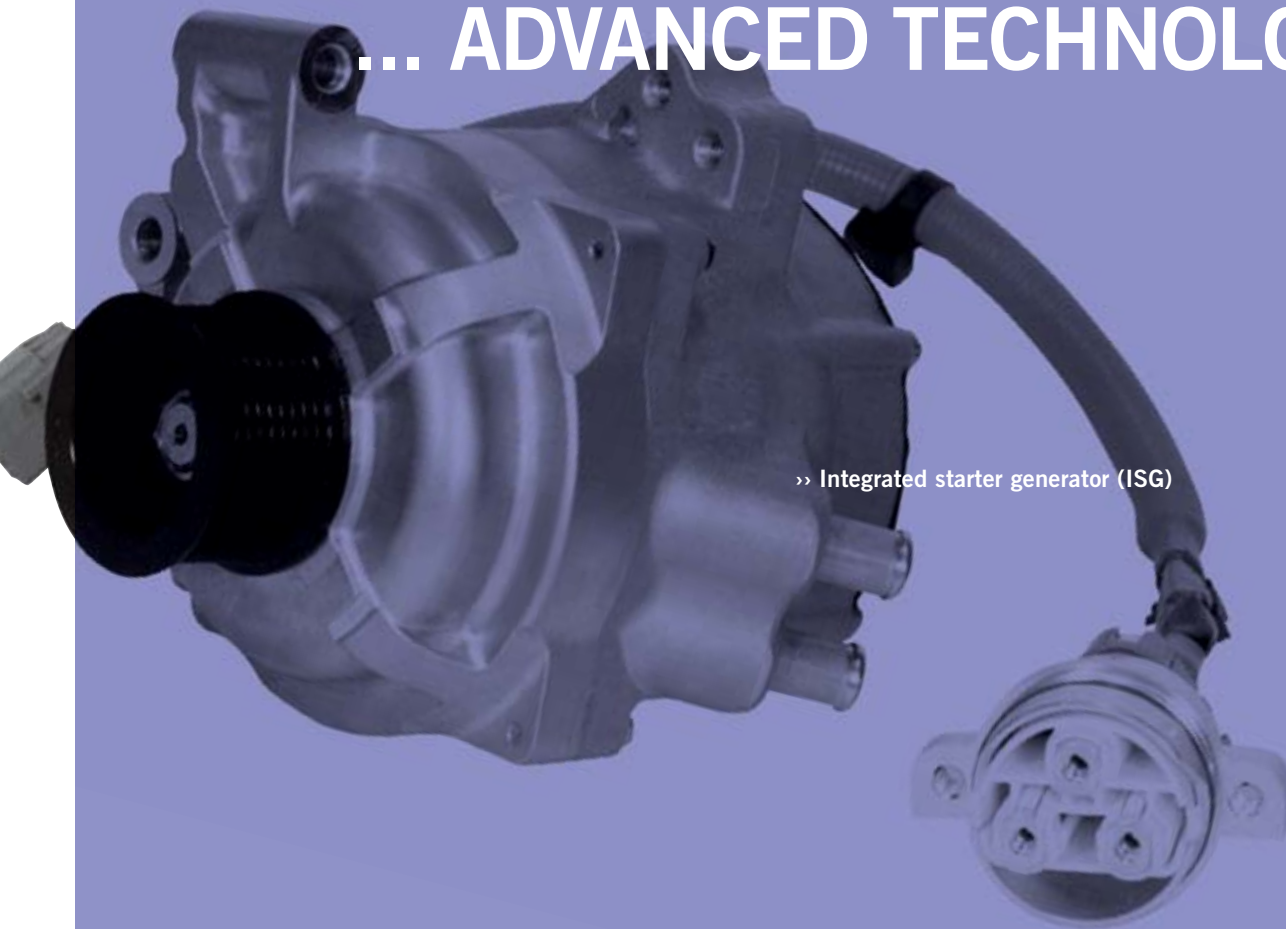
In our flagship air-conditioner product category in Asia, we are within sight of completing a manufacturing network to respond to expected growth in demand. Plants in Thailand, Indonesia, Malaysia, India, the Philippines, China, and Taiwan, have been completed. We have also bolstered our production capabilities in engine management systems, establishing a manufacturing facility in Vietnam, DENSO Manufacturing Vietnam Co., Ltd., in October 2001, and another in Thailand, Siam DENSO Manufacturing Co., Ltd. (SDM), in February 2002. SDM will start full-scale production of diesel common rail systems in 2004. These steps in Thailand follow close on the heels of moves by global automobile

manufacturers to ramp up local production of pickup trucks in the Thai market, and will ensure DENSO stays one step ahead of its rivals in the region. We also plan to start production of components for gasoline engines in both the Thai and Vietnamese markets.

