

Overview by Product

- 81 Business Portfolio and Value Creation
- 82 Business Information and Main Products
- 84 Electrification Systems
- 86 Powertrain Systems
- 88 Thermal Systems
- 90 Mobility Electronics
- 92 Advanced Devices
- 94 Industrial Solutions
- 96 Food Value Chain

Business Portfolio and Value Creation

DENSO operates seven core businesses in a broad range of domains, centered on the mobility domain. The Company has established a business portfolio for creating new value that can address the future needs of the mobility society. Through this portfolio, DENSO strives to maximize value in its businesses so that it can enhance the potential of the mobility society.

In addition, DENSO will accelerate the reshuffling of its business portfolio in order to realize sustainable growth under a rapidly changing business environment.

Business Composition and Focus Fields

In its automotive businesses, DENSO supplies an extensive lineup of products and systems as a Tier 1 supplier that is trusted by car manufacturers around the globe. We operate a total of five automotive businesses, starting with the Electrification Systems Business, which provides the key for the shift to electrification. In addition, we operate the Powertrain Systems Business, which can manufacture powertrains for all types of vehicles, and the Thermal Systems Business that manufactures such products as in-vehicle air-conditioning systems, for which we boast the No. 1 global share. We also operate the Mobility Electronics and Advanced Devices businesses, which will be crucial for mobility-related development in the future. These five businesses contribute to development in three of

our focus fields: electrification, advanced safety and automated driving, and connected driving.

Furthermore, in our non-automotive businesses, we leverage the technologies cultivated in our automotive businesses to contribute to the field of factory automation (FA) and AgTech.

Four Focus Fields: □ P.28–29

Value Creation in Our Businesses

In each of our seven core businesses, we contribute to development in our four focus fields and work to maximize the value of “green” and “peace of mind,” which are adopted as part of our Long-term Policy for 2030. In addition, through our business activities, we will work to achieve the targets of the SDGs and create new value for the future mobility society.

Segment		Contribution to Long-term Policy for 2030 (Value of Green and Peace of Mind)	Revenue Ratio by Segment in Fiscal 2022 (Based on organizational structure as of fiscal 2022)	Relevant Focus Fields		Relevant SDGs
Automotive businesses	Electrification Systems	Green Peace of Mind	20.6%	Electrification Connected Driving	Advanced Safety and Automated Driving Non-Automotive Businesses (FA and AgTech)	7, 9, 13
	Powertrain Systems	Green Peace of Mind	22.6%	Electrification Connected Driving	Advanced Safety and Automated Driving Non-Automotive Businesses (FA and AgTech)	9, 12, 13
	Thermal Systems	Green Peace of Mind	23.2%	Electrification Connected Driving	Advanced Safety and Automated Driving Non-Automotive Businesses (FA and AgTech)	7, 9, 12, 13
	Mobility Electronics	Green Peace of Mind	24.6%	Electrification Connected Driving	Advanced Safety and Automated Driving Non-Automotive Businesses (FA and AgTech)	7, 9, 17
	Advanced Devices	Green Peace of Mind	3.2%*	Electrification Connected Driving	Advanced Safety and Automated Driving Non-Automotive Businesses (FA and AgTech)	7, 9, 13
Non-automotive businesses	Industrial Solutions	Green Peace of Mind	3.4%	Electrification Connected Driving	Advanced Safety and Automated Driving Non-Automotive Businesses (FA and AgTech)	2, 8, 9, 17
	Food Value Chain	Green Peace of Mind				





* Sales including semiconductors (power semiconductors, ASICs, sensors, etc.) produced internally for other businesses: ¥420.0 billion

Business Information and Main Products

Relationship of Companywide Strategy and Business Strategies

Business strategies linked to the Companywide strategy are key to realizing the Mid-term Policy for 2025 and achieving “green” and “peace of mind” strategies. DENSO is able to provide value to society by steadily shuffling its business portfolio based on strategies for each growth business and strategies for businesses nearing their final stages, and accelerating the pace for developing and increasing sales of environmentally friendly and safe products. Leveraging its unique strengths in each business and capital resources,

each year, DENSO draws up, deliberates on and monitors specific short-, medium-, and long-term scenarios for realizing the Companywide strategy based on the current business environment and progress on strategies. Additionally, the Company is committed to reinforcing its strengths in R&D, *Monozukuri*, and *Hitozukuri* in each business. On the following pages, we introduce the results of these activities.

Segment		Business Activities	Core Products That Contribute to Green and Peace of Mind	
Automotive businesses	Electrification Systems	<ul style="list-style-type: none">■ Development and manufacture of HEV and BEV drive systems, power supply systems, and aircraft propulsion systems■ Development and manufacture of electric power steering motors, control brake motors, and electric control units (ECUs)■ Development and manufacture of various kinds of small motor system products, such as windshield wiper systems, power window motors, engine control motors, and blower fans	       	● Green ● Peace of mind
	Powertrain Systems	<ul style="list-style-type: none">■ Development and manufacture of gasoline and diesel engine management systems, which cover everything from combustion to intake and exhaust■ Development and manufacture of valve-related products, such as variable cam timing (VCT) systems and exhaust gas sensors; and products for drive systems, such as oil pressure control valves	      	● Green ● Peace of mind
	Thermal Systems	<ul style="list-style-type: none">■ Development and manufacture of air-conditioning systems for passenger and commercial vehicles■ Development and manufacture of air quality products, etc., that provide comfortable spaces■ Development and manufacture of cooling products, such as radiators and inverter coolers■ Development and manufacture of thermal management systems and heat pump systems	      	● Green ● Peace of mind
	Mobility Electronics	<ul style="list-style-type: none">■ Development and manufacture of environmental products, such as engine ECUs, HEV ECUs, BEV ECUs, and body ECUs■ Development and manufacture of HCUs,*¹ meters, HUDs,*² CIDs,*³ ETC*⁴ systems for vehicles, road-to-vehicle and vehicle-to-vehicle communication devices, vision sensors, millimeter-wave radar sensors, sonar sensors, self-driving car ECUs, airbag sensors & ECUs, DSMs,*⁵ and other safety-related products■ Development and provision of mobility-related electronic systems and platforms <p>*¹ HCUs: Human-machine interface control units *² HUDs: Head-up displays *³ CIDs: Center information displays *⁴ ETC: Electronic toll collection *⁵ DSMs: Driver status monitors</p>	       	● Green ● Peace of mind
	Advanced Devices	<ul style="list-style-type: none">■ Development and manufacture of transmission hydraulic control valves, shift-by-wire system actuators, and other drive-related products■ Development and manufacture of energy management products, such as BEV/engine coolant water volume control valves■ Development and manufacture of microelectronic devices, such as in-vehicle power semiconductors, semiconductor sensors, and custom integrated circuits (ICs)	     	● Green ● Peace of mind
Non-automotive businesses	Industrial Solutions	<ul style="list-style-type: none">■ Development and manufacture of industrial equipment best exemplified by our automated equipment, modules, and industrial-use robots■ Development and manufacture of equipment for use by society, including handy terminals and QR and RFID payment and recognition solutions, and provision of services (building access management systems, automated checkout systems for company cafeterias, facial recognition systems, etc.)	     	● Green ● Peace of mind
	Food Value Chain	<ul style="list-style-type: none">■ Manufacture and sale of turnkey solutions* for horticultural facilities (consulting and cloud services related to greenhouse materials, devices, and cultivation) as well as the provision of after-sales services■ Manufacture and sale of in-vehicle refrigeration units and compact mobile refrigeration units as well as the provision of after-sales services■ Building and sale of systems for digitization of food distribution and data-linked services <p>* A lineup of products and services combined in an optimized way to enable all people involved in agriculture to produce crops in a stable manner</p>	    	● Green ● Peace of mind

