

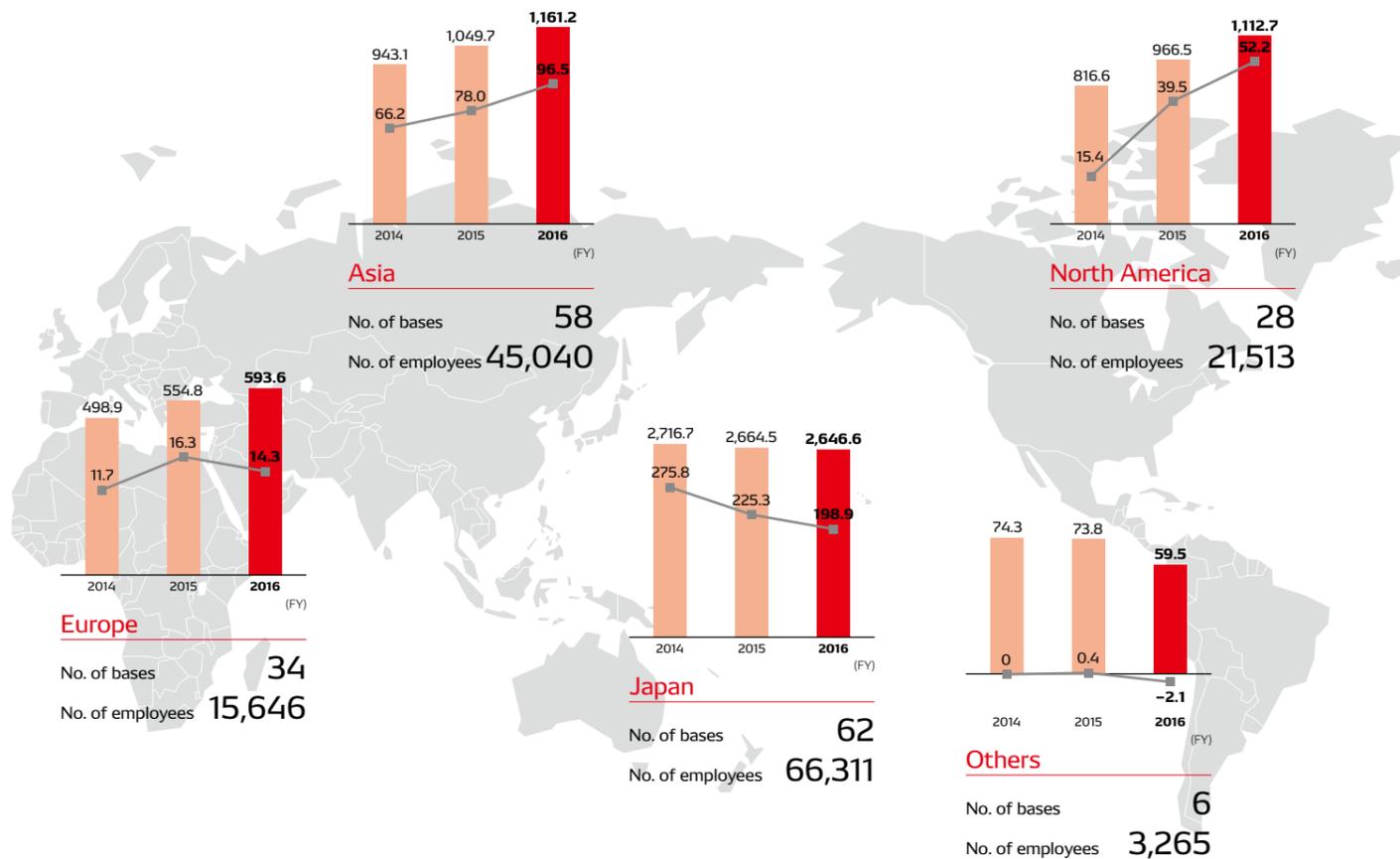
# Business Growth Strategy

DENSO is working vigorously to expand its global business activities. In addition to addressing the needs of customers across a wide range of regions worldwide, the Company is endeavoring to become an entity that is highly trusted. Through these efforts, DENSO has continued to expand its business domain and today boasts a global network of 188 consolidated subsidiaries spanning 35 countries and regions. Currently, the Company maintains regional headquarters covering the Group's operations in Japan, North America, Europe, Asia, and other regions. Spearheaded by these regional headquarters, steps have been taken to set up an independent structure within each region while promoting increased awareness toward the Group's business policies.

In addition, DENSO is organized around business groups. These businesses coordinate with one another to accommodate systemization and modularization with decision-making conducted promptly in line with the prevailing conditions of each business.

## Overview by Segment

DENSO has also established autonomous development, procurement, and production activities by each regional organization. This framework enables faster local decision-making in line with customer needs.



■ Revenue (Billions of yen) ■ Operating profit (Excluding other income and expenses) (Billions of yen)  
 Note: The number of employees excludes personnel dispatched to consolidated companies, but includes personnel on loan from consolidated companies. Temporary staff are also excluded from the number of employees.

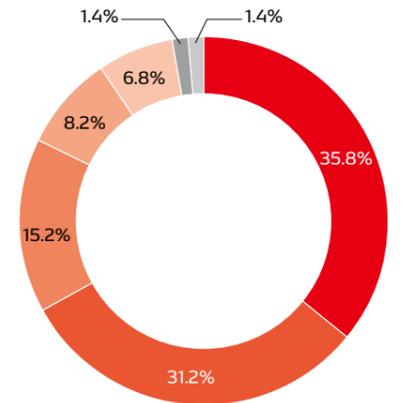
## Overview by Product

While focusing mainly on its automotive-related operations, DENSO also pursues a wide range of business opportunities, from new businesses that utilize automotive technologies to consumer-, industrial-, and other related products. Details of the composition of revenue for each business are presented briefly as follows.