We are, of course, keeping an ever-watchful eye on the Chinese market, as we believe this country is crucial to DENSO's future. In April 2002, we established an office in Shanghai, our fifth in the country. This move further bolsters our manufacturing presence in the market—five facilities producing a wide range of components, including alternators, starters, and air-conditioning systems.

DENSO's drive to develop new technologies is focused on three strategic areas—safety, information and communications, and the environment. As a leading automotive component supplier, our ultimate goal is to create automobile systems that enhance car safety and comfort and reduce the impact of the car on the environment, while at the same time transcending existing product categories and fields. With a product lineup that covers these three areas and proprietary expertise ranging from design to control systems, DENSO has the resources needed to reach this objective.

## ... ADVANCED TECHNOLOGIES



» Integrated starter generator (ISG)

## DENSO'S THREE STRATEGIC AREAS



### **SAFETY:** **NEW LEVELS OF SOPHISTICATION**

DENSO is developing automobile safety technology in two distinct areas: active safety systems for collision prevention and avoidance, and passive safety systems for damage minimization in the event of collision.

In active safety, we are enhancing the performance of DENSO driver support systems already on the market. One example is our adaptive cruise control (ACC) system, which uses a laser radar to scan the road ahead vertically and horizontally. This radar is linked to a distance control unit that works to ensure a safe distance between vehicles. Another example is an engine electronic control unit (ECU) that uses information gleaned from car navigation systems to make appropriate adjustments to the car's gears when road conditions change; braking into a corner for example. This brings enhancements to both driveability and safety. DENSO also has some exciting new technologies under development—sensors that use biosigns such as heart rate and eye

movement to monitor driver drowsiness and fatigue, and control systems that respond as required to the driver's condition. We are also developing a system that aids driver night-vision using infrared technology.

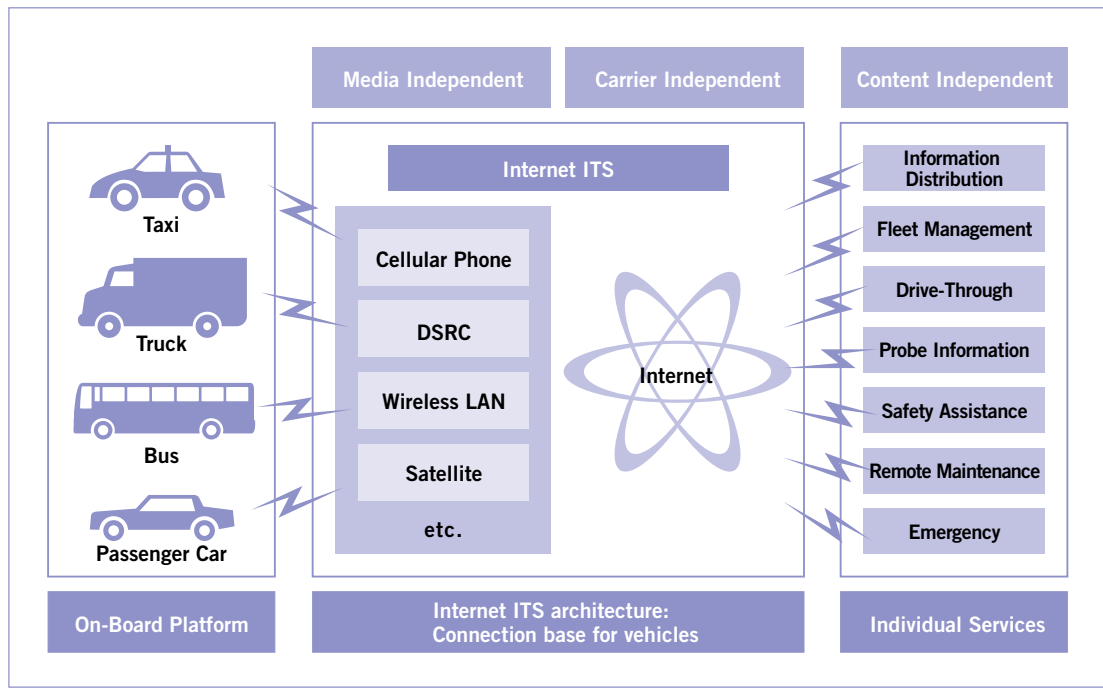
In passive safety, our main focus lies in the development of next-generation airbag sensing systems. DENSO has already captured a commanding lead in this product category. We are planning to reinforce this position by incorporating the latest technologies and looking ahead to our next-generation products. Our goal is to make airbag sensing systems more accurate in detecting collisions, more responsive in deployment, and increasingly sensitive to the size, weight, and position of vehicle occupants. To achieve this, we are targeting the development of dispersed sensing and car occupant sensing technologies, while more advanced ECUs will improve the speed and deployment of the airbag itself using data gleaned from these sensors. DENSO is also developing millimeter wave technology to accurately identify potential obstacles a split second prior to collision,

thereby allowing quicker operation of safety equipment.