ELECTRIFICATION SYSTEMS

Supporting electrification in all areas of mobility to realize an enriched environment and comfortable movement

To deliver electrification systems for vehicles that are eco-friendly and enable even more comfortable travel, we have built up a solid track record with the development of electrification technologies, realizing high performance, compactness, and fuel efficiency for the major products needed for HEVs. Going forward, we will leverage our expansive business domains to form linkages between various in-vehicle systems and products in an effort to efficiently manage energy within vehicles. In this manner, we will further improve fuel efficiency and contribute to the conservation of energy.



Jiro Ebihara
Head of Business Group

Business Strengths

System Development Capabilities

It has become increasingly important to improve the environmental performance of vehicles as electrification intensifies. The DENSO Group offers the full range of components used in electric drive systems, the heart of electric vehicles. Our system development capabilities involve having a thorough understanding of how each hardware component in a vehicle is used and being able to incorporate that knowledge so that higher levels of performance and reliability can be realized as a whole, satisfying diverse market needs.

Global Production and Supply Structure

From approximately 50 bases in 19 countries including Japan, DENSO supplies high-quality products to customers around the world. Maximizing these existing assets, DENSO Manufacturing Tennessee, Inc. (DMTN) began manufacturing electrified products in 2019, followed by Tianjin DENSO Engine Electrical Products Co., Ltd. (TDS) in 2021. Looking ahead, the Company will strengthen its production and supply structure for electrified products in Europe and India, where growth is gaining momentum.

Manufacturing for a New Era

At our Electrification Innovation Center established at the Anjo Plant, we are rapidly and efficiently developing and introducing next-generation manufacturing technologies, such as prototyping production lines that help conserve energy and preserve the environment by restricting CO₂ emissions, and a CO₂ recycling plant on mass production lines for an adjoining electrified product plant.

Business Strategy for 2022

DENSO is efficiently shifting management resources to electrified product businesses by accelerating the reorganization of businesses nearing their final stages. We intend to expand electrified product businesses by quickly adding products to our lineup that address global and customer needs as society becomes more electrified in a bid to become carbon neutral.

Growth Strategy	Amid the accelerating movement toward BEVs, DENSO has been steadily adapting to Toyota Motor's electrification strategy that will be the basis for future development. The Company is creating new business models while expanding its product lineup in order to increase sales to existing and new automakers in Europe, the United States, and China. In China, a key market, DENSO will commit more resources than before and improve ties with its Chinese partners.
Strategy for Businesses Nearing Final Stages	For businesses nearing their final stages, DENSO is efficiently restructuring production and supply structures, including consolidating production facilities, while maintaining the quality demanded by its customers and fulfilling its responsibility to supply products. As a part of these efforts, in June 2022, the Company moved its alternator and starter operations to the Powertrain Systems Group and stepped up business activities.
R&D	DENSO aims to enhance the value of electric-powered mobility, from compact distribution vehicles to passenger cars and large distribution vehicles, through a combination of software and hardware in power supplies and electric drive systems, while concentrating on motors and electric drive control technologies that magnify the competitiveness of its components for electric vehicles. At the Electrification Innovation Center established at the Anjo Plant in April 2020, we aim to rapidly commercialize new businesses through fast-paced development integrating mass production trials.
Monozukuri	Through production reforms, DENSO is expanding its production and supply structures in tandem with the quickening shift to electrified products. The Company aims to become carbon neutral at an early stage through the use of methane gas generated from CO ₂ in production processes (as of 2021), as well as the installation of hydrogen composition facilities, such as SOFCs*1/SOECs*2 and power conditioning with storage batteries and EVs (as of 2022).
Hitozukuri	DENSO is accelerating the reassignment of personnel to growth businesses while reorganizing businesses nearing their final stages. We are training personnel to take an active role in new businesses while working to resolve social issues along with customers in a world of diversifying needs.

*1 Solid oxide fuel cells
*2 Solid oxide electrolyzer cells

Outcome of Green and Peace of Mind Strategy

Objectives	Results
Reinforce development structure and expand lineup of electric drive products	Completed lineup in Core & Customization Strategy for electric drive systems. Launched System Engineering Department and strengthened the overall structure of the energy management system
Advance development of new green businesses	Developed new motors for electric-powered aircraft with Honeywell. Began to develop high-voltage battery packs for BEVs
Promote CO ₂ -neutral plants	Commenced operations at facilities to generate methane gas at CO ₂ recycling plant

Efforts toward Quality

One of our most important business assets is our reputation for quality in markets where we have continued to deliver large volumes of products around the world. Sharing this knowledge with customers, we are able to guarantee the quality of our electrified products, which must never have severe defects because they are depended upon by AI-driven vehicles. We are also enhancing our ability to respond to sudden changes in the business environment while ensuring the quality of existing products, such as by rapidly adopting alternative parts and materials as a part of our BCP that has become increasingly important today.

Specific Initiatives to Achieve Strategic Aims Shift to Electrified Product Businesses and Expansion of Production and Supply Structures

DENSO is accelerating business restructuring in mature products in order to effectively utilize existing assets while rapidly and efficiently shifting them to growth businesses. DMTN (North America) and TDS (Tianjin) have commenced production of inverters and motor generators in growth businesses. In January 2022, DENSO transferred the type III alternator business to Chengdu Huachuan Electric Parts Co., Ltd.,

which had been receiving technical support from DENSO for a while. In addition to restructuring production bases in Japan and overseas, DENSO will accelerate the shift of resources to growth fields while fulfilling its responsibility to supply products and advancing collaboration with partners.

Diversifying Markets, Responding to Faster Growth in BEVs

To realize its growth scenario, DENSO is expanding its lineup of electrified products based on its Core & Customization Strategy for its standardized product line. In January 2022, Toyota Motor's new NOAH and VOXY models began to feature our new high-power and compact inverters that reduce loss in battery power by 20% compared with previous products. DENSO commenced mass production of electricity supply units (ESUs) with functions for charging, power conversion, and power distribution for Toyota Motor's bZ4X model in May 2022 and for Subaru's Solterra model in mid-2022.