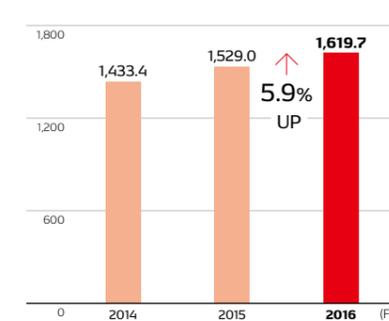
Revenue

**4,524.5** billion yen

- Powertrain Control
- Thermal
- Information & Safety
- Electronics
- Small Motors
- Others
- New Business

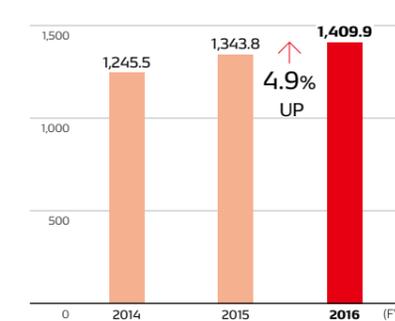


### Powertrain Control



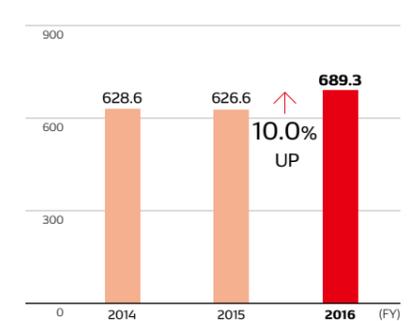
In fiscal 2016, the year ended March 31, 2016, revenue increased 5.9% compared with the previous fiscal year, to ¥1,619.7 billion. This was largely due to the increase in sales of gasoline direct injection products including injectors and pumps as well as variable valve timing (VVT)-related products, mainly in North America and China.

### Thermal



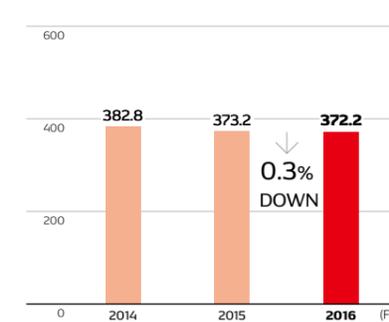
In fiscal 2016, revenue increased 4.9% compared with the previous fiscal year, to ¥1,409.9 billion. In addition to the volume production of global standard air conditioners, this increase largely reflected the upswing in sales of heating, ventilation, and air-conditioning (HVAC) in Europe.

### Information & Safety



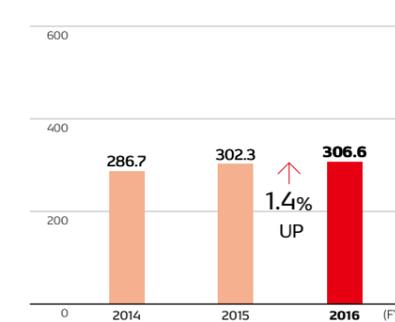
In fiscal 2016, revenue climbed 10.0% compared with the previous fiscal year, to ¥689.3 billion on the back of increased sales of meters in North America and safety products in Japan.

### Electronics



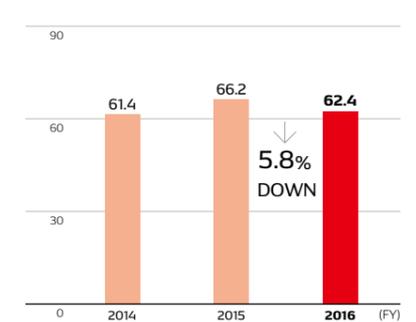
In fiscal 2016, revenue was roughly the same as the previous fiscal year, edging down 0.3%, to ¥372.2 billion. Results were significantly impacted by the decline in vehicle production in Japan.

### Small Motors



In fiscal 2016, revenue grew 1.4% compared with the previous fiscal year, to ¥306.6 billion. While the Group's performance in this business was impacted by the decline in vehicle production in Japan, the improvement was mainly due to increased sales of windshield wiper systems in the U.S., South Korea, and China. Results were also supported by automobile sales growth in North America.

### New Business



In fiscal 2016, revenue decreased 5.8% compared with the previous fiscal year, to ¥62.4 billion. Despite increased sales of industrial robots in the industrial products field, this downturn largely reflected the impact of the curtailment of capital investment by DENSO's customers.

# Powertrain Control

## VISION

We will take the lead in developing, mass-producing, and marketing environment-friendly products that help to completely utilize fuel, recover energy, and purify emissions to the broader global market in a bid to ensure a sustainable global environment.

## OVERVIEW

### Business Activities

Development and production of gasoline and diesel engine control systems and related products, hybrid and electric car drive systems, power supply and related products, and power supply and starting system parts such as alternators and starters



### Main Products



Common rail systems



Fuel pump modules



Alternators

### Strengths

■ We maintain a wide variety of technologies and are active across a broad range of business domains that extend from gasoline and diesel internal combustion engines to products that are powered by electricity, including hybrid cars, electric automobiles, and fuel-cell vehicles. Drawing on our inherent strengths, we are engaged in comprehensive systems and technology development.

