

# History of Innovation and Creation

Just as it did when DENSO was founded, the commitment set out in the DENSO Creed is our starting point to this day. Amid a rapidly changing external operating environment, we must boldly take on unprecedented challenges, such as promoting initiatives toward CASE\* and realizing carbon neutrality. Taking the baton that was passed to us by our predecessors, who consistently took on the challenge of resolving the social issues of the times, we will steadily move forward toward our aim of bringing happiness to people and society as a whole.

\* CASE: Connected, autonomous, shared & service, and electric

## 1930s to 1950s: Taking on the challenge of resolving social issues using cutting-edge technologies from the time of our founding

External Environment	Postwar Reconstruction and Motorization
Social Needs	International Standards of Technology and Quality

### 1935: Taking on the Challenge of Producing Electrical Equipment In-House

An automobile department was established within Toyoda Automatic Loom Works, Ltd. (currently Toyota Industries Corporation). In 1935, the executive director of Toyoda Automatic Loom Works, Kiichiro Toyoda, instructed Ryuichi Suzuki (who would later become a member of the Board at DENSO) to take on the challenge of producing electrical equipment in-house. However, developing such equipment proved challenging due to the unreliable quality of electrical equipment at the time. In fact, Mr. Toyoda stated to Mr. Suzuki that this task seemed to be far harder than he had imagined, and he asked Mr. Suzuki whether they should quit at that juncture. Mr. Suzuki pleaded to Mr. Toyoda to allow him to continue his efforts for one more month in order to realize in-house production. Sometime after doing so, the enthusiasm and persistence of Mr. Suzuki and the young engineers on his team led to the official adoption of electrical equipment in Toyoda vehicles.



**Team in Charge of Electrical Equipment Development**  
At the time, a team of approximately 30 engineers and technicians devoted themselves to the in-house development of electrical equipment, often going without sleeping and eating.

### 1949: Birth of NIPPONDENSO

With the Japanese economy in an extremely difficult state due to the promotion of the Dodge Line by the General Headquarters of the Supreme Commander for the Allied Powers, the electrical equipment department split off from Toyota Motor Co., Ltd., and was established as NIPPONDENSO CO., LTD. The company's first president, Torao Hayashi, aimed to rapidly expand the company not just in Japan but also overseas. For that reason, he expressed the company's determination to become independent by choosing the name NIPPONDENSO ("Nippon" meaning Japan), rather than KARIYADENSO, AICHIDENSO, or TOKAIDENSO, which are names of the local area where the company was founded.



### 1953: Start of Technical Cooperation with Robert Bosch GmbH

In the early 1950s, a technological gap clearly existed between NIPPONDENSO and Western companies. Consequently, we urgently needed to achieve world-class technologies and quality. At this juncture, we encountered German-based company Robert Bosch GmbH, which was an order of magnitude larger than us. Thanks to the mediation of Dr. Tokushichi Mishima, who was the inventor of MKM steel, and the determination of our management, we concluded a technical alliance with Robert Bosch. By learning from our new partner, we established the foundations of internationally competitive technologies and quality.

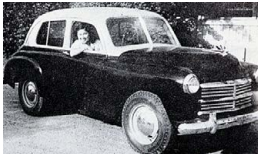


### Specific Initiatives

- Beginning in the 1950s, we catered to the needs of customers, especially Toyota Motor Corporation. At the same time, we established and grew a business field centered on mechanical parts and realized the provision of products supported by internationally competitive technologies and quality.

### Green Value and Peace of Mind Value Provided

- Developed and mass-produced the DENSO-GO electric vehicle in 1950, when it was difficult to obtain gasoline. Many of DENSO-GO's electronic components were designed and manufactured in-house, and approximately 50 of these vehicles were sold.
- Developed Japan's first car and bus air-conditioning systems. Although there was a concern that such systems would impede driving performance, these systems were able to overcome that notion and quickly grew in popularity due to their high level of convenience and comfort.



DENSO-GO

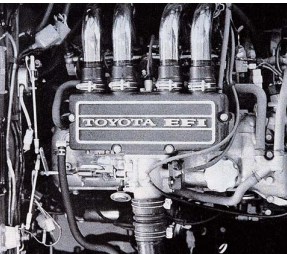
## 1960s and 1970s



External Environment	Popularization of Private Cars during the Period of Rapid Economic Growth Together with the Emergence of Traffic Accidents, Air Pollution, and Numerous Other Social Problems
Social Needs	High-Mix, Variable-Volume Production Capabilities and Development of Environmental and Safety Technologies

### Specific Initiatives

- Received the Deming Prize, the most prestigious award for quality control
- Established the IC Research Center in 1968 in anticipation of a shift to the electronic control of automotive components; began developing semiconductors; and manufactured the automotive industry's first semiconductors. Accumulated a large amount of knowledge on semiconductor and IC specifications by conducting thorough analysis



Electronic fuel injection system



Received the Deming Prize

### Green Value and Peace of Mind Value Provided

- Achieved the practical application of electronic fuel injection systems ahead of regulations on exhaust gas. After doing so, we continued to develop products that respond to environmental regulations, one after the other.
- Participated in the Comprehensive Automobile Traffic Control System (CACS) project initiated by the Ministry of International Trade and Industry (currently the Ministry of Economy, Trade and Industry). This project would later help us develop car navigation systems and connected driving products.