ESU (Electricity supply unit)

Resolving Social Issues through Our Businesses

Relevant SDGs

Contributing to a Sustainable Mobility Society with Electrification Technologies

DENSO is developing electrification technologies that support all forms of electric-powered mobility, from compact distribution vehicles to passenger cars and large distribution vehicles. In a joint initiative with Honeywell International Inc., a long-time alliance partner, the Company newly developed an electric motor for electric-powered aircraft that do not emit CO₂ while ensuring a quiet and comfortable flight. Our electric motor was adopted for use in an eVTOL (all-electric vertical take-off and landing) aircraft being developed by Lilium N.V. of Germany. This aircraft is a form of air mobility that solves the issues of congestion in urban areas, the emission of CO₂, and access to

suburban areas and outlying regions far away from core transportation lines via a high-speed direct transportation network. The electric drive motor that has been selected for this aircraft is a safe and environmentally conscious system that is compact and lightweight thanks to innovative design, and it does not emit exhaust gas when operating. For the air mobility field, DENSO will apply its electrification technology and high-quality mass production technology amassed in products for vehicles in the automobile industry. By reapplying technologies it refines in the aircraft business to the automobile industry, we aim to contribute to a sustainable mobility society.

POWERTRAIN SYSTEMS

Balancing the joy of life with vehicles with superior environmental performance—Providing solutions that help overcome this seemingly contradictory task

We will reduce the environmental burden of vehicles to the greatest extent possible and respond to the diversification of fuel and various environmental regulations, which are becoming stricter by the year. We will also work to supply high-quality systems and components. By doing so, we will strive to create and deliver new value in order to contribute to society as a whole.



Hisashi Iida
Head of Business Group

Business Strengths

R&D Capabilities That Have Led Development of World-First Products and Advanced Powertrains

DENSO has mass-produced a number of world-first products, such as common rail systems and a product that directly injects fuel in diesel internal combustion engines, while pursuing greater environmental performance in vehicles. Our core technologies and development capabilities also contribute to the expansion of options for carbon-neutral powertrains, such as hydrogen and biofuel engines.

Highly Reliable Manufacturing Technologies That Facilitate Safe Driving of Vehicles

To enable the high-performance driving of vehicles, DENSO has refined its highly reliable manufacturing technologies that are integrated from materials preparation to molding and sintering, as well as its technologies for high-speed assembly and highly complex and precise processing at the micron level. DENSO aims to sharpen its technological edge further by fusing together cutting-edge AI and digital technologies with robots and its accumulated skills and manufacturing knowledge.

Personnel, Masters of Powertrains, Form Organically Coordinating Organizational Capabilities

In order to create vehicles with automakers that can satisfy tough environmental regulations and withstand harsh operating environments, professionals with a wide range of core technologies and skill sets work together from a vehicle perspective, while deploying advanced organizational capabilities to leverage specializations in all areas, from systems to components.

Business Strategy for 2022

DENSO is streamlining businesses nearing their final stages in the internal combustion engine domain, and creating new energy businesses.

Growth Strategy	To realize a green society, DENSO is accelerating and strengthening activities (in carbon-neutral fuels, etc.) to commercialize businesses in the new energy domain. <ul style="list-style-type: none">DENSO is increasing choices for carbon-neutral powertrains compatible with new energy sources (hydrogen, bio-fuels, synthetic fuels, etc.) in order to create carbon-neutral vehicles.DENSO contributes to the proliferation of carbon-neutral vehicles by coordinating with energy companies in the infrastructure and aftermarket service fields.
Strategy for Businesses Nearing Final Stages	Amid the global trend in electrification, progress on electrification differs in each region and country, in a reflection of the energy mix and how vehicles are used. <p>To realize a sustainable mobility society and provide to customers safe and secure products for internal combustion engines, DENSO is envisioning scenarios and drawing up plans for businesses nearing their final stages in the internal combustion engine domain.</p> <ul style="list-style-type: none">With the aim of maintaining and improving the competitiveness of internal combustion engine products as an industry, DENSO is thinking beyond corporate boundaries and examining the transfer of businesses to ideal partners.* <p>* On January 17, 2022, DENSO signed an agreement to transfer its fuel pump module business to Aisan Industry Co., Ltd.</p> <ul style="list-style-type: none">Amid significant changes in markets, DENSO is optimizing its production structure by realigning global production bases and creating flexible production lines able to manufacture multiple products depending on the volume of demand.
R&D	Despite uncertainties about how energy will be used in the future, in order to accelerate the commercialization of new energy businesses, DENSO has drawn up a medium- to long-term energy vision and top-level strategies to guide the optimal allocation of resources and to consolidate and integrate related organizations. The Company is focusing on the development of products that solve issues related to new energy, such as using hydrogen resources.
Monozukuri	DENSO is combining its accumulated on-site knowledge and the latest digital technologies to outline concepts for production lines able to stay competitive in a bid to realize production lines that are able to flexibly manufacture multiple products in accordance with changes in demand.
Hitozukuri	In order to smoothly match human resources to growth domains and shift power, we are visualizing specializations in a diverse range of core technologies and skill sets, while pivoting from product-based to skills-based career formation. Moreover, we are defining the areas where our refined skills can be leveraged inside and outside the Powertrain Systems Group. We aim to create organizations that are full of optimism and excitement for the future.

Outcome of Green and Peace of Mind Strategy

Objectives	Results
Set policy for streamlining businesses nearing their final stages in the internal combustion engine domain, and begin coordinating with industry players and stakeholders	DENSO is working with its customers to transition away from older products with high environmental impact and adopt higher-grade models. We have started to realign and consolidate global operations in the internal combustion engine domain with the aim of building an efficient production structure while eyeing the maturing business domain for internal combustion engines and its eventual contraction.
Create business concepts in new energy domains	DENSO has created concepts for businesses and products for new energy sources (hydrogen, biofuels, synthetic fuels, etc.), and it has launched projects to develop and commercialize new businesses in each domain through internal and external collaboration.

Efforts toward Quality

We have positioned the restoration of our quality as our top priority issue and are working to build a corporate structure that prevents quality-related issues in the market. To that end, in specialized divisions, we have gathered together human resources who can handle quality in a comprehensive manner, covering everything from systems to components. These divisions engage in efforts that span from investigating the true causes of quality-related issues to reproducing problems to determine a resolution. To respond to tightening regulations on fuel performance and exhaust gas as well as the increasing complexity of environmental stress, these divisions will accelerate and improve the accuracy of quality verification measures through digital engineering and model-based development and virtual vehicle evaluations.

Specific Initiatives to Achieve Strategic Aims
Aiming to Solve Environmental and Social Issues by Advancing Technologies and Skills Inherited from Our Predecessors
The replacement of internal combustion engine vehicles with BEVs will accelerate in the movement toward a carbon-neutral environment and society. Even in 2040, however, worldwide demand for internal combustion engine vehicles will probably be at the same level as in 2000. We have a responsibility to continue delivering to our customers high-quality products for internal combustion engines in an affordable and reliable manner. The type of energy used differs by region, depending on geopolitics and energy security, so it is necessary to increase choices for mobility solutions.