### **INFORMATION AND COMMUNICATIONS:** **FROM THE ROAD INTO CYBERSPACE**

The automobile continues to evolve from a simple mode of transport into a mobile terminal seamlessly integrated into information networks. Driving this change is the latest Internet-enabled ITS technology (Internet ITS). Internet ITS uses Internet Protocol Version 6 (IPv6) to ensure the vehicle is always connected to the Internet; anytime, anywhere. This opens up a wealth of possibilities by enabling vehicle occupants to freely access web-based services while on the road. Internet ITS creates other benefits—with on-board electronic components wired into the Internet, their performance can be constantly monitored from a remote location.

Japan is making important strides in this area. DENSO has joined hands with public and private organizations to initiate the Internet ITS Project (<http://www.InternetITS.org/>). This project is aimed at establishing a common



### INTERNET ITS

Internet ITS provides a limitless range of services for access anytime, anywhere.

communications infrastructure for ITS applications, thereby facilitating the development of on-board ITS equipment and software. A number of Internet ITS pilot programs have already started in Japan, the biggest involving 1,570 taxis in Nagoya, conducted from January through March 2002. DENSO supplied on-board equipment for the program.

DENSO has been involved in the development of electronics for automobile components since the transistor age. We will leverage this wealth of knowledge and our experience in telecommunications and network technology in the new field of on-board ITS devices.

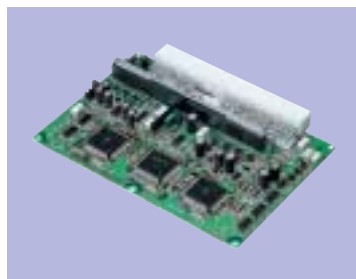
### THE ENVIRONMENT: CARS WITH LESS IMPACT

The majority of the world's car air conditioners use a hydrofluorocarbon refrigerant called HFC-134a. Although this substance does not harm the ozone layer, it does have a high global warming potential (GWP). With DENSO's accumulated expertise in air conditioners, we are naturally at the forefront of efforts to find

a better refrigerant. DENSO's answer to this problem is air-conditioning systems, currently under development, that utilize naturally occurring compounds such as carbon dioxide (CO<sub>2</sub>). Natural refrigerants have an exceptionally low GWP compared with fluorocarbon refrigerants. We have successfully developed an air-conditioning and heat-pump system that uses a CO<sub>2</sub> refrigerant for Toyota's prototype Fuel Cell Hybrid Vehicle (FCHV-4). The FCHV-4, equipped with our system, began public road tests in August 2001. Limited sales are slated to begin at the end of 2002. An earlier spin-off of our research efforts in this area was the development of a household heat-pump water heater that uses CO<sub>2</sub> as the refrigerant. This unit is more economical and has less impact on the environment than the widely used combustion type heat-pump water heaters. Demonstrating its superiority is the strong demand for this technology from home-builders, electric utilities, and electric appliance makers since its launch in May 2001.

Gasoline engine management systems pose equally difficult challenges. Customers

### A CO<sub>2</sub> REFRIGERANT AIR-CONDITIONING AND HEAT-PUMP SYSTEM



### A CAR NAVIGATION SYSTEM-LINKED ENGINE ECU

### A DIESEL PARTICULATE FILTER (DPF)



are demanding engines that are cleaner and offer improved fuel consumption and higher performance. But meeting these requirements and supplying competitively priced components is a daunting prospect. At DENSO, though, we are rising to the challenge with our technological expertise in engine management components used in intake, combustion, and exhaust processes, as well as our control algorithms that ensure both optimal and precise management of combustion parameters such as the air/fuel ratio. One example in this area is our latest, pioneering fuel-injection technology that achieves new levels of fuel atomization, thereby significantly reducing levels of hydrocarbons in exhaust gases. DENSO's advanced processing technology was a vital factor in creating the unique apertures in the fuel injector nozzles that made this improvement possible.

In diesel engine technology, the key issue is not fuel consumption. Instead, engineers are working on ways to reduce concentrations of harmful substances such as particulate matter (PM) and nitrogen oxides (NOx) in

exhaust gases. DENSO is also making great strides in this area, with diesel common rail systems, a technology originally created for trucks and more recently applied to diesel passenger cars. DENSO's new diesel common rail systems use a high injection pressure—at 1,800 bar, the highest in the world—and multiple injections during each combustion stroke to reduce PM and NOx in exhaust gases. With this technology, we have comfortably cleared the regulatory standards set by the European Union in its EURO 4 emission regulations, due to come into force in 2005. DENSO has also developed a diesel particulate filter (DPF) for Toyota's diesel particulate-NOx reduction (DPNR) system. In diesel engine technology, our goal is to prevent exhaust gas issues from standing in the way of more people benefiting from the fuel efficiency and power of diesel engines.