## STRATEGY

### Our Understanding of the Business Environment

Looking at the fuel economy and exhaust gas emission regulations of various countries, requirements are becoming increasingly stringent. As a result, we are seeing:

1. An increase in the number of automobiles equipped with idle-stop systems as well as hybrid, electric, and fuel-cell vehicles
2. The growing importance of improved gasoline and diesel internal combustion engines

### Mid-term Policy

#### Strengthen Electric System and Product Development Capabilities

■ With the increasingly fast-paced application of electric systems, automobile manufacturers and the market as a whole are demanding more compact and cost-effective products that deliver a host of benefits including greater efficiency and higher output. With this in mind, DENSO is committed to preempting these needs by developing the necessary technologies. To do this, the Company is increasing the number of high-quality personnel with product development capabilities and bolstering its collaborative ties with automobile manufacturers.

#### Deliver High-Value-Added Internal Combustion Engines

■ Amid the growing use of electric technologies in automobiles, we recognize the need for gasoline, diesel, and other internal combustion engines to deliver additional value. In order to ensure that the internal combustion engine business remains a mainstay pillar of the Group, we are therefore shifting our focus to high-value-added development and production.

#### Strengthen Manufacturing Capabilities

■ We work diligently to ensure that our products are efficient, reliable, and easy to use. Every effort is also made to apply a standard design that transcends regional boundaries. In this manner, we are endeavoring to promote the seamless overseas expansion of our high-value-added products while reinforcing our cost-competitive advantage.

## PERFORMANCE OVERVIEW

### Fiscal 2016 Overview

■ In fiscal 2016, we developed and commenced the mass production of power control units and motor generators that help improve the environmental performance of the new model Prius, a hybrid vehicle manufactured by Toyota Motor Corporation. After our success in North America, we also commenced the production of power control units in China in line with the needs of the region and customers.

#### 1. Power Control Unit

We developed a new high output density power card and a more efficient cooling structure. Compared with its installation in the previous Prius model, application of this advanced power control unit helps to reduce electric power loss by 24%. At roughly two-thirds the size of the Company's existing product, this new power control unit can be easily installed. Improved energy regeneration efficiency also contributes to increased fuel economy while reducing CO<sub>2</sub> emissions. In addition, we focused on standardizing the design of the product in order to further curtail costs.



Power control unit

#### 2. Motor Generator

We developed a new stator for use in high-rotation motors using a new innovative coil winding technique that is more than 20% lighter than that used in the previous Prius.

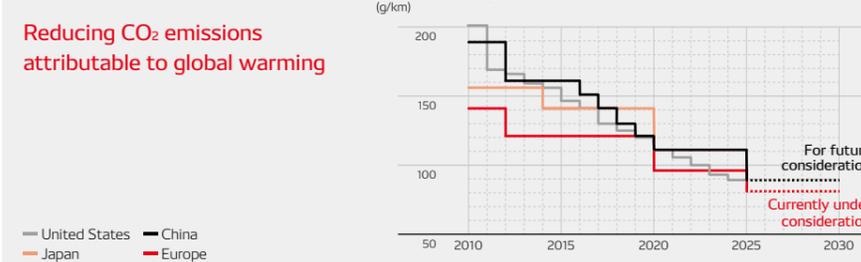
■ As a part of efforts to strengthen our manufacturing capabilities, we adopted a global standardization policy across our production lines. We are engaging in development that focuses on the specific attributes of each product in line with this policy, with plans to commence operations at the first production line in fiscal 2017.

## VALUE PROVIDED TO SOCIETY

### Social Issues

Reducing CO<sub>2</sub> emissions attributable to global warming

### Emission Regulations by Country



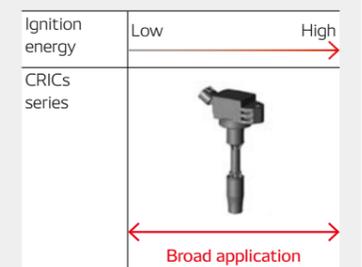
### DENSO's Aspiration

Our goal is to help maintain the global environment by further enhancing the efficiency of internal combustion engines in concert with the increasingly fast-paced trend toward electric-powered vehicles and related products.

### Taking Steps to Resolve Social Issues

We have commenced the manufacture of a new ignition coil, CRICs. For gasoline engines, the trend toward supercharged downsizing and the application of a high compression ratio make it difficult to effectively ignite fuel. Our new ignition coil overcomes this difficulty. By reducing the amount of voltage conversion loss and promoting ignition efficiency to ensure an intense flame, our coil facilitates total fuel combustion, thereby contributing to a reduction in CO<sub>2</sub> emissions.

At the same time, we have succeeded in developing a more compact product. The same structure can therefore be applied to a wide range of engines that require different types and degrees of ignition energy.



# Thermal

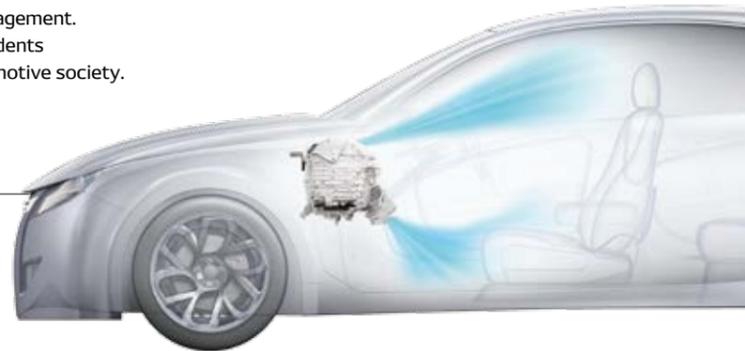
## VISION

We are committed to consistently creating world-first products that help maintain the environment as a leading company in thermal management. In addition, we are determined to reduce the incidence of traffic accidents while enhancing comfort and contributing to a safe and secure automotive society.