- With this in mind, DENSO is engaging in the three following activities.
- (1) As part of a scenario for businesses nearing their final stages, DENSO has started to create plans for fulfilling its responsibility to supply products for internal combustion engines along with the rest of the industry, while maintaining a business foundation and putting into place a system for ensuring safe quality products through “Reborn21.” We will continue to shift toward growth domains with the resources (personnel and cash) freed up from businesses nearing their final stages while reforming work processes under the banner of “green” and “peace of mind.”
 - (2) While collaborating and coordinating with partners in co-creation, DENSO is rapidly internalizing the core technologies needed to solve issues concerning the environment and greater society, and is breathing life into new businesses that will increase choices for becoming carbon neutral.
 - (3) DENSO is redefining the skills of human resources and the nature of work in the future, and is training professionals to fulfill its principles. We conduct a thorough vetting process and carefully interview each and every person before sending them off to work. We strive to create bright work environments where everyone is passionate about their work, and both young and veteran employees can refine their technologies and skills in businesses nearing their final stages, while everyone works together to make dreams a reality.

Resolving Social Issues through Our Businesses

Relevant SDGs

7 AFFORDABLE AND CLEAN ENERGY

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Promoting Eco Factory Activities on a Path to Carbon Neutrality


To realize carbon-neutral manufacturing, DENSO has updated its injector plant within the Zenmyo Plant. This update has created a plant able to more efficiently manufacture products in a pleasant atmosphere, while cutting energy consumption by 50%.

(1) A Just-in-Time (JIT) system that thoroughly conserves energy

Instead of the previous air-conditioning system for entire buildings, the Company has created a system that air-conditions the necessary areas at the necessary times in the necessary amounts. Natural skylights and solar panels on the roof of the plant have cut energy usage for manufacturing in half.

(2) Improvement in productivity (+20%) by consolidating production lines and doing away with partitions within the plant

By switching to optimized area-based air-conditioning and controlling the airflow throughout the plant, the Company was able to get rid of traditional clean rooms. Productivity was greatly improved as a result of consolidating production lines and work.



Zenmyo Plant

THERMAL SYSTEMS

Contributing to a more pleasant society for the earth and its people by solving heat-related issues faced in a mobility society

With the arrival of a carbon-neutral society and the CASE era, the automotive industry is undergoing a paradigm shift. Amid this shift, the Thermal Systems Business Group is working to leverage its strengths as a leading-global thermal systems supplier to the greatest extent possible to help create the society of the future through heat management systems, which resolve issues related to BEVs, such as extending driving range, and products that improve air quality, which create comfortable vehicle interiors.



Yasuhiko Yamazaki
Head of Business Group

Business Strengths

Thermal Management Technology	Moving from Quantity to Quality Manufacturing	Global Network
There are three issues hindering the proliferation of BEVs, namely, driving range, battery degradation, and recharging times. To solve these issues—i.e., to extend driving range, inhibit battery degradation, and shorten recharging times—it is necessary to solve a variety of heat-related issues, such as saving electricity used in air-conditioning and managing the temperature of batteries. DENSO provides optimal solutions for managing the thermals of vehicles with the Thermal Systems Business Group's thermal management technologies and lineup of world-first products, as well as system controls that combine these two.	DENSO has fulfilled its responsibility to supply products while constantly evolving the manufacturing of products in the Group with advanced automated production lines, standardized from design to process, and synchronized direct manufacturing for zero intermediary inventories. As products for thermal management systems become more diverse and complex, we are shifting from the mass production of standardized products to the small-lot production of many varieties of products, and further evolving our manufacturing structure into one that does not depend on volume.	Since the establishment of DENSO (Thailand) Co., Ltd. in 1972, the Thermal Systems Business Group has addressed the needs of customers around the world through nine technical centers and more than 50 production bases in 26 countries. We will tackle new issues with customers in the CASE era while using our robust network built up over 50 years.

Business Strategy for 2022

DENSO is reshuffling its portfolio of thermal management products for BEVs from its lineup of internal combustion engine products. The Company is creating a high-earnings business structure while striving to realize a carbon-neutral society.

Growth Strategy	DENSO aims to establish de facto standards and unique technologies in the future, completing its modular concept for thermal management systems while cornering the market during the BEV proliferation phase by meeting the diverse needs of automakers for heat pump systems.
Strategy for Businesses Nearing Final Stages	DENSO is concentrating on shaping up growth scenarios and utilizing its assets (people, technology, and supply networks) built up with identified resources, while accelerating the streamlining of businesses nearing their final stages (existing products for internal combustion engine vehicles, such as radiators and capacitors), in addition to withdrawing from older products and transitioning production.
R&D	In addition to the knowledge accumulated by the Thermal Systems Business Group, DENSO is utilizing the wisdom of the entire company, industry and academia, accelerating the development of new businesses. The Company is helping to increase the speed of vehicle development with more efficient development processes based on MBSE* to deal with the growing complexity and diversity of vehicle development, as competition heats up on the electrification front. * Model Base System Engineering (MBSE): An approach that aims to increase the efficiency of the development process through digital simulation that leverages accumulated data and know-how in systems development
Monozukuri	DENSO is creating a flexible manufacturing system able to produce a large variety of products in smaller quantities, reducing economic units through compact process designs relative to the increase in system combinations with its lineup of products for thermal management systems.
Hitozukuri	DENSO is reinforcing its structures for creating thermal management systems, training human resources in software able to control complex systems entirely, in addition to its mechanical product knowledge and thermal technologies. While exchanging human resources around the world, we are creating the foundations for diverse human resources to maximize the use of their experiences and knowledge in special improvement activities led by senior personnel.
Reinforcing Our Business Foundation	While maintaining a slim posture attained during the pandemic, the Company is increasing its responsiveness to change in an uncertain business environment, while rebuilding its production supply structure to take into account country risk. While identifying industry issues such as rising costs (transportation and materials) due to a deterioration in conditions, we aim to rightsize our supply chain and continue to fulfill our responsibility to reliably deliver products.

Outcome of Green and Peace of Mind Strategy

Objectives		Results
Green	Finish thermal management system strategy for future growth, expand market by increasing sales of heat pump systems	The Company's heat pump systems have been adopted by automakers in Japan and around the world, including for Mitsubishi Motors' Outlander and Renault's Megane models, while solving problems from the vehicle development phase. We also defined the product lines and technologies needed to solve heat-related issues we identified in BEVs. We formulated strategies while exploring theoretical solutions with cutting-edge development partners, including Toyota Motor and other automakers.
	Bring to market air quality products that offer peace of mind in car interior environments	DENSO introduced on the market air cleaning equipment for buses and taxis to satisfy needs for higher air quality due to the pandemic. In addition to automakers, we obtained feedback from end-users and will use this information to expand our products that offer peace of mind.