DENSO is also actively developing components for hybrid electric vehicles (HEVs). HEVs, which combine a conventional engine with a battery powertrain, significantly cut fuel consumption and emissions, particularly

in traffic-congested cities. The idea is simple. Power is supplied by the battery instead of the engine when exhaust gas emissions and fuel efficiency would be at their worst—car starts and low speeds. DENSO supplies a range of HEV components, including integrated starter generators (ISGs), inverters, DC-DC converters, and battery ECUs, that make this technological sleight of hand possible. Our reputation for innovation extends to the HEV field: DENSO's development of a belt-driven ISG that enables an idle-stop function was an industry first and was equipped to several HEV models from 2001.

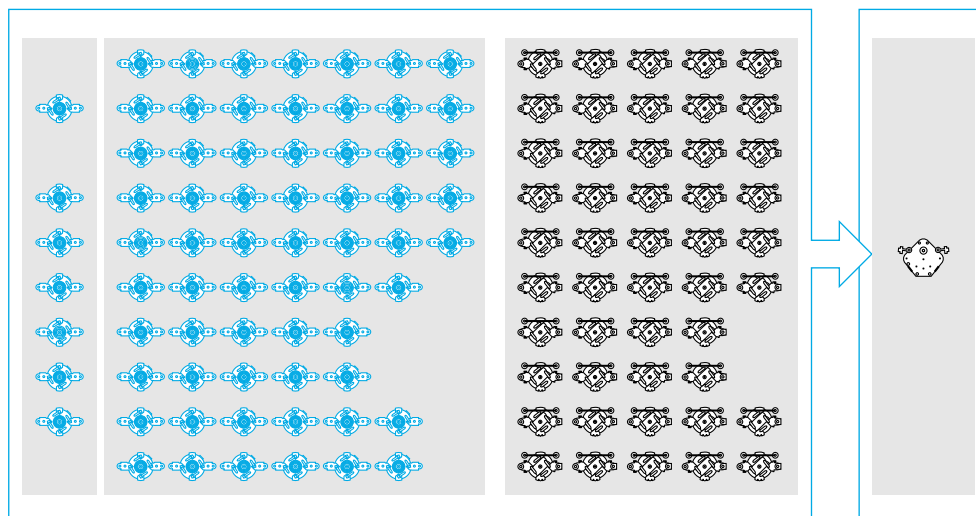
As global automobile manufacturers embark on a new round of corporate reengineering, they are demanding ever-lower prices from component suppliers. Suppliers, in turn, must battle to stay alive in a cut-throat market dictated by cost. At DENSO, we are confident we can rise to this challenge and use it as an opportunity to grow. We are taking a number of approaches to reducing costs—standardization of parts and processes, smaller, lighter components with greater functionality, modularization, shorter development times, and streamlined manufacturing processes. These methods are part of an integrated approach to generate significant cost-saving synergies.

## ... COST REDUCTION



» Supply pump for the 1,800-bar common rail system

## VARIATIONS OF INSTRUMENT CLUSTER MOVEMENTS PARED DOWN FROM 118 TO 1



### ALL ROADS LEAD TO STANDARDIZATION

Reducing the number of different product variations we manufacture—the heart of the standardization concept—helps to streamline manufacturing processes. This creates benefits for DENSO in the form of lower capital investment in machinery and facilities, improved quality, and enhanced productivity. For our customers, it creates advantages such as smaller, lighter, and more functional components, and the opportunity to modularize parts and save costs.

DENSO is also developing individual components that simultaneously meet the needs of multiple customers—creating interchangeability across a wide range of car platforms. This is achieved by carrying out extensive consultations at the planning stages. Meanwhile, as long as cars in the aftermarket continue to use DENSO components, no matter how few, we have a duty to continue to supply these components. Standardizing existing components for this aftermarket will generate significant cost savings. Based on these ideas, we are

broadening the scope of standardization throughout the manufacturing process, from R&D to production; and already seeing the benefits.

One example is the standardization of instrument cluster movements, devices that convert speed and other data into readable form on the dashboard. By moving to a stepper motor with a drive torque 200 times greater than conventional motors, we have succeeded in reducing the types of movements we produce from 118 to just 1. Cost per unit has been cut, while component weight has been reduced by half and accuracy boosted fivefold. This standardized instrument cluster movement entered mass production in November 2001. Another example is our high-pressure supply pump for the 1,800-bar diesel common rail system. The supply pump has an outer cam structure, which allows us to manufacture two types to cover a wide range of engine displacements in both two-cylinder and three-cylinder configurations. This range of pumps also uses an electro-magnetic suction valve, as opposed to two

valves in the past, for inlet-metering, further reducing the cost per unit. Using aluminum for pump housing sections not under high pressure has generated weight savings.

