Manufacturing Capital

Outline of Efforts to Strengthen Manufacturing Capital

Manufacturing is DENSO's forte, and the Company has accumulated an abundance of excellent manufacturing capital that includes a network of production bases throughout the world and numerous highly skilled frontline employees. As the CASE revolution progresses, we are building a global production structure to enhance the satisfaction of customers in all areas of operation in terms of quality, cost, and delivery (QCD). At the same time, we are striving to reduce our environmental burden by conducting production activities with a commitment to world-leading environmental efficiency and high productivity. In these ways, we are working to evolve our manufacturing bases. We will also evolve plants by establishing DENSO-style digital-twin plants through a combination of our long-standing creative prowess—made possible by employees' collective knowledge and efforts—with scientific, data-enabled analysis capabilities.

KPI Targets for Fiscal 2026

Capital expenditures ¥350.0 billion

Planned investment in efforts to reduce CO_2 emissions

¥100.0 billion (fiscal 2023–fiscal 2026)

Characteristics of DENSO's Manufacturing Capital (Fiscal 2023 results)

Capital expenditures
¥366.8 billion

CO_2 emissions per unit
50% reduction (compared with fiscal 2013, non-consolidated)

Number of regional production bases worldwide
127 plants in 25 countries

Reinforcement of Manufacturing Capital—Its Significance and the Value Created

To create new value and sustain growth in an era of major changes in business conditions, further enhancement of the manufacturing capital we have built up is essential.

In addition to existing initiatives to automate production lines, improve productivity based on data analysis, and reduce capital investment through disciplined investment decisions, DENSO is accelerating the development of manufacturing technologies for the creation of new value. These include technologies that anticipate the risk of future resource depletion, such as hydrogen technologies and technologies compatible with the use of recycled materials. In addition, we are leading the way in creating frameworks for the achievement of carbon neutrality in manufacturing. For example, we have introduced internal carbon pricing for investment decisions. Further, with the aim of minimizing costs, we are increasing efficiency through the bolstering of business continuity capabilities that ensure stable production even in volatile conditions. Business continuity measures include the utilization of bridge production and the maintenance of high-risk inventories at appropriate levels.

Global Production and Supply Capabilities

In line with its basic principle of manufacturing in close proximity to customers, DENSO has built highly competitive production structures in six countries and regions: North America, South America, Europe, Asia, China, and Japan. At our production bases worldwide, we aim to achieve leading levels of quality, cost, and delivery in each region and realize *Monozukuri* (manufacturing) that is resilient to volatility. As well as reweighting our business portfolio to accommodate the increased production of connected, autonomous, shared & service, and electric (CASE) vehicles and to realize carbon neutrality, we are currently clarifying the roles of each region and plant so that we can stably deliver products to customers even when facing the semiconductor supply risks and various geopolitical risks that have emerged recently. Our goal is to build robust global production and supply capabilities that fully leverage DENSO-style *Monozukuri* know-how and production assets across the global supply chain, including our suppliers.

In addition, to cater to the rapid progress in vehicle electrification, we are transitioning from internal combustion engine plants to electric vehicle component plants on a global basis. For inverters, a representative electric vehicle component, we started up production in Japan in fiscal 2006 and in North America and China in fiscal 2020, with production of these components slated to commence in Europe in fiscal 2024. Going forward, we will build production capabilities and ramp up production capacity globally with respect to electric vehicle components.

DENSO-style Digital-twin Plants

To create even better products and production lines, we have worked to create a robust manufacturing foundation through Excellent Factory (EF) activities in which all employees participate on a daily basis. As for DENSO-style digital-twin plants, which we are currently advancing, people play the leading role. Through the combined use of ideas and creativity with a range of production-related data, we will encourage personnel to take the initiative in making improvements. In this way, frontline operations will continuously evolve. We will not only share accumulated data in plant operations but also link it with data from the engineering chain and the supply chain to increase the speed and flexibility of processes from development through to production.