Efforts toward Quality

DENSO aims for a fresh start in true quality through concurrent engineering that integrates processes from design to manufacturing with DX, and to improve gate management on a global basis, going beyond product quality to encompass work quality throughout the entire process, from initial flow to mass production.

Resolving Social Issues through Our Businesses

Relevant SDGs



Contributing to the Proliferation of BEVs with Thermal Management Systems

BEVs are key to becoming a carbon-neutral society. One barrier to their proliferation is driving range. Electrical energy consumed for heating is one factor that reduces driving range. DENSO's heat pump systems use heat in the air as a thermal source for heating, thereby reducing the consumption of electrical energy and greatly extending driving range.

Moreover, thermal management systems that use heat pumps enable the efficient adjustment of temperatures in vehicles and the cooling of batteries, facilitating the proliferation of BEVs with inhibited battery degradation and shorter recharging times.



Heat pump system

Specific Initiatives to Achieve Strategic Aims Expanding Sales of Thermal Management Products

DENSO is developing markets for its thermal management systems by solving heat-related issues in BEVs with automakers by proposing a wide range of products and systems. As a recent



High-efficiency eco heat pump system

achievement, our high-efficiency eco heat pump system, a world-first product, was adopted in Toyota Motor's bZ4X model and Subaru's Solterra model in 2022. We aim to expand sales for BEVs around the world.

Enhancing Response to Diversifying BEV Market

In August 2021, DENSO turned Chongqing Chaoli Electric Appliance Co., Ltd. into a consolidated subsidiary in order to realize its growth scenario. In addition to reinforcing our product lineup and supply structure, we are expanding our points of contact with customers, including local automakers in China and emerging automakers from other industries, and strengthening operations in China, a leading market for BEVs, while addressing new needs.

MOBILITY ELECTRONICS

Realizing a society in which all people can move comfortably and with peace of mind (Quality of Mobility)

DENSO helps realize zero traffic fatalities and carbon neutrality by continuing to introduce products in tune with the times, using its software and electronics technologies (sensors, semiconductors, ECUs), while precisely understanding the needs of users and advances and changes in society brought about by the CASE revolution.



Shinnosuke Hayashi
Head of Business Group

Business Strengths

Ability to Create Large-Scale Integrated Systems from an All-Vehicle Perspective	Product Development Capabilities with Reliability and Sophistication Accumulated in Automotive Products	Global Network
Needs for electronic systems in the CASE era are evolving into large-scale systems that integrate and coordinate power-trains, bodies, chassis, cockpits, advanced driver assistance systems (ADAS), and other single-domain control systems. DENSO has experience in all of these systems. We create compelling products from an all-vehicle perspective with a broad range of technological capabilities.	Automotive products must feature high quality and performance in order to be able to operate in harsh environments under various constraints. We have been engaged in the automotive electronic products business for many years, ever since vehicles began to become more electronic, and we have accumulated extensive knowledge of vehicles as a result. DENSO develops competitive products through a combination of this knowledge with the latest electronics and software technologies.	DENSO has honed its human capital, intellectual assets, and a global production structure by overcoming numerous obstacles with automakers around the world. Using these strengths, we provide various solutions to automakers while refining our CASE-related technologies, moving the world one step closer to a safe and secure mobility society that is easier on the environment.

Business Strategy for 2022

DENSO helps realize zero traffic fatalities and carbon neutrality with its capabilities in electronics and software, aiming for a safe and secure mobility society that is better for the environment.

Growth Strategy	Through “green” and “peace of mind,” DENSO aims to balance business growth with efforts to resolve social issues by providing high-value vehicle integration applications for users, while refining ADAS and electronic control systems that are becoming increasingly important amid the CASE revolution. The Company is solidifying structures resilient to change by delving deeper into reforms to work processes through DX that was kicked off with “Reborn21.”
Strategy for Businesses Nearing Final Stages	We are devising strategies for businesses nearing their final stages while fulfilling our obligations to our customers, identifying businesses that fall outside our creed of “green” and “peace of mind” as a part of portfolio management, and products with singular functionality that are becoming commodities. Using the capabilities derived from these strategies, we are shifting power to business domains with excellent growth prospects and profitability with even higher value for users.
R&D	DENSO is accelerating the development of electronic platforms to make software-defined vehicles (SDVs) a reality in the CASE era, by thoroughly refining omnidirectional sensing technologies, algorithms, and control technologies to improve the user experience (UX). We are developing highly competitive products, such as systems and components for self-driving cars, in preparation for an advance into the self-driving car market, and reinforcing our development processes with DX and automation on both the software and hardware fronts.
Monozukuri	DENSO is reinforcing its competitiveness in <i>Monozukuri</i> with a lean and flexible structure that features digital-twin plants and multi-generation, high-speed mixed production lines. DENSO is building an optimized supply structure around the world that facilitates the movement toward carbon neutrality, while responding to rapidly expanding production volume globally as automotive electronics become more sophisticated.
Hitozukuri	We are developing our human resources with the aim of grooming professionals with the ability to turn ideas into reality, raising individual abilities through innovative careers for employees who are experts in software and electronics. We aim to sharpen our technological capabilities across control functions and rapidly maximize performance. Our career support systems for individual employees facilitate the reallocation of personnel across organizations through human resource visualization.

Outcome of Green and Peace of Mind Strategy

Objectives		Results
Green	Develop electrical, low-power consumption control systems for achieving carbon neutrality	Ramped up development of low-power ECUs and electronic control systems that help lower power consumption, and electronic platforms that minimize energy usage by optimally integrating controls of all vehicle systems
Peace of mind	Develop advanced driving support technologies with the aim of zero traffic fatalities	Developed and brought to market Global Safety Package 3, a concept that balances compactness and low costs, with expansion in accident prevention and driving assistance functions

Efforts toward Quality

Automotive software is becoming more expansive, sophisticated, and complex following the advancement of the CASE revolution. Under these circumstances, we aim to realize a more robust quality control structure by reforming processes at the initial development stages for large-scale software development, leveraging synergies within the Mobility Electronics Business Group, which has streamlined our electronics and software development functions. Based on an approach that prioritizes safety and quality above all else, we will prevent the recurrence of quality-related issues.

Specific Initiatives to Achieve Strategic Aims

Strengthening Competitiveness in Priority Domains and Accelerating Business Growth

DENSO is prioritizing the development of the following products in the fields of “green” and “peace of mind.”

- Green: Development of ECUs and software necessary for electric vehicles
- Peace of mind: Development of high-value-added product lines that work with ADAS and human-machine interface (HMI), based on precision information processing

- Integrated electronic platform that leads to greater value in “green” and “peace of mind” fields: Development of electronic platform that facilitates optimized actions among applications

Strengthening Software Business and Hitozukuri

DENSO balances the development of human resources (*Hitozukuri*) on the cutting edge of change with business growth in the software field.

