Business Analysis

By utilizing technologies and expertise developed in respective businesses to realize products that meet current trends, DENSO has provided society with value. Today, each of our businesses continues to grow and transform itself based on business strategies that are linked to a Companywide strategy. This section provides a close-up on the achievements, advantages, strategies, and initiatives that will enable our businesses to continue providing value going forward—a topic that is often the focus of our dialogues with investors, analysts, and other external stakeholders.

Electrification Systems

Q: As the penetration of BEVs increases, how competitive will DENSO's inverters be?

A: DENSO has many different business segments and fields of expertise and will ensure competitiveness by offering system solutions that meet the expectations of markets and customers. For many years, DENSO has worked on improving entire systems, including battery control systems and thermal management systems. In other words, we approach improvements from the perspective of overall vehicle specifications. In addition, by evolving, improving, and utilizing the SiC power semiconductors that are incorporated into inverters, we will help enhance the driving distance of BEVs. Moreover, increasing the commonality between BEV inverters and those of hybrid electric vehicles (HEVs) will shorten lead times for bringing inverters to market and allow us to increase cost competitiveness by leveraging the volume of HEV inverters.

Q: Given that automakers are increasingly manufacturing electric drive components (motors and inverters) in-house, what is your strategy for growing sales?

A: Motors and inverters are as important to electric vehicles as engines are to internal combustion engine vehicles. Therefore, some customers prefer to insource the manufacture of electric drive components to keep workforces employed. With electric mobility demand diversifying globally, DENSO's mobility electronics and motor businesses give the Company in-house capabilities covering all stages of electronic product manufacture—from wafers through to components—as well as a development platform for the integrated in-house production of all sizes of motors, encompassing design, manufacture, and inspection processes. Thus, our strength lies in an ability to provide and contribute to systems in terms of mobility performance and quality. We can also provide standardized components and modules that meet diverse customer needs, thereby advancing the popularization of electric vehicles and helping the realization of a carbon-neutral society.

Powertrain Systems

Q: Could you please explain your future strategy for internal combustion engine products as the trend toward carbon neutrality gains momentum?

A: The spread of electric vehicles will accelerate mainly in Europe, the United States, and China. However, the pace of electric vehicle introduction will differ depending on the energy situation in each region and vehicle type, such as commercial, agricultural, and construction vehicles. To meet the wide variety of future demand, we must provide a range of power source options with low environmental impacts. By leveraging technologies fostered for internal combustion engine products and developing engines that use hydrogen, biofuels, e-fuel, and other fuels with high energy efficiency and low environmental impact, we will support customers and industry as a whole in the current phase of transformation. In this way, we will contribute to the realization of environmental measures globally.

Thermal Systems

Q: DENSO's target is to realize capacity for the manufacture of 5.4 million thermal management products by fiscal 2031. Can you please explain this target as well as your strategies for sales growth and technologies?

A: By 2030, we expect that BEVs will have transitioned from an introductory phase to an "infancy" phase in which automakers adopt dedicated BEV platforms in earnest and begin mass production, leading to diversification of automakers' thermal management needs. Catering to diversifying needs risks increasing development man-hours and creating a bloated value chain for current thermal management systems, which are realized through the alignment of various functional components. With its sights set on the aforementioned infancy phase of BEVs, DENSO will further improve the core technologies established by the Thermal Systems Group, such as thermal control and system construction technologies and technologies for creating high-performance compact products and miniaturized products. These initiatives will enable the creation of differentiated products that heighten our competitiveness. In addition, we are formulating a concept that entails improving development efficiency through model-based systems engineering* and then integrating various component functions into modules. Through different combinations of these modules, we will create modular products tailored to meet the needs of each customer. To realize this concept, we will participate in the early development phases of major customers, seek solutions to issues through our modules, and work with customers to clarify future requirements for the development of thermal management and to establish understanding of the value that should be realized. We will use these close collaborations to increase our sales even further. Also, DENSO is reorganizing its production and supply system so that it can deliver 5.4 million thermal management products. We are consolidating existing products in step with shrinking demand for internal combustion engine products and focusing the utilization of facilities, personnel, and other existing assets on the thermal management area. DENSO has also begun examining reorganization that transcends business boundaries by utilizing the production bases and technological capital of other business divisions. Through these initiatives, we will achieve our sales growth target for thermal management products and achieve business portfolio transformation while maintaining our business structure and competitiveness.