## OVERVIEW

### Business Activities

Development and production of air-conditioning systems for cars and buses, truck refrigeration units, air purifiers and related air-conditioning products, radiators, and cooling systems



### Main Products



Air-conditioning systems for cars



Radiator

### Strengths

- **Leading share of the global market**
- **Outstanding proposal and development capabilities that link closely to a wide range of products** from engine-related control systems to meters that convey information to drivers

## STRATEGY

### Our Understanding of the Business Environment

1. Differentiation difficult; susceptible to price competition
2. Fuel economy regulations in each country becoming increasingly stringent
3. Increase in the incidence of traffic accidents attributable to human error, including day-dreaming, inattention, and a lack of due diligence

### Mid-term Policy

#### Strengthen the Competitiveness of Existing Products

- Turning to the Group's existing products, we are determined to leverage our relationships with customers throughout the world and to further standardize global specifications and attributes in an effort to strengthen cost competitiveness while addressing market needs.
- Basing our activities around standardized products, we will strengthen the competitiveness of our products by adding value in line with the driving conditions of each region while upgrading and expanding our product lineup.

#### Develop the World's Most Advanced Fuel-Saving Products for Air-Conditioning Systems and Vehicles as a Whole

- We will look to differentiate ourselves from competitors by employing proprietary fuel-saving technologies. Every effort will be made to reduce power consumption in the air-conditioning field. To this end, we will work to reduce heat loss caused by air ventilation and minimize air-conditioning capacity by directing both heating and cooling functions solely to passengers, and by promoting increased power-saving capabilities.

- We will place considerable weight on increasing fuel economy in connection with each vehicle as a whole through proper thermal management. This will include various measures including efforts to reduce thermal damage and to promote the recovery and use of waste heat.

#### Develop Products That Enhance Comfort and Contribute to Increased Security and Safety

- We will endeavor to commercialize technologies that help minimize the incidence of traffic accidents as a part of efforts to explore opportunities in new value fields. To this end, we will pursue increased comfort focusing mainly on the five human senses as well as human biology research. At the same time, energies will be channeled toward further differentiating existing products with a particular emphasis on air-conditioning products and systems in which we maintain a top global share.

## PERFORMANCE OVERVIEW

### Fiscal 2016 Overview

- We commenced the mass production of air-conditioning systems to a uniform global standard across seven regions worldwide. At the same time, we upgraded and expanded our product lineup while taking into consideration the needs of each region. As a part of efforts to further localize the production function, positive steps were taken to increase the content of local materials and facilities used for products targeting emerging countries. In this manner, we were successful in enhancing the cost competitiveness of our products.
- Turning to the development of fuel-saving products, we brought to the market a cold storage evaporator that increases actual fuel economy during the summer months by 5%. We also developed a water-cooled charge air cooler for

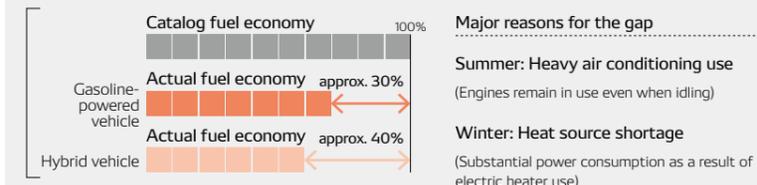
use in supercharged downsizing engines that contributes to improved vehicle fuel economy. Making the most of the technologies developed through its automotive operations, we developed an ejector, which is a small refrigerant injector, for use in the cooling systems of the vending machines used for beverages. This ejector helps to reduce annual electric power consumption by 25%.

- We completed steps to commercialize certain products including seat air conditioning and temperature sensors. As a part of efforts to develop products that in addition to their focus on user comfort also help to enhance safety and security, we undertook verification tests to improve the accuracy of product concepts.

## VALUE PROVIDED TO SOCIETY

### Social Issues

#### Gap between catalog and actual fuel economy



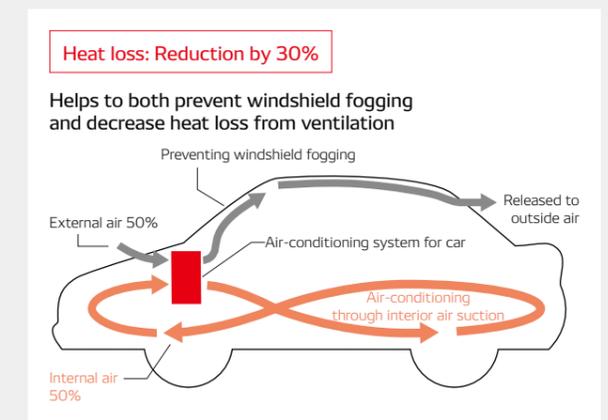
Air conditioning is estimated to account for approximately 40% of the gap.

**DENSO's Aspiration**  
**Our goal is to increase the fuel efficiency of our air-conditioning systems, thereby helping to produce vehicles that better contribute to the environment.**

### Taking Steps to Resolve Social Issues

We developed a car air-conditioning system that balances the needs for comfort and environmental performance for use in the new model Prius manufactured by Toyota Motor Corporation. In addition to increasing the efficiency of its electric compressor, this system is also equipped with an ejector-integrated evaporator (heat exchanger) that helps to reduce power consumption during air cooling by roughly 18% compared with the system used in the previous model Prius. Moreover, this new air-conditioning system employs a two-layer recirculated/fresh air unit to draw in external air while circulating internal air to ensure the performance of air heating during the winter months and preventing windshields from fogging up. This in turn reduces the heat loss due to air ventilation by 30%.

