DENSO Integrated Report 2024 Overview by Product

MOBILITY ELECTRONICS

Realizing a society in which all people can access mobility conveniently and with peace of mind (enhancing the 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 developments in society brought about by the CASE revolution.



Business Strengths

Ability to Create Large-scale Integrated Systems That Connect Cars, People, and Society

The demand for electronic systems is evolving as vehicles become more intelligent due to the introduction of software-defined vehicles (SDVs) and the revolution resulting from the increased production of connected, autonomous, shared & service, and electric (CASE) vehicles. In addition to existing demand for powertrains, bodies, chassis, cockpits, advanced driver assistance systems (ADAS), and other singledomain control systems, new demand for large-scale systems that integrate and coordinate these systems is emerging. Moreover, demand is growing for systems that connect cars with the outside environment DENSO will realize appealing products by utilizing the technological capabilities and integration capabilities that it has garnered in the course of developing a full range of the aforementioned systems.

Product Development Capabilities with Reliability and Sophistication cumulated in Automotive Products

Automotive products must realize high levels of reliability and performance in harsh environ ments and under operational restrictions. We have been engaged in the automotive electronic product business for many years—ever since the early days of vehicle electrification-and accumulated extensive vehicle-related expertise as a result. By utilizing the advantages of this expertise, DENSO is developing competitive products that combine the differentiated reliability and performance of its automotive products with the latest electronics and software technologies.

Global Network

Hiroshi Kondo

Head of Business Group

To expedite the realization of large-scale systems in the SDV era, collaboration with partners is essential. DENSO has developed human capital, intellectual capital, and a global production system by overcoming numerous obstacles in partnership with semiconductor manufacturers. software vendors, and automakers around the world. Using these strengths, we will refine our SDV-related technologies while providing various solutions to customers, thereby moving the world one step closer to safe mobility that provides peace of mind and is environmentally friendly.

Business Strategy

With the transition to SDVs and battery electric vehicles (BEVs), electronic platforms are undergoing major renewal, and the mobility electronics market is polarizing into the traditional field of single-function electronic control units (ECUs) and the growth field of largescale integrated ECUs. Using this shift as an opportunity, DENSO will develop and grow businesses through portfolio management that strengthens its presence in this growth field.

Creation of New Value	 We aim to sustain business growth by improving our electronic platform planning capabilities and elemental technologies, both of which contribute directly to heightening the product appeal of SDVs and BEVs. As the value sought in relation to cars shifts from functionality toward user experience, we will bolster initiatives focused on planning products that reflect the user perspective, proposing them to customers, and creating commercial products. Through the creation of value, we will enhance profitability. Supported by our comprehensive knowledge of vehicle-related electronics and software, we will work very closely with customers and jointly develop electronic platforms with the aim of creating new value. Further, increased sales of ECUs based on these optimized electronic platforms will enable us to further lower costs by taking advantage of the economies of scale resulting from mass procurement and production.
Business Portfolio Transformation	With our sights set on further growth of the safety systems business, we will expand our lineup of products that cater to specific market segments and regions and move forward with global rollouts. We will also focus on the software business and the development of electronic platform products for BEVs with the aim of creating new value. At the same time, we will identify businesses that do not conform to the green and peace of mind principles as well as products that are becoming commoditized and replace them in our portfolio systematically and in close coordination with our customers.
Realization of Carbon Neutrality	We will help achieve carbon neutrality by advancing the formation of a circular economy through contributions to the increased introduction of BEVs, the utilization of Factory-IoT (F-IoT) to visualize energy wastage at manufacturing sites, the sourcing of recycled materials, the development of repair technologies, and the development of products with structures that facilitate disassembly.
Realization of Sustainability Management	 By establishing business foundations that are adaptable to change, we will achieve sustainability management. Development system reinforcement: With the aim of achieving large-scale, cross-domain software development, DENSO will redeploy human resources through portfolio management while developing and enhancing the capabilities of globally competent personnel through the Company's distinctive training system. Further, we will utilize AI technology to enhance the efficiency of development. Manufacturing competitiveness: In anticipation of the mass production of large-scale integrated ECUs, we will further refine and combine our strengths, namely, in-vehicle quality, mass production, and adaptability. In addition, we will collaborate with external manufacturing partners to strengthen our global manufacturing foundations and increase their resilience to changing conditions.