* An engineering method that improves efficiency and quality by basing the entire systems engineering process, including business processes, on digital models

Mobility Electronics

Q: Electronic platforms are likely to see demand growth. What is your strategy for them?

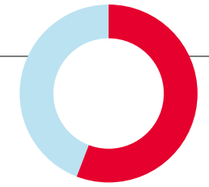
A: As the introduction of software-defined vehicles (SDVs)* and BEVs advances, demand for electronic platforms will increase even more. DENSO has long been involved in electronic systems for entire vehicles, including the powertrains, bodies, chassis, cockpits, and ADAS. Consequently, we have accumulated extensive technological capabilities and expertise in electronics and software for entire vehicles. Further, over many years we have built networks with automakers around the world. In addition to these advantages, we will incorporate the latest digital transformation and automation methods to accelerate the development of electronic platforms that support the realization of highly appealing SDVs and BEVs.

* Vehicles (or vehicle manufacturing) in which software plays a central role in the realization of electrification, automated driving, and vehicle security

Q: What is your road map for the development of ADAS technology?

A: We will further improve the performance of Global Safety Package (GSP), an advanced safety system. As shown in the chart, we will continue development with the goal of eliminating 56% of traffic accident fatalities by fiscal 2026. As for the remaining 44%, we will develop high-performance sensors that recognize hazards in the entire area surrounding vehicles and vehicle–infrastructure cooperative systems that detect hazards in vehicle blind spots. Moreover, for accidents resulting from hazards that cannot be detected by GSP or vehicle–infrastructure cooperative systems, DENSO will develop technologies that monitor the driver's condition and skills. We will then develop algorithms that constantly monitor both the vehicle's surroundings and the driver's condition and integrate the acquired data. Through these system development efforts, we aim to eliminate traffic accident fatalities.

Percentage of Traffic Accident Fatalities Covered by GSP



Note: Estimated figures based on accident analysis conducted by the Institute for Traffic Accident Research and Data Analysis in 2018
Estimate subject: Fatal accidents in which passenger cars (standard motor vehicles or light motor vehicles) were the first party, excluding car–train accidents

Advanced Devices

Q: Could you please explain DENSO's SiC supply strategy, including external collaborations?

A: With the introduction of carbon-neutral regulations globally, automakers are accelerating product development to comply with them, and the spread of electric vehicles in the market is expected to advance rapidly. DENSO will seek differentiation by rolling out inverters with silicon carbide (SiC) semiconductors, which have lower loss, higher quality, and larger areas (8-inch diameter) than conventional silicon (Si) semiconductors. By doing so, we will claim a larger share of the market for electric vehicle inverters and contribute to the market penetration of electric vehicles and the reduction of CO_2 emissions. SiC power semiconductors with DENSO's unique trench-type metal-oxide-semiconductor structure*1 improve the output per chip by simultaneously achieving high voltage and low on-resistance*2 operation and by reducing power loss associated with heat generation. This increased output extends driving distance. In addition, to increase the resilience of supply capabilities and ensure that we can stably supply SiC power semiconductors with the required quality in the same way that we do for Si power semiconductors, we will disclose patent-protected technologies and in-vehicle specifications and provide technical support to contracted manufacturers within the supply chain. Having been adopted by the Green Innovation Fund in 2022, this supply chain initiative is also utilizing a subsidy from the fund. Through development aimed at increasing the efficiency of energy management in vehicles, the initiative will help realize a carbon-neutral society.

*1 Semiconductor devices with a trench gate that uses DENSO's patented electric field relaxation technology
*2 A measure of the ease of current flow; the lower the value, the lower the power loss