#### Two-layer recirculated / fresh air unit



# Information & Safety

## VISION

We are helping to bring about a safe and secure automotive society by providing a broad range of technologies that deliver advanced driver assistance systems while realizing automated driving in a timely manner.



## OVERVIEW

### Business Activities

We develop and manufacture products and provide services across a wide range of human machine interface (HMI), information and communications, body electronics, advanced safety, collision safety, vehicle motion control, and related fields.

### Main Products



### Strengths

- We are active in **four key areas that are essential to realizing advanced driver assistance systems**. These areas are road environment recognition, HMI, information and communications, and vehicle motion control technology. We are able to engage in the development of products that draw on these comprehensive strengths.
- Our competitive advantage also rests on the **combined basic research** that underpins each of these technology fields.

## STRATEGY

### Our Understanding of the Business Environment

1. Continued progress in the area of advanced driver assistance systems and accelerated efforts to commercialize automated driving
2. Growing demand for "connected vehicles" in line with evolution toward an information society

### Mid-term Policy

#### Road Environment Recognition Field

- Drawing on the technological expertise and know-how gained through our efforts to develop automated driving systems for use on such roads as expressways, we are expanding into next-generation advanced driver assistance systems.

#### HMI Field

- We are focusing on technologies that hone in on a driver's physical and mental condition including drowsiness and inattention as well as systems that draw from a wide range of data to convey to the driver select information. In this way, we are strengthening our ability to develop technologies that provide drivers with important information in an easy-to-understand manner without imposing any excess burden.

#### Information and Communications Field

- Drawing on our many years of experience as an in-vehicle product manufacturer with a wealth of outstanding environment-resistance (including low and high temperatures) as well as noise-resistance technologies, we are working to deliver safe driving support by developing products that provide a link between vehicles and connect vehicles with infrastructure to convey a wide range of information encompassing dangerous blind spots and distant traffic congestion data.

#### Vehicle Motion Control Field

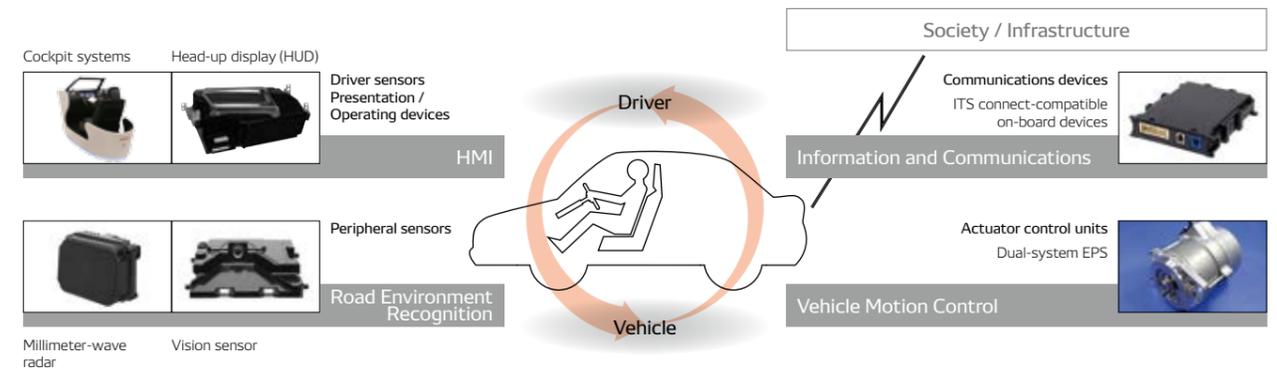
- We are pushing forward efforts to develop and provide power steering control systems that deliver enhanced reliability in a bid to address the needs for advanced driver assistance systems and automated driving.

## PERFORMANCE OVERVIEW

### Fiscal 2016 Overview

- We established the Advanced Driver Assistance System (ADAS) Business and Technology Development Division by integrating related internal technology units as a part of efforts to provide practical advanced driver assistance systems and help commercialize automated driving in earnest. We also set up the Information & Safety Systems Advanced Technology Development Office in its Tokyo Office with the aims of recruiting excellent human resources, strengthening cutting-edge technological development, and promoting academia and industry collaboration. Consistent with our efforts to enter into alliances with external organizations, we concluded an agreement with Morpho, Inc. to pursue the joint development of image recognition technologies that employ image processing and deep learning techniques.
- As for new product development, we have developed and commenced the volume production of the following: millimeter-wave radar and vision sensors, which detect obstacles in front of a vehicle and thereby assist in collision avoidance or reducing damage; intelligent transportation system (ITS) connect-compatible, vehicle-mounted devices that contribute to preventing road traffic accidents and traffic efficiency by linking cars with infrastructure and other cars via communications; and dual-system electric power steering (EPS) that has brought about improvements in the safety of the "turn" function. These products are being installed in the Toyota Motor Corporation's new Prius and other models.