Business Analysis Q&A

Q: From a cost perspective, how do you plan to respond to increasingly large-scale software development?

A: As we enter the SDV era, more-extensive vehicle functions and their integration with society will significantly change in-vehicle electronic platforms and greatly increase the scale of in-vehicle software. DENSO will adapt to these changes by redoubling efforts to strengthen software development capabilities and by increasing the efficiency of development through the introduction of new work processes. In strengthening development capabilities, we plan to deploy 18,000 developmentrelated personnel by 2030, 1.5 times more than the current number. By 2030, we also aim to establish development activities that are twice as efficient as current activities through a

Objectives and Results of Strategies for Green and Peace of Mind

Objective: Popularize ADAS with a view to eliminating traffic accident fatalities Results: Increased the penetration of Global Safety Package 3 (GSP3),* featuring heightened safety performance, and increased accident scenario coverage to 37% in fiscal 2023, aiming to raise it to 56% by fiscal 2026 * GSP3: A system that uses millimeter-wave radar and vision sensors to assist driving

Objective: Augment product lineup and develop electric, low-power consumption control systems with a view to carbon neutrality Results: As well as offering a lineup of hybrid electric vehicle (HEV), plug-in hybrid electric vehicle (PHEV), and BEV products, advanced the development of low-power ECUs and electronic control systems that help lower power consumption and electronic platforms that minimize energy usage by optimally integrating control of all vehicle systems



Resolving Social Issues through Our Businesses

Initiatives Aimed at the Elimination of Traffic Accident Fatalities

We believe that to eliminate traffic accident fatalities, increasing the accident scenarios for which advanced driver assistance systems (ADAS) are effective and promoting their widespread use is important. Aiming to realize a system that is effective in 100% of accident scenarios by fiscal 2036, DENSO will develop advanced technologies that combine the respective benefits of ADAS functions, human-machine interface (HMI), and infrastructure linkage. As for promoting the widespread use of ADAS, we will enhance our lineup of sensor and system packages optimized to meet the diverse needs of each region and customer. (Peace of Mind Strategy P.40–41) To realize our 2035 goal, we are also developing large-scale electronic control units (ECUs)

range of measures. Specifically, we will (1) deepen collaboration with automakers even further to achieve efficient development that encompasses the creation of specifications through to integration, (2) further strengthen the cross-industry division of labor with IT vendors and other partners, (3) strengthen efforts to establish standardized, common systems-on-chips (SoCs) and middleware by utilizing expertise in semiconductors, and (4) renew development tools by using generative AI to evolve in-house tools

Through the aforementioned initiatives, we aim to create a software business worth ¥800 billion by fiscal 2036, roughly four times its scale in fiscal 2024.

> Effective in Many Different Accident Scenarios Vision sensor detection angle: 128 degrees (28-degree increase versus other companies)

Millimeter-wave radar detection angle: 103 degrees (13-degree increase versus other companies)

Note: Detection angles based on DENSO's measurements

One barrier to the proliferation of BEVs is driving distance, and a factor that limits driving distance is the electricity consumed for heating. DENSO's heat pump systems use heat in the air as a thermal source for heating, thereby reducing the consumption of electricity and greatly extending driving distance. Moreover, thermal management systems that use heat pumps enable the efficient adjustment of temperatures in vehicles and the cooling of batteries, which helps to inhibit battery degradation and shorten recharging times.

that can process huge amounts of data at high speed. DENSO will continue developing advanced technologies and its product lineup with the aim of realizing a society where everyone can enjoy unrestricted mobility with peace of mind.



Example of a Large-scale ECU

This ECU aggregates information from sensors that monitor the vehicle's surroundings and controls the vehicle accordingly. The ECU recognizes each sensor's realtime information and is able to process it in milliseconds.