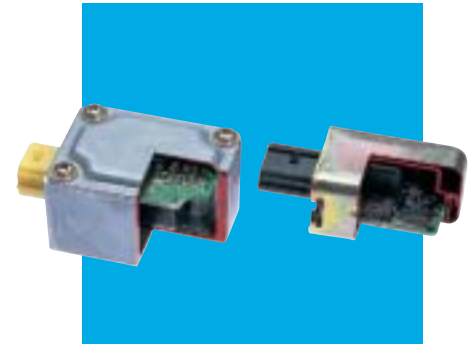
### SMALLER, LIGHTER, MORE FUNCTIONAL

These watchwords are at the heart of our drive to add more value to DENSO products. Making compact, lightweight components incorporating cutting-edge technologies is not new to us. But with ever-tougher demands from automobile manufacturers and increasing component standardization, further progress in this area is vital.

Evaporators used in air conditioners is one product category where we are making headway: We have progressively reduced the core width of our evaporators, from 90mm a decade ago to 58mm today, by redesigning refrigerant pathways and adopting inner fins in evaporator tubes. Our latest product, slated to go into full-scale production in the summer of 2002, is even slimmer, at 38mm, thanks to finer fins and tubes that generate improvements in heat transfer efficiency.

### THINNER EVAPORATORS

We have progressively reduced the core width of our evaporators by almost two thirds.



### SMALLER SIDE IMPACT SENSORS (SIS)

Our latest side impact sensors (right) are over 50% smaller than previous models (left).

This yields reductions in manufacturing costs and on-board volume. In other product categories, our latest side impact sensors (SIS) for airbag sensing systems, which went into production in June 2001, are less expensive and over 50% smaller than previous components.

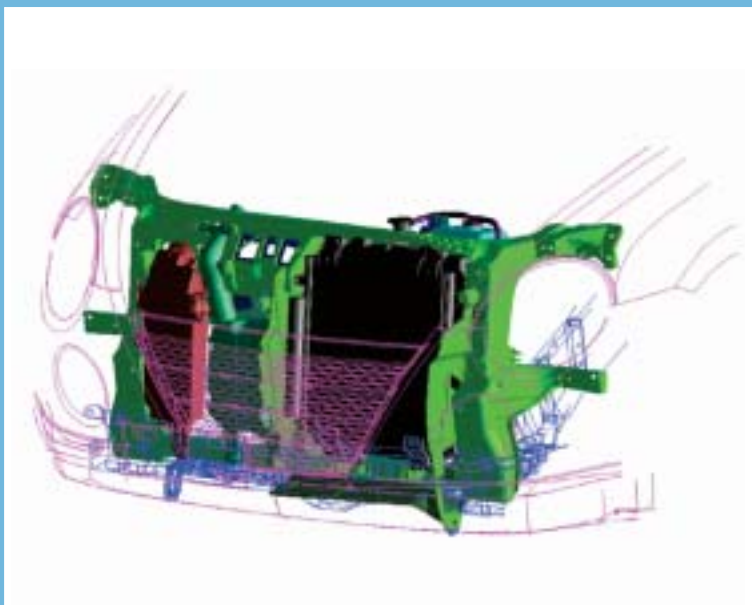
Meanwhile, our most recent electronic throttle body, which controls engine intake air in accordance with travel in the accelerator pedal, is another example of our drive to make components smaller, lighter, and more functional. This latest component is the first in the industry to adopt a built-in non-contact sensor using a Hall IC to detect valve steps. This increases the functional life of the throttle body twofold. The integrated design also means it is 20% smaller and lighter than previous models, while internal parts have been reduced to a minimum. The electronic throttle body went into production in July 2001.

### ENHANCING COMPONENT VALUE: MODULARIZATION

At DENSO, we approach modularization from two angles: as a way of combining the functions of two or more components into a single module, and as an integral part of our efforts to make components smaller, lighter, and more functional. With DENSO's all-round strengths across a wide range of automobile components, it is an area where we can excel. Modularization is also a boon to automobile manufacturers, who can realize enormous efficiency savings on assembly lines and enhance competitiveness.

In 2001, we developed an integrated air/fuel module, launching it in overseas markets in September 2001 and in Japan in June 2002. The configuration for the Japanese market integrates eleven components in one compact unit including an air cleaner, variable intake control system, air flow meter, electronic throttle body, intake manifold, injectors, and an engine ECU. Combining these components in one unit allowed us to design an integrated air intake system covering the entire

## A DENSO FRONT-END MODULE



process—from the air inlets to the cylinder head ports. This leads to lower air intake noise levels, and improved engine performance. Integrating the engine ECU also removed the need for a separate ECU case and reduced the volume of wiring.

In May 2002, we launched an advanced front-end module. This integrates a radiator, condenser, electric fan, engine inter-cooler, and front-frame carrier into one unit for installation in the front of the vehicle. Using new materials for the carrier and redesigning the separate components as one unit, produced weight-savings of around 30% and improved thermal efficiency in the condenser, radiator, and inter-cooler components.

### DECCS: FOR A BETTER DESIGN PROCESS

Changing the way automobile components are designed can play a major role in reducing manufacturing costs, by significantly shortening development cycle times. To this end, we have been introducing the DENSO Engineering Core Computing System (DECCS) at design divisions, since 1997.