### DENSO Technologies That Provide Advanced Driver Assistance Systems and Help Realize Automated Driving



## VALUE PROVIDED TO SOCIETY

### Social Issues

European NCAP\*1 trend leading the way in the world

2014	2015	2016	2017	2018	2019	2020	2021
AEB*2 Vehicle (Rear-end collision)	AEB Pedestrians (Day)	AEB Pedestrians (Night)	AEB Vehicle (Head-on)				
						Under consideration	

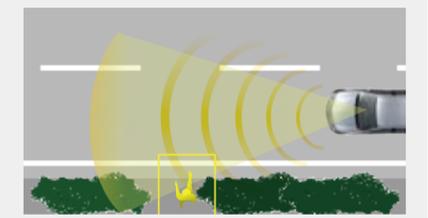
Source: Revised by DENSO based on Euro NCAP Rating Review 2015

\*1 NCAP: New Car Assessment Program  
\*2 AEB: Autonomous Emergency Braking

**DENSO's Aspiration**  
Provide security and safety in every driving-related situation

### Taking Steps to Resolve Social Issues

We have developed vision sensors and millimeter-wave radar to realize the detection not only of vehicles but also of pedestrians. Combining the functions of two sensors utilizes the features of each sensor and has enabled the faster and more accurate detection of obstacles in front of the vehicle. Toyota Motor Corporation is adopting these products for its Toyota Safety Sense P safety technology package. Currently, the products are installed on the company's new Prius and Land Cruiser.





# Electronics

## VISION

Amid the advancing installation of electronics in cars, we are contributing to the more widespread use of environment-friendly, secure, and safe products by offering overall-optimized system products across the Company's business domains.

## OVERVIEW

### Business Activities

Development and manufacture of electronic products and in-car semiconductor sensors for engine control computers as well as of microelectronic devices such as ICs

### Main Products



ECUs for engine control



In-car semiconductor sensors

### Strengths

- **Extensive product lineup** in the field of in-car electronics
- **Advanced technological strengths** capable of in-house semiconductor manufacturing
- **Development capabilities in vertical integration\*** of semiconductors that satisfy individual product needs

\* DENSO proprietary integrated semiconductor development, from semiconductors to ECUs and actuators

## STRATEGY

### Our Understanding of the Business Environment

In association with the further installation of car electronics, brought about by more stringent environmental regulations and the accelerated development of automated driving systems:

1. Increased technological sophistication (improvements in precision/responsiveness, reliability, and durability)
2. Accelerated development

### Mid-term Policy

#### Construction of Development System Capable of Responding to Customer Needs

- Amid increasing technological sophistication, we are entering the upstream processes of vehicle development and undertaking product development that predicts manufacturer and market needs. With regard to our global customers, we are providing application development systems that are completed locally.

#### Technology Differentiation and Streamlined Development through Strengthening of Partnerships

- We are raising our differentiated technological capabilities and accelerating the pace of development through wide-ranging partnerships (in industrial fields: general manufacturers; industry and academia: research institutes and universities; horizontal relationships: industry standardization, alliances, etc.). Furthermore, by going one stage further into the completion level of current development themes, we are creating world-first and regionally developed technologies.

#### Software Standardization

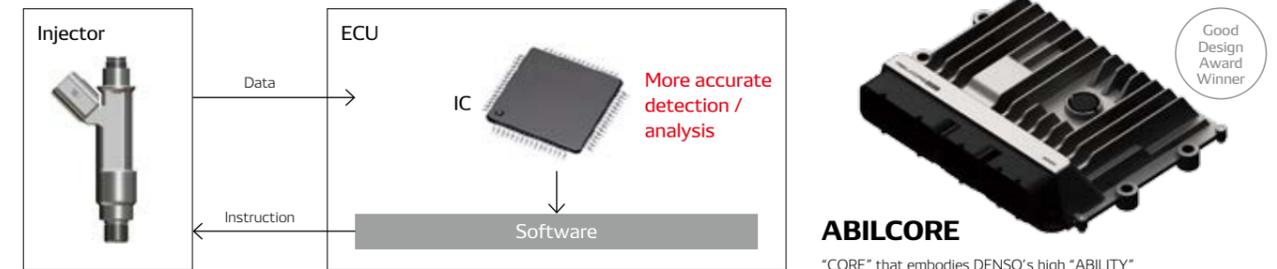
- Rather than developing software individually customized for each vehicle, we work to streamline development by arranging the software structure, such as by integrating the software for each function, and advancing standardization. For example, rather than a jumble of individual components, software is designed to control each domain arranged by function, such as the functions for conveying information to the driver, or detecting the driver's status, and the design standardized to allow changes to the software and to allow for the software's evolution.

## PERFORMANCE OVERVIEW

### Fiscal 2016 Overview

- Together with combining technologies to be compatible with any vehicle, we have developed the next-generation ABILCORE engine computer series that realizes improvements in combustion performance and a reduction in unit size. The development of products is under way for which semiconductor miniaturization technologies have been utilized and improved performance materials (SiC, silicon carbide) adopted, thereby contributing to higher performance and unit size reductions.
- At the same time as strengthening its R&D structure in Japan and overseas, the Company promoted the functional strengthening of its development system, particularly in Europe, in fiscal 2016.
- Aiming for standardization and accelerating efforts toward development efficiency, in May 2016 DENSO established AUBASS, CO. LTD., which is responsible for the basic software to be installed in cars. The plan is to establish Toyota Tsusho DENSO Electronics (Thailand) Co., Ltd. in October 2016, and for the company to be in charge of the application development for engine ECUs.

#### Next-Generation ABILCORE Engine Computer



## VALUE PROVIDED TO SOCIETY

### Social Issues

The incidence of unauthorized entry into computers and cyberattacks to enable fraudulent manipulation is on the rise.

In anticipation of automated driving, amid expanding collaboration between cars and with social infrastructure, measures for the cyber security of cars have also become necessary.