- We are introducing ideal development models incorporating cutting-edge IT in software development methodologies accumulated in automotive products.
- We are greatly strengthening our human resources, organizations, and corporate culture by establishing a systematic management cycle and career development process, which was implemented in fiscal 2022.

Building an Optimal Supply Structure and Strengthening Manufacturing Competitiveness

DENSO is improving its competitiveness while building an optimal global supply structure able to respond to sharp growth in production volume of electronic products amid advances in CASE technologies.

- Consolidate/Create series for easy-to-manufacture product structures
- Finish building digital-twin plants

Resolving Social Issues through Our Businesses	Relevant SDGs
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Global Safety Package 3 Helping Improve Safety Performance of Vehicles with Millimeter-wave Radar and Vision Sensors

We developed Global Safety Package 3 as an accident prevention system and launched it in fiscal 2022.

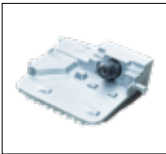
Global Safety Package 3 is a system that assists drivers with a combination of millimeter-wave radar sensors that detect the position and speed of vehicles and objects on the road and vision sensors that use cameras to observe conditions in front of the vehicle.

In order to eliminate traffic accidents while ensuring freedom of movement, it is important to develop products with attractive prices while further advancing safety products with cutting-edge technologies, and then deploying these products in as many vehicles as possible. Global Safety Package 3 realizes both compactness and low costs, while expanding assistance scenarios through the use of cutting-edge technologies, such as AI.

We are developing technologies with the objective of ensuring safe freedom of movement for drivers, pedestrians, and everyone else in the world.



Millimeter-wave Radar Sensors
Our millimeter-wave radar sensors help vehicles avoid collisions at intersections, such as with oncoming vehicles when turning right, or with pedestrians crossing the street when turning left or right, thanks to a wider angle and longer distance of object detection, and improvements in the speed of analysis functions. With the aim of installing these radar sensors in a variety of vehicles, we are working to improve detection performance and make the radar sensor more compact and lightweight, thereby lowering the hurdles to installing the sensors in vehicles.



Vision Sensors
Our vision sensors help vehicles avoid collisions in intersections thanks to a wider horizontal view angle. This wider angle of view also enhances cruise control functions that maintain distances with the vehicle in front and when changing lanes, while increasing the distance a vehicle can detect objects. We are improving object detection capabilities with AI in a bid to expand functionality to vehicle distance maintenance assistance and traffic signage recognition assistance.

ADVANCED DEVICES

Creating and growing businesses that solve issues faced by society and customers beyond the mobility domain

As a company reorganized to go beyond technologies and focus more on helping society and our customers, we are 1) collaborating on the sensing and actuation fronts, and 2) enhancing the value of systems through semiconductors that leverage our strengths derived from vertical integration. While creating new devices and systems, we aim to win the trust of our customers with an all-points approach to quality, cost, and delivery (QCD) in the expanding electrification market.



Yoshifumi Kato
Head of Business Group

Business Strengths

Creation of New Value with Sensing and Actuation

Within the business group, our core technologies in actuation (i.e., hands and legs) are combined with semiconductors (i.e., brains) and sensing (i.e., eyes) to create new devices and systems based on nimble concepts, enabling the development of “great-if-possible” solutions for issues faced by our customers.

Leadership That Drives Collaboration with Partners and External Production Contractors, in Addition to Internal Production of Semiconductors

In preparation for expansion in the electrification market, DENSO will internally produce Si and SiC power semiconductors that are key devices with world-first technologies. We will guide our supply chain to make the necessary improvements to cost competitiveness and supply capabilities.

On-Site Capabilities That Support Production Technologies Highly Resilient to Changes in Specifications and Volumes in New Product Domains

DENSO is broadening the scope of applications for new product domains where it is competitive, thanks to human resource development and handpicked young employees. DENSO leverages digital-twin technology and collaborative robots to build a production system that can be optimally organized and configured by changing production line shapes and locations in accordance with fluctuations in volumes for new products.

Business Strategy for 2022

DENSO contributes to the creation and proliferation of the next generation of mobility solutions by building robust supply chains and improving its internal production of mechatronics and semiconductors. At the same time, we are using and deploying core technologies in non-automotive fields, such as agriculture and factory automation, to address issues related to carbon neutrality, labor shortages, and an aging society.

Growth Strategy	DENSO aims to create new businesses, products and solutions, with the help of external partners and other business groups, going beyond the capabilities of its own business groups to solve problems at customers. Moreover, the Company is leveraging its strengths derived from vertical integration to spur growth and improve the value of systems for the DENSO Group with its semiconductor capabilities.
Strategy for Businesses Nearing Final Stages	We decide to continue operations after reviewing each product, centered on products for internal combustion engines, from the standpoints of whether we can continue to reliably supply quality products, whether we can maintain and improve competitiveness, and whether core technologies may tie in with new domains. When we decide to discontinue products, we make sure our customers are able to continue operations as our businesses near their final stages. We will continue to offer other products that align with our <i>Monozukuri</i> capabilities while eyeing carbon neutrality from the manufacturing to use stages.
R&D	DENSO aims to create new systems and devices that solve problems from a market-oriented perspective, going one step beyond <i>Monozukuri</i> that satisfies required customer specifications. The Company aims to offer new solutions for problems at customers and in society as a whole by fusing together components, software, and AI technology.
Monozukuri	DENSO develops and invests in production lines able to switch product types and volumes by sharing equipment in new domains with uncertainties that make it hard to anticipate volumes. The Company is concentrating skills and technologies on reforms to <i>Monozukuri</i> processes with the use of collaborative robots and digital-twin technology to facilitate workstyle reforms and alleviate labor shortages at production sites.

Outcome of Green and Peace of Mind Strategy

Objectives	Results
Expand lineup of individual products and advance entire projects in the CASE domain	Made steady progress toward commercialization by promoting new product concepts for the fields of electrification and safety
Reduce investments in products for internal combustion engines	Avoided major investments while gaining understanding of customers in contracting businesses for products used in internal combustion engines
Accelerate activities at head office and Group companies to reduce CO ₂ emissions at plants	Began to shape up plans for conserving and creating energy at the Hirose Plant and DENSO HOKKAIDO CORPORATION

Efforts toward Quality

We are taking steps to ascertain quality-related risks that cannot be understood based on a product’s required specifications alone by running simulations of how customers use our products and considering customer perspectives. We are also building quality into our highly reproducible product design and manufacturing processes at Group bases in Japan and around the world, in order to ensure equal quality in all of our products globally. All of us are working diligently to get a fresh start on quality by preventing quality-related risks from materializing and never forgetting our “Customer First” approach.