This system allows us to take advantage of 3D design and virtual prototyping capabilities such as model analysis and testing in a virtual environment. In October 2001, we started introducing the DECCS mass production drawing issuance system at manufacturing divisions, completing its rollout in June of this year. The issuance system enables the rapid distribution of accurate design information, including 3D data, thereby saving time in the manufacturing process. Using DECCS in the early development stages will allow production engineers to step into the design engineer's shoes and make suggestions for changes to component design. We have great hopes for DECCS, not only as a way of reducing development cycle times, but also as a means of improving quality.

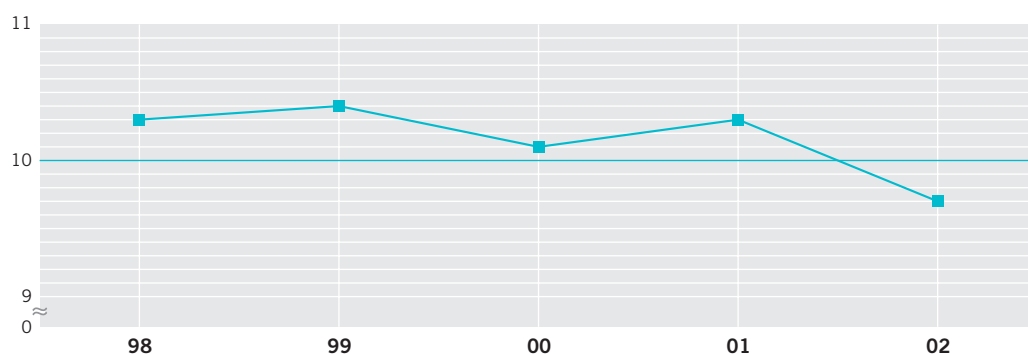
DENSO's basic philosophy is to guarantee the reliable supply of high quality, competitively priced systems and components to automobile manufacturers. To ensure we do, a productive R&D program and sound financial footing are essential. We believe the source of our ability to compete lies in the innovative technology our research facilities can conceive; that is why we have consistently been investing approximately 10% of non-consolidated sales in R&D programs. Meanwhile, to strengthen our financial base and meet shareholders' expectations, we are targeting an ROE of 8% by enhancing our earnings structure, improving asset efficiency, and repurchasing treasury stock. And with the goal of creating a DENSO more responsive to market fluctuations, we are taking a number of initiatives to optimize our corporate structure, including spin-offs.

## ... CORPORATE INITIATIVE —TO BE A GOOD COMPANY



» Targeting an ROE of 8% in 2005

## R&D EXPENDITURE (As a ratio of non-consolidated sales) (%)



### REDUCING FIXED COSTS FOR A STRONGER FINANCIAL FUTURE

At DENSO, we have consistently emphasized stable management underpinned by a healthy balance sheet. This will continue to be our primary goal, but we will strive to become still more efficient by reducing variable costs associated with our products, and by cutting fixed costs through Value Creation (VC) activities, which we introduced in 1999. We are specifically targeting a reduction in depreciation by achieving more savings in machinery manufacturing costs, and paring R&D and indirect manufacturing costs.

We are ultimately aiming to reduce expenses related to machinery manufacturing by a third by shifting to smaller scale, simplified production processes and facilities to match the equivalent move in components. Our assembly line for engine management components, where we have reduced machinery area and costs by 70% and 30% respectively, is a prime example of these efforts. The overall result has been a fall in depreciation as a ratio of non-consolidated

sales, from 6.5% in the year ended March 1999 to 5.6% in the year under review.

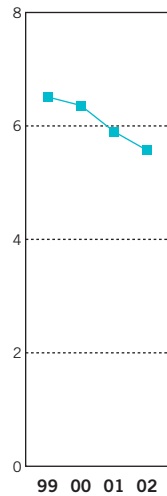
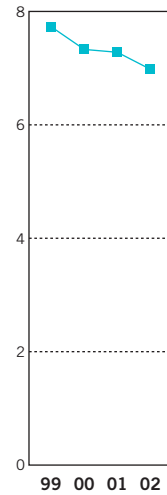
Although we are aiming for a constant level of investment in R&D programs to stay competitive, we are more rigorous in identifying and giving priority to technologies for commercialization. We are also making progress on IT engineering. Again, we are seeing results—R&D expenses have fallen from 10.4% of non-consolidated sales in the year ended March 1999 to 9.7% in the period under review. Despite these cost cutting measures, DENSO remains committed to consistently investing approximately 10% of non-consolidated sales in R&D programs.

In indirect manufacturing costs, we are using sophisticated computer systems to seek new sources of efficiencies in production management systems and production line design. These steps have reduced indirect manufacturing costs as a ratio of non-consolidated sales from 7.7% in the year ended March 1999, to 7.0% in the year under review. As a result of these activities, we succeeded in reducing fixed costs by 2.0%,

on a non-consolidated basis, from the year ended March 1999 to the end of the year under review.