### Protection from Cyberattack



DENSO's Aspiration  
To achieve the high-level safety of a "connected car"

### Taking Steps to Resolve Social Issues

In January 2014, we set up a project office responsible for cyber security measures. The development of the basic specification, architecture, and processes that have been advanced as a result ended with the goal of the necessary security infrastructure completed for a product that will enter the market in 2019. Following interactions between Japanese and overseas

industry associations, we also assisted in the standardization of security specifications. In the years to come, we will seek to collaborate with diverse development partners to advance a car security system structure that will be compatible with the increasing sophistication of the permanent connectivity and automated driving of cars.

## Small Motors

### VISION

Through the development and supply of small motors for use in new systems that contribute to CO<sub>2</sub> reduction and improved fuel efficiency, and electromechanically integrated motors that combine electronic control units and small motors, we are contributing to the spread of environment-friendly, secure, and safe products



### OVERVIEW

#### Business Activities

Development and manufacture of all types of small motors, including windshield wiper systems, power windows, power seats, power steering, motors for engine control systems, blowers, and cooling fans (ASMO Co., Ltd.)

#### Main Products



Windshield wiper systems      Motors for power windows

#### Strengths

- **Speedy development system** through close collaboration between machine (small motor) technology and electronic control technology specialists within the Group and the orchestration of comprehensive capabilities
- **Monozukuri capabilities that realize smaller, lighter, and more efficient products—precisely** because we have a thorough knowledge of small motors

### STRATEGY

#### Our Understanding of the Business Environment

1. Due to the increase in vehicles equipped with electrically powered systems for a range of functions, the number of small motors being installed in cars is increasing.
2. Amid the accelerated efforts toward the commercialization of automated driving, there are expanding needs for small motors, but on the other hand, competition is also intensifying.

#### Mid-term Policy

##### Product Development Compatible with Switch to Electric-Powered Vehicles and Related Products

- There will be a rise in development capabilities that enable small motors to be controlled with greater precision. In the environment field, amid the increase in numbers of small motors installed in cars, the development of more compact and lighter small motors that have lower energy consumption will be undertaken to contribute to improvements in fuel economy. In the security and safety fields, as advanced control becomes necessary—for example, running, turning, stopping as automated driving progresses—efforts will also be directed toward the development of more functional products.

##### Strengthening of Monozukuri Competitiveness

- In response to moves to increase the production of small motors due to the switch to electric-powered vehicles and related products and the commercialization of automated driving, we are addressing the establishment of a stable, global production structure. For example, we will realize launches of new products with fewer losses and greater operational efficiency by advancing concurrent development from the product design stage so that the production technologies, processing machines, and trial production all come together. Moreover, we will address the acceleration of product launches and the undertaking of stable production by promoting the standardization of the facilities and equipment themselves and the modularization of each process.

### PERFORMANCE OVERVIEW

#### Fiscal 2016 Overview

- In the case of the brushless small motors used for electric fans, the design of the motors and electronic controls was akin to that of semi-detached houses that had been separately individually optimized, and the conventional products had inferior competitiveness, including on cost. Therefore, design engineers transcended organizational boundaries by discussing face to face their visions of the ideal product and undertaking joint development to arrive at a detached house, that is to say they were able to devise optimizations to the overall product lineup in a short period of time. As a result, they ensured its superior performance in terms of build and noise level, and developed a power-saving, high-efficiency product that is competitive, including on cost.

- In the development of the next-generation fan, we visualized volume production issues from the trial development stage and engaged in making *Monozukuri* that brings together products and processes more efficiently. For example, in anticipation of volume production, we used corrugated plastic to put together model processes from processing standards to facility specifications to carry out the process concept. As a result, we achieved an improved level of completeness of the final product and minimization of start-up loss.



Model processes with corrugated plastic

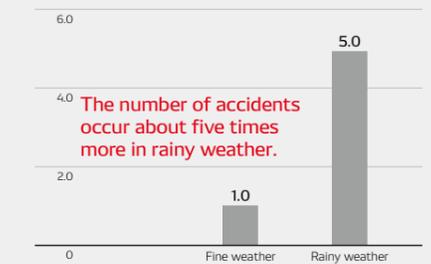
### VALUE PROVIDED TO SOCIETY

#### Social Issues

Increase in the number of traffic accidents in rainy weather

#### Number of Accidents per Hour

(Number of accidents/hour)



To ensure visibility in the rain, improvements in wiping performance that does not obstruct the driver's view are being demanded.

Source: <http://www.shutoko.co.jp/english/drive/>

**DENSO's Aspiration**  
Realize safe, comfortable driving from a variety of perspectives

#### Taking Steps to Resolve Social Issues

To realize a high field of vision that does not obstruct the driver's view, we are advancing the pursuit of wipe control technologies linked to improvements in driving safety. In comprehensive collaboration with Toyohashi University of Technology, we are focusing on human cognition and sensitivity to quantify wiper movement that feels comfortable as well as the timing of the wiping operation. We are also engaged in R&D from various points of view, including the efficiency of energy consumption, and are aiming for commercialization as a next-generation advanced technology.