Since 2019, DENSO has been steadily introducing its in-house developed Factory-IoT (F-IoT) system to Group companies in Japan and overseas and utilizing the system in day-to-day production and improvement activities. To accelerate improvement activities and enhance productivity even further, we have set up software workshops within plant facilities. These workshops enable personnel to develop their own apps, which significantly expedite the discovery and solution of problems. Plans call for development of our F-IoT system with the aim of introducing it to suppliers. A presentation on the concept of DENSO-style digital-twin plants was held at the head office's *Monozukuri* building in fiscal 2023. In fiscal 2024, we began introducing and verifying the concept at the Anjo and Daian plants, which are serving as model plants.

Message from the Chief Monozukuri Officer

Opening Up a New World of *Monozukuri*

Jiro Ebihara
Chief Monozukuri Officer (CMzO),
Senior Executive Officer

Business models are changing due to the instability of world affairs and the proliferation of CASE vehicles. Meanwhile, society is undergoing dramatic changes as a consequence of labor shortages and initiatives focused on climate change and resource recycling. DENSO will help address the social issues arising from these changes by placing importance on *Monozukuri* and *Hitozukuri* (the development of human resources) while remaining focused on the new era that is emerging. Thanks to our predecessors' farsighted establishment of global development, production, and supply capabilities, we already have development and manufacturing bases in regions worldwide, giving us the resources to deliver better products to our customers around the world.

Going forward, we will focus on the three tasks below so that we can adapt to diverse changes as rapidly as possible while implementing measures for the realization of carbon neutrality and a circular economy.

1. Rigorous Standardization and Digitalization

At DENSO plants, plant managers lead EF activities in which all employees participate in efforts to rigorously standardize work processes and operations. These improvement activities optimize the entire plant by focusing on not only the production line in question but also pre- and post-processes. Also, by utilizing simulations of virtual production lines to envision the movements of workers and verify automation and energy-saving benefits before production line start-ups, we create plants in which problems are readily identifiable. All employees then implement continuous improvement activities to address the identified problems. To further evolve these EF activities, we are currently building a platform that will digitalize current activities so that they can be made available as data for utilization by all personnel from design and production engineering managers through to on-site personnel.

2. Automation and the Development of Personnel with Digital Technology Literacy

With labor shortages becoming an issue in all industries, we will incorporate intelligent robots and combine AI and data science so that robots and machines can perform complex tasks previously performed by humans, such as incidental work and sensory inspections. In this way, we will realize safe, high-quality automated plants. Due to the introduction of digitalized and automated paper forms and other innovations, an increasing number of digital tools are available for the management of frontline operations. Therefore, we will reskill personnel so that they acquire literacy in digital technologies and can readily utilize such tools.

3. Digitalization throughout the Supply Chain

As well as sharing data within our plant operations, we will share it with suppliers and customers. Moreover, this data will not only enhance quality but also the ability of our supply chain to adapt to production fluctuations and risk actualization. In conjunction with these efforts, we will enhance the social value of our products by making available in reliable formats the traceability data necessary for verifying CO_2 emissions volumes and for verifying the history of reused and recycled materials.

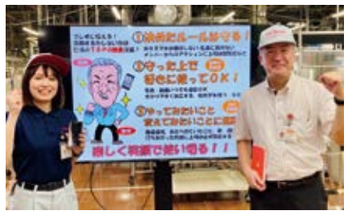
The aforementioned initiatives will realize exciting frontline operations where all coworkers involved in manufacturing are able to engage in creative work and take on challenging new tasks. Our plants are proceeding with verification and implementation with their sights set on realizing such operations, which we refer to as DENSO-style digital-twin plants.

Message from an Employee

Monozukuri Digitalization That Also Strengthens Team Unity

The digital terminals distributed to each frontline employee have revolutionized our work. For example, when a defect occurs in a manufacturing process, we used to explain the problem verbally. Now, however, we can use the terminal to photograph the situation, which leads to speedy and accurate analysis of the problem. When we are conducting inspections, the digital terminal enables us to perform a variety of tasks, from viewing work instructions and quality samples to managing the number of workpieces.

In addition, younger employees have taken it upon themselves to teach their teams how to use the terminals, which has had the unexpected benefit of stimulating communication throughout the team. We will continue utilizing the power of teamwork and digital technologies to tackle various *Monozukuri* challenges as a united team.



From left:
Akane Oishi and Eiji Kawakami
Production Section 6, Plug Plant, Daian Plant