Specific Initiatives to Achieve Strategic Aims Collaborative Production in Automotive Power Semiconductors

In April 2022, in order to meet growing demand for automotive semiconductors amid the rapid development and proliferation of electric vehicles, DENSO signed an agreement to collaborate

on the production of power semiconductors at the 300-mm wafer plant operated by United Semiconductor Japan (USJC), the Japanese subsidiary of United Microelectronics Corporation, a leading chip foundry. Through this partnership, DENSO aims to produce high-performance power semiconductors with high cost efficiency by combining USJC’s 300-mm wafer production technologies with DENSO’s system-oriented IGBT* device and process technologies, with plans to launch IGBT production on 300-mm wafers in the first half of 2023. This initiative was selected by the Ministry of Economy, Trade and Industry for subsidies to cover the cost of projects for decarbonizing and upgrading production facilities for semiconductors essential to supply chains. This initiative aligns with the government’s strategy to reinforce the production of semiconductors in Japan, and will contribute to the electrification of vehicles through the reliable procurement of power semiconductors that are essential in electrification efforts.

* IGBT = Insulated gate bipolar transistor

Resolving Social Issues through Our Businesses

Relevant SDGs



Contributing to Improvements in the Practicality of Electric Vehicles

DENSO has successfully developed and mass-produced the world’s first high-efficiency cooling water control valve (MCV-e) as a prime example of the efficient control and use of thermal energy. Reducing energy consumption can result in longer driving distances for electric vehicles, shorter recharging times, and lower system costs. Our products including a new electrical current sensor, featuring a 40% smaller size with better current detection accuracy for detecting the discharge and charge current in batteries, have been adopted by Toyota Motor in its bZ4X model and by Subaru in its Solterra model. Our next-generation power modules with SiC diodes and SiC transistors are 30% smaller in volume and reduce power loss by 70% compared with previous products. These power modules have also been adopted by Toyota Motor for its new MIRAI model. We will continue efforts to offer products that help realize a carbon-free society.



MCV-e



Electrical current sensors



SiC power cards

INDUSTRIAL SOLUTIONS

Enhancing the productivity of the *Monozukuri* industry and improving quality of life

Our mission in the Industrial Solutions Business Unit is to realize carbon-neutral *Monozukuri* (manufacturing) from the perspective of “green,” and to build a society that expands human potential from the perspective of “peace of mind.” Guided by this mission, we will work to earnestly address the *Monozukuri*-related issues facing our customers, providing them with solution packages that resolve such issues in a manner that best suits their needs. By doing so, we will make significant contributions to industrial and social progress.



Katsuhisa Shimokawa
Head of Industrial Solutions
Business Unit

Business Strengths

Production Assets Thoroughly Refined at Manufacturing Sites and Global 130 Plant

Using our high-quality, highly durable facilities that have been refined on auto part production lines, as well as our core factory automation equipment, such as robots and sensors, we are playing a role in improving productivity throughout the manufacturing industry and society at large while spreading our reach from standalone equipment to processes and modules.

***Monozukuri* Know-How That Has Supported DENSO's Products for More Than 70 Years**

DENSO solves serious issues directly affecting the manufacturing industry, such as labor shortages, carbon neutrality and DX, with its know-how in flexible and lean manufacturing and lean automation technologies.

Safe and Secure Solutions for Society Using QR Codes Developed by DENSO

DENSO creates value for new domains and applications by incorporating outside ideas for using QR codes and QR code reader technologies that have been evolving since 2000 and which have become an international standard (ISO/IEC 18004).

Business Strategy for 2022

In addition to lean automation, DENSO is commercializing eco-friendly *Monozukuri*. We strike a balance between business growth in non-automotive fields and the business principles for lean and clean *Monozukuri*.

Growth Strategy	With the aim of spreading lean automation, we are working closely with our customers to come up with ideas for flexible and lean automation, including getting involved in process engineering. We are also utilizing open platforms co-created with partners and scaling up business by leaving behind the idea of being self-sufficient.
R&D	DENSO is concentrating on the development of next-generation technologies to realize clean and lean <i>Monozukuri</i> based on carbon neutrality, digital-twin plants, and collaborative robots to address serious issues faced by the manufacturing industry. The Company is accelerating industry–government–academia activities to further spread DENSO's concept of next-generation plants.
<i>Monozukuri</i>	Leveraging its strengths in factory automation equipment and facilities provided by the Industrial Solutions Business Unit (i.e., products that are thoroughly proven, improved, and refined with DENSO's Global 130 Plant concept, and then delivered to customers), DENSO is improving productivity while being in touch with customer needs and always providing high-quality production assets.
<i>Hitozukuri</i>	DENSO develops a broad spectrum of human resources adept in digital technologies that are essential for next-generation manufacturing, such as digital-twin and open platforms, as well as human resources that excel in providing solutions (sales engineers) and are able to precisely propose ideas that combine know-how with technologies owned by DENSO to solve issues faced by customers.

Outcome of Green and Peace of Mind Strategy

Objectives	Results
Spread awareness of lean automation around the world (15 companies)	Inside the plants of 15 customers that took our courses on lean automation, we together achieved several improvements in operations based on the concept and skill sets of lean automation.
Increase partners for co-creation of open platforms (40 companies)	We agreed to co-create an open platform with 47 partner companies that share our concept of lean automation and solutions to rationalize plants.

Efforts toward Quality

In the Industrial Solutions Business Unit, when DENSO commercializes production assets that have supported its “Quality First” approach to the automotive business, we build in quality in the facilities desired by our customers (shorter preparation times, stable operations soon after launching mass production, ability for anyone to maintain conditions, easy-to-use facilities). DENSO is driving improvements in productivity across the manufacturing industry with its production assets, thoroughly refined via on-site verification and iterative improvements.

Specific Initiatives to Achieve Strategic Aims

Initiatives to Spread Lean Automation
Needs are constantly increasing for rapidly ramping up production and the manufacture of diverse types of products in various volumes in domains where labor plays a large role, such as assembly, inspection and logistics, as a means to reduce CO₂ emitted from plants and to address labor shortages in an aging population.
DENSO has developed and begun selling solutions for rationalizing plants with DX-CELL* and other products that have been expanded for enabling lean automation. In fiscal 2023, the Company accelerated activities to propose improvements across a broader spectrum of operations, and added to its lineup a newly developed robot called COBOTTA PRO that boosts productivity while working alongside people. We are

also actively engaged in industry–government–academia partnerships to spread DENSO's concept of lean automation.

* DX-CELL is a robot universal mount platform able to flexibly adapt to variable-volume production of different types of products with modular additions, including by third parties, thereby facilitating the rapid design of precisely automated production lines using DX tools.