#### Cognition / Sensitivity

Verification of eyesight specificity when driving Sense of obstruction / Stress quantification Cognitive-emotional evaluation of all types of control systems



#### Provide new value

Automatic ON/OFF, pleasant movement  
Balance performance and feel (trade-off)

# New Business

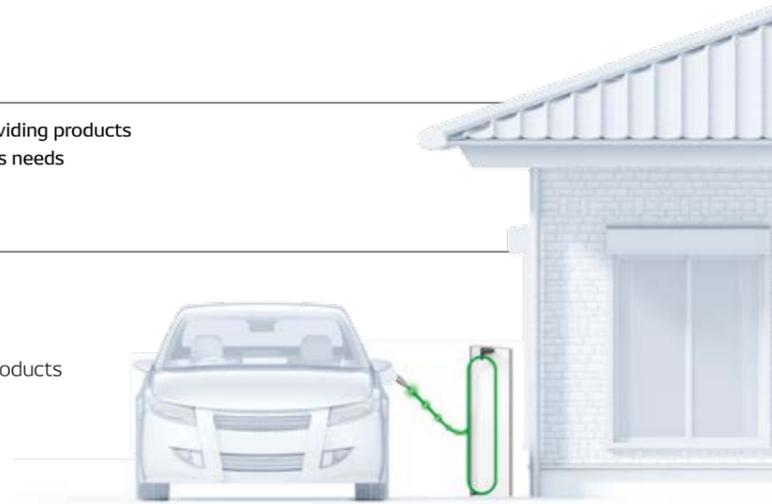
## VISION

Honing authentication, control, and sensing technologies, and providing products and services even outside the automotive field that meet society's needs

## OVERVIEW

### Business Activities

Development and manufacture of consumer products and other products not in the automotive field, such as industrial products for industrial robots (for which Denso Wave Inc. is responsible) and CO<sub>2</sub> refrigerant heat pump water heaters



### Main Products



Articulated robot



CO<sub>2</sub> refrigerant heat pump water heaters

### Strengths

- Advanced recognition, control, and sensing technologies accumulated from the automotive field
- Understanding of customers' and society's needs and efforts to propose innovative products and services

## STRATEGY\*

### Our Understanding of the Business Environment

1. Expansion of medical/pharmaceutical industries associated with the rapidly advancing aging society
2. Progress with the Internet of Things (IoT) and acceleration of big data utilization associated with Industry 4.0 proposals

### Mid-term Policy

#### Pioneering New Fields by Leveraging Core Technology Strengths of Existing Products

■ Leveraging the robotics technologies accumulated on the front line of *Monozukuri*, we will deploy the high reliability and maintenance of sanitary conditions demanded by robotics in the medical/pharmaceutical, food, and cosmetics industries. For example, in the medical/pharmaceutical field, we will build up a picture of the front-line needs, such as the innovative development of robots that can ensure high sanitary levels and fungus resistance, and reflect those needs in products. Furthermore, we will strengthen security measures—such as settlement business that utilizes its QR code and IC reader technologies and QR code anti-counterfeiting measures—while promoting market expansion to create a new business model in fields requiring high reliability, including an anti-counterfeiting business for use with various forms of tickets.

#### Create New Product Value That Will Transform Social Systems

■ To realize an IoT for *Monozukuri*, we will collaborate with the DENSO DP IoT Innovation Office to develop a database to centrally manage front-line information, such as the operational status of facilities for their production progress and results. Linking 30,000 pieces of equipment across the world, we will then work to improve productivity. Leveraging the technologies amassed within the DENSO Group, we will also promote the commercialization of the IoT database and services.

## PERFORMANCE OVERVIEW\*

### Fiscal 2016 Overview

- In the robot business, for medical robots we commenced the volume production of the Intelligent Arm Support System (iArms), an automatic tracking robot that innovatively supports surgeons' hands when performing operations and reduces hand shaking and strain, and of medical-use robots for sterile environments. Starting with these products, we will make headway with further business expansion.
- Having started the "Q-revo trace" service, which provides a visual representation of distribution from the producer to the consumer by the utilization of QR codes and the cloud, we commenced sales. Users are able to simply check on their smartphones who the producer was, when the shipment was sent, and by which route it is being delivered, thereby enabling the delivery of safe, reliable products to the consumer.

### Traceability Service Beginning with QR Codes and Smartphones



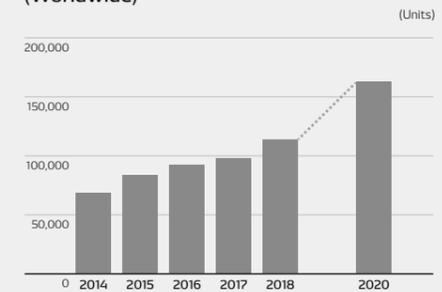
## VALUE PROVIDED TO SOCIETY\*

### Social Issues

Medical needs are expanding due to the rapidly advancing aging society

Cultivation technologies for the pharmaceuticals effective in regenerative medicine/cell treatments (cell cultivation, formulation of anti-cancer agents, etc.) are in demand.

### Medical-Use Robot Market Forecast (Worldwide)



Source: Reality and Future Outlook of Worldwide Robot Market 2016 (Fuji Keizai)

**DENSO's Aspiration**  
We want to contribute to people's safety and security by developing medical- and pharmaceutical-use robots

### Taking Steps to Resolve Social Issues

Denso Wave Inc. has started to develop and market high-productivity robots for the innovative pharmaceutical cultivation industry. Due to the robotics technologies Denso Wave has been amassing over many years, the company has brought to fruition a compact body that enables the robot's operation amid the equipment used to perform cultivation operations. Using the robot in sterile conditions, such as cell culture and medicine formulation, is made possible by a surface treatment that is designed to withstand washing by hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), and high cleanliness is maintained by having kept the unevenness of the surface to the absolute limit. Highly rated for this level of outstanding design, we won a Good Design Award for the robot.



\* We provide details with a focus on the Industrial Systems field, which has a high sales revenue ratio.