### A GLOBAL CASH MANAGEMENT SYSTEM

In order to increase efficiency in financing and fund management within the DENSO Group, we reorganized our accounting operations into the independent DENSO Finance & Accounting Center Co., Ltd., in July 2000. In conjunction with our move to more unified, group-wide management practices, this step has accelerated the creation of a worldwide group cash management system. Surplus funds at group companies can be efficiently pooled for use by other group members. Progress is also being made on global cash pooling, with the start of U.S. dollar-based pooling in January 2002 at a subsidiary in the Netherlands. This allows the efficient, centralized management of U.S. dollar funds. DENSO also began yen-based global pooling in May 2002, the first Japanese company to do so. In the U.S. and Japan, we started a netting system among group companies and

**DEPRECIATION**(As a ratio of non-consolidated sales)  
(%)**INDIRECT MANUFACTURING COSTS**(As a ratio of non-consolidated sales)  
(%)

expanded the system to Asia. We plan to introduce the system at our European operations by the end of 2002. Another development has seen the Finance & Accounting Center introduce factoring in Japan in February 2002. Targeting DENSO's domestic suppliers, the system is designed to enhance payment efficiency and drive down costs. Plans are already on the table to extend the system to all domestic group companies' suppliers. And in order to increase the efficiency of group accounting procedures and support cost-saving activities, DENSO is working to concentrate some accounting functions by standardizing accounting procedures and systems at all group companies, including those overseas.

**ENHANCING THE GROUP-WIDE R&D STRUCTURE**

A consistently high level of R&D investment has been central to creating DENSO's renowned technological expertise in numerous product categories. Constant investment in promising product areas, seen in our long-term

strategy in the telecommunications field, is how we approach R&D. This has not hobbled the profitability of the company either.

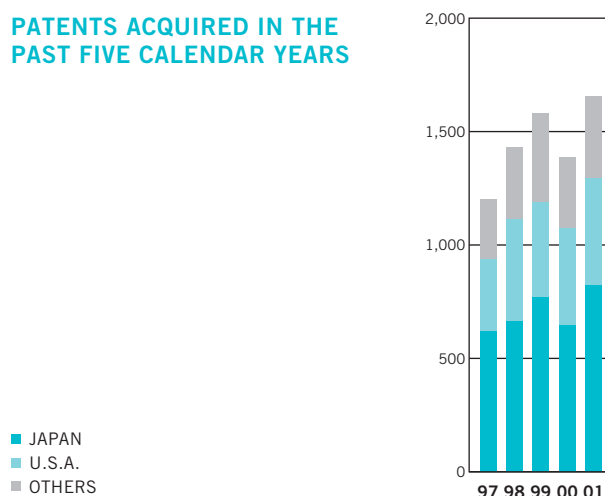
DENSO's fundamental R&D structure is built on a number of organizations in Japan—the DENSO Research Laboratories, Corporate R&D Department, Production Engineering R&D Department, Nippon Soken Inc., and DENSO IT Laboratory. Each of DENSO's six key business groups—Thermal Systems, Powertrain Systems, Electronic Systems, Electric Systems, Small Motors, and ITS—also have independent R&D sections.

Looking ahead, we expect new and exciting products to be borne out of research that integrates multiple technical fields, and further strides toward modularized components. We are therefore forming project teams that cut across research disciplines and organizational barriers, including not only researchers, but also manufacturing and quality experts. This will enhance the efficiency of R&D processes and lead to a DENSO product lineup with higher added value. As DENSO aggressively



DENSO RESEARCH  
LABORATORIES

#### PATENTS ACQUIRED IN THE PAST FIVE CALENDAR YEARS



targets increased worldwide sales, imbuing our local manufacturing facilities with our reputation for technological excellence and quality is vital in winning the trust of local customers. With this in mind, we are working to rapidly enhance our global R&D structure of technical centers in the U.S., the U.K., Germany, and Sweden, with a particular focus on greater investment in technical centers in Europe.

In new fields, we are forming alliances that complement our own technological strengths. These include the PALAP (Patterned Prepreg Lay Up Process) Consortium, formed with five Japanese printed circuit board (PCB) manufacturers. PALAP board is a next-generation, high-performance PCB developed in-house by DENSO. Made from thermoplastic resin, multi-layered PALAP board can be made using a simplified one-stage pressing operation. PALAP board is also recyclable and resistant to higher temperatures. DENSO has formed the consortium with plans to commercialize PALAP board and make it the de facto standard in the industry.

Finally, we are actively taking steps to protect our newly developed proprietary technologies on a global basis by acquiring patents for DENSO intellectual property (IP). During calendar 2001, we secured 1,654 patents worldwide, including 821 in Japan and 475 in the U.S. DENSO's policy on protecting its intellectual property was completed in the DENSO IP Vision in April 2002. Based on this Vision, the entire group will enhance the efficiency of its patent acquisition programs and be more active in asserting its patent rights.