People working alongside COBOTTA PRO

- This robot looks, thinks, and moves on its own, automating work that could only be done by hand
- Saves space by making safety cages unnecessary, as robot moves slowly when people are nearby

DX-CELL facilitates variable-volume production of different types of products

- Able to work with prototypes, small-lot production, mass production, and production wind-downs
- Can be deployed at necessary time to necessary location, only with a software update

Resolving Social Issues through Our Businesses

Relevant SDGs

Aiming to Resolve Regional Issues by Collecting Data on QR Code Usage

DENSO has provided QR code solutions that match diverse customer needs in the railway, retail/wholesale, and hotel industries. By using the collected QR code data more universally, we intend to expand services to new domains and applications.
For example, DENSO is cooperating with companies in Tendo City, Yamagata Prefecture (DMC Tendo Onsen Co. and Yamako Bus Corporation) to promote the creation of attractive tourist destinations. Together, we tested the “Gururi” Tendo City bus routes to improve accessibility to tourist spots and enhance transportation convenience. With DENSO's QR code application, DENSO and Tendo City can gather data on tourists' travel history, i.e., when and where they traveled and for what purpose, and use this data to increase the efficiency of tours while satisfying the needs of tourists.

DENSO is helping to revitalize regional activities through the visualization of a broader range of data on people's movements, including restaurants, hotels and shopping, through the use of QR codes.



FOOD VALUE CHAIN

Combining technologies and ideas to provide new value and contribute to a society where all people can live safely and with peace of mind

Food is essential to human life. Together with our business partners, while observing the entire food value chain, we will provide solutions that deliver food safety and security to each region of the world, anytime, anywhere, and to anyone, forever.



Hidehiro Yokoo
Head of Food Value Chain Business Development Division

Business Strengths

Greenhouses That Ensure Reliable Harvests While Dealing with Labor Shortages and Climate Change

By applying our *Monozukuri* technologies gained with automobiles to agricultural production, we are supporting technologies that condition environments for reliably harvesting agricultural products. We introduce automation technologies to create environments where people can move around easily, and globally supply solutions for greenhouses in a highly productive way that sustains growth.

High-Quality, Versatile Chillers for Vehicles That Help Deal with Driver Shortages and Delivery Diversification



Since the launch of operations for automotive chillers in 1972, DENSO has sold more than 200,000 chiller units, focusing on high-quality, high-efficiency *Monozukuri*. In addition to chillers for trucks, which come in many variations, we offer compact mobile chillers that can be nimbly used for deliveries by regular drivers in passenger cars for small-lot deliveries that have diversified in recent years.

New Distribution DX Solutions for Changing Needs in Food Distribution

Utilizing the QR code and RFID technologies we accumulated with automobiles, we are digitizing diverse information related to food in order to visualize food distribution information from production to sale, in response to consumer needs for safe and secure food. We also offer a straight-through food distribution platform that facilitates supply-demand optimization in inefficient distribution operations and rightsizes inventories.

Business Strategy for 2022

Together with our internal and external partners, we are starting to truly expand business, creating a structure for global business development and the provision of solutions that resolve social issues.

Growth Strategy	<p>While eyeing a sustainable society able to produce and transport food needed around the world, DENSO is creating optimal and advanced solutions with its proprietary technologies to resolve social issues in the food value chain.</p> <p>In the agricultural production business, along with greenhouse business partner Certhon Build B.V., DENSO is developing business in innovative greenhouses that leverage its automation technologies, while adapting to social needs in each region. In Japan, we are stepping up efforts to stimulate local industry with greenhouses able to reliably produce agricultural products with workers of all skill levels.</p> <p>In logistics-related business, working with partners, DENSO is creating new solutions that leverage its strengths in chiller technologies for newly emerging types of logistics for small-lot deliveries that require temperature management, an area where demand is likely to expand along with the e-commerce market.</p> <p>Utilizing DX in food distribution, we aim to create a distribution system that increases the efficiency of supply chains while ensuring traceability to safely and securely deliver food to consumers. Working with our partners, we are testing prototypes in actual markets while moving to introduce the system in the future.</p>	 <p>Collaboration with Certhon Build B.V.</p>
R&D	<p>Aiming for smart agriculture, AgriD Inc. (established in 2018 with Asai Nursery, Inc.) is advancing verification testing of production systems and automation technologies for creating a new model for agricultural production where people work alongside machines.</p>	 <p>AgriD Inc.</p>

Outcome of Green and Peace of Mind Strategy

Objectives	Results
Win orders for greenhouses in Japan	Proposed solutions combining optimal products tailored to customer needs and obtained orders from agricultural producers
Commence trials of compact mobile chillers for markets other than parcel delivery	Won orders from food companies
Commence market trials of QR traceability system	Finished market trials with partners for increasing distribution efficiency

Efforts toward Quality

We will realize optimized levels of quality and service in the field of horticultural facilities, drawing on the quality control methods that we have cultivated for many years in our automotive businesses. In addition, with the aim of ensuring the stable supply of safe food throughout the entire food value chain, we will collaborate with other companies within all processes from food production through to distribution and consumption to establish the necessary quality control methods for maximizing the value we offer to customers.

Specific Initiatives to Achieve Strategic Aims Contributing to Regional Revitalization with Local Governments for Carbon-Neutral Agriculture

In Date City, Hokkaido, in a bid to revitalize the region through agriculture, DENSO constructed a newly developed multi-wing interconnected greenhouse for training workers and verification testing of a smart farm that uses IT. The greenhouse features an innovative forced-air ventilation system that creates uniform, stable agricultural conditions within the greenhouse, and DX functions enable the rapid training of new farmworkers. Plans call for using natural energy in the greenhouse, such as wood pellets made from local resources. We plan to begin construction on the greenhouse in summer 2022 and start verification testing with vegetable production in the city from fiscal 2024.

DENSO will contribute to the revitalization of the region by advancing agriculture initiatives in Date City, Hokkaido while training new workers in the community.

Contributing to Regional Revitalization with Local Private Companies in Agriculture

Village Development Inc. is a real estate company in Aichi Prefecture that began growing mini tomatoes in September 2022 with DENSO's *Profarm T-cube* forced-air ventilation greenhouse. It is seeking to hire new farmworkers in the region with plans to sell the harvested mini tomatoes at farm-to-table markets in local communities. By using DENSO's *Profarm T-cube*, airflow inside the greenhouse can be controlled better than a conventional greenhouse, creating uniform and stable agricultural conditions within the greenhouse. With *Profarm T-cube*, we are helping companies enter the agricultural business.

DENSO will continue to contribute to regional revitalization by expanding the agricultural business further with Village Development.



Profarm T-cube

Resolving Social Issues through Our Businesses

Relevant SDGs

Contributing with Systems to Improve Local Agricultural Brands with Local Governments

DENSO is working to improve the recognition of local agricultural brands, namely, short-necked asari clams farmed in Kumamoto Prefecture. DENSO participates in Kumamoto Prefecture's newly launched public-private organization, the Locally Farmed Asari Value Chain Improvement Council, and is working on verification testing of innovative systems built for providing local production guarantees and traceability in production channels for asari clams.

Kumamoto Prefecture issues local production certificates for asari clams caught by local fishermen, and consumers can use QR codes to verify this certification, which facilitates the dissemination of information on locally produced foods in a proper manner. DENSO contributes to food safety and security by supporting the creation of traceability systems from production to sale.



DENSO's QR codes scanned for information on source of local production



Local production certificate issued by Kumamoto Prefecture