As one of the world's leading suppliers of automobile systems and components, DENSO is striving to reduce the impact of the car on the environment. With this in mind, we are implementing numerous initiatives that influence all stages of the life of the car, from manufacturing processes where DENSO is directly involved, through car use and end-of-life stages. In June 2000, we formulated DENSO EcoVision 2005. This Vision provides the foundation for environmental action plans initiated by DENSO and its consolidated subsidiaries and affiliates, and details concrete measures and targets related to environmental issues. The result—a comprehensive approach to environmental activities utilizing the resources of the entire DENSO Group. The following are just some of the steps we are taking in this area.

## ... CORPORATE INITIATIVE —TO BE A GOOD CITIZEN



» DENSO volunteers have started planting *kenaf*, a plant that can absorb more CO<sub>2</sub> than many other species.

## IMPROVING COMPONENT RECYCLABILITY

Based on DENSO's own product recyclability appraisal method, we are working to ensure that a higher proportion of the car can be recycled. We set ourselves a clear target: 95% of DENSO automobile components to be recyclable by fiscal 2005. These efforts are aimed at European Union regulations that stipulate an actual recycle rate for end-of-life cars of 95% by 2015. In fact we have already cleared the first hurdle, achieving a 96.9% recyclability rate for automobile components in the year under review. We are now focusing on maintaining this high recyclability rate and achieving more gains. Despite available technology that enables the recycling of some components, the high cost of this technology, the need to build infrastructure, and the degraded quality of recycled material, all mean that actual recycle rates have still not matched the recyclability of components. So at DENSO, we are now developing new recycling technologies and pushing ahead with reuse and remanufacturing businesses to improve the actual component recycle rate.

### DENSO AND DUPONT: DEVELOPING COMPOSITE RECYCLE TECHNOLOGY FOR RADIATOR END TANKS

Nylon-based radiator end tanks currently used in cars are recycled using a crushing process. Unfortunately, the process cannot recover material properties that have severely degraded during the life of the tanks. This limits the reuse of the crushed material. The inherent inefficiency in the process means the great majority of radiator end tank material is sent to landfills. In an attempt to rectify this, DENSO has joined hands with DuPont Engineering Polymers to enable the recycling

of nylon-based radiator end tanks using new technology. The new technology can recover degraded nylon material with minimal losses. DENSO has already succeeded in producing a radiator end tank made from reclaimed material, and it is currently undergoing evaluation in a test vehicle.

### DENSO'S CHEMICAL SUBSTANCE DATABASE

In order to control and reduce the use of environmentally harmful chemicals in its operations, DENSO has compiled a chemical substance database—the Material Chemical Assessment System (MACAS). The database, which became fully operational in April 2001, lists over 1,400 primary chemicals used to produce DENSO products and secondary chemicals such as cleaning agents employed in manufacturing processes. The MACAS database allows DENSO to keep a close watch on chemical usage and releases. The database is a vital tool in reducing the volume of environmentally harmful chemicals used in DENSO's operations.

### ECO-MANAGE—AN INDUSTRIAL WASTE AND RESOURCE MANAGEMENT SYSTEM

DENSO has developed and introduced a system to manage the volume of resources it uses and to verify the amount of waste reused in its operations. Using proprietary bar code scanning systems, DENSO can accurately measure and monitor the volume of waste and scrap materials generated at its facilities. This data helps DENSO to reduce waste volumes, cut back on waste management costs, and utilize resources more effectively. This system can be integrated with another DENSO-developed product—the advanced vehicle operation system (AVOS). AVOS uses GPS and a network of

communication satellites to track the location of vehicles. Fitted to waste disposal vehicles, AVOS allows DENSO to verify that all waste is disposed of appropriately and in accordance with relevant regulations by monitoring waste transportation routes and records. DENSO began sales of this system, sold as “Eco-Manage,” in December 2001.

### PROGRESS ON FLUOROCARBON RECOVERY AND DESTRUCTION

In anticipation of Japan's Fluorocarbon Recovery and Destruction Law that came into effect in April 2002, DENSO joined hands with Japan Automobile Manufacturers Association Inc. and the Japan Auto Parts Industries Association, to help build a recovery and destruction system for chlorofluorocarbon (CFC-12) substitute HFC-134a. The project includes putting in place necessary infrastructure. As part of the system, in May 2001, DENSO started transferring HFC-134a it recovers in one-liter canisters to larger containers. This increases efficiency at destruction facilities. DENSO has carried out similar operations for CFC-12 since 1998. In the year under review, around 31,000 canisters of CFC-12 and 4,000 canisters of HFC-134a were transferred at three facilities in Japan. Moreover, DENSO has put in place its own recovery and destruction system to ensure the safe disposal of refrigeration vehicle fluorocarbons, which are different to those used in car air-conditioning systems.