### "Safe DENSO," the Origin of Our Accident Prevention Training

In 1969, an explosion accident occurred at the die-casting factory of the Anjo Plant in which six employees lost their lives, making it the biggest disaster at DENSO since its founding. In October of the same year in the wake of the incident, we created the new "Safe DENSO" slogan to redouble our resolve to ensure that another such accident would never happen again. Additionally, to ensure that we would never forget this accident and always remain aware of safety, we established September 8, the date the disaster occurred, as "Safety Day." We are also currently rolling out special safety training activities on a global basis.

## 1980s



External Environment	Globalization, Trade Friction, and Increasingly Severe Environmental and Safety Issues
Social Needs	Overseas Production and Higher-Performance Vehicles

### Specific Initiatives

- Established manufacturing companies and technical centers overseas to realize regionally optimized product development, manufacture, and supply capabilities
- Helped address pollution, global warming, and other environmental issues by acting as a trailblazer in the creation of eco-friendly products
- Launched a project for the practical application of robots. Furthermore, the development of such technologies as barcode readers and RFID,\* which we pursued in a similar manner as we did with robots, helped establish the foundation of our current factory automation (FA) business.

\* RFID (radio frequency identification): A non-contact system that reads data from RF tags using electromagnetic waves



DENSO (MALAYSIA) SDN. BHD. at the time of its establishment in 1980



In-vehicle test in Europe

### Green Value and Peace of Mind Value Provided

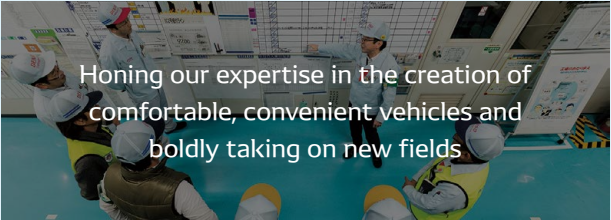
- Developed the world's first electronic control-type diesel pumps, which impressed the world with their ability to control exhaust gas, reduce fuel consumption, and realize high output
- Commenced the mass production of vacuum sensors, which represented the world's first in-vehicle semiconductor sensor. With this technology, we led the way ahead of other companies by equipping semiconductors with sensors and thereby adding value.
- Gradually realized the practical application of safety systems, including antilock brake systems, airbag sensing systems, and forward collision warning systems, leveraging the research that we had been conducting since the 1960s
- Opened the Nukata Testing Center, a one million square meter test course comparable in scale to those of auto manufacturers. Through this center, we continued to advance our testing facilities on a daily basis to ensure product performance and quality that exceed customer expectations.



A natural environment test course that can replicate driving conditions at night or in the rain



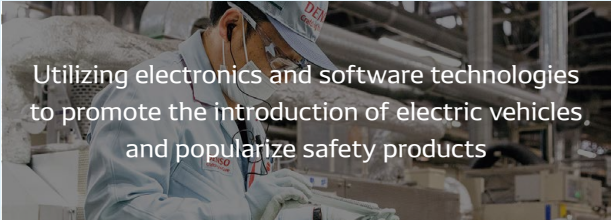
1990s



Honing our expertise in the creation of comfortable, convenient vehicles and boldly taking on new fields

External Environment	Collapse of the Bubble Economy and Acceleration of International Debate on Global Warming
Social Needs	Compact, Fuel-Efficient Vehicles and Environmentally Friendly Lifestyles

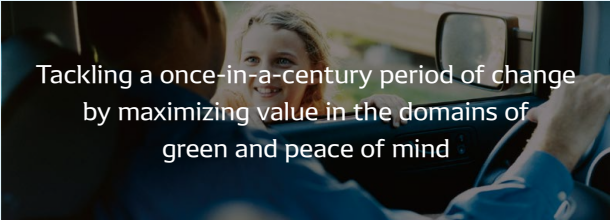
2000s



Utilizing electronics and software technologies to promote the introduction of electric vehicles and popularize safety products

External Environment	Spread of Digital and Information Technologies and Creation of International Frameworks and Regulations for Global Warming Prevention
Social Needs	Diversification of Powertrain Technologies and Introduction of Products for Hybrid Electric Vehicles (HEVs) and Other Electric Vehicles

2010s to 2020s



Tackling a once-in-a-century period of change by maximizing value in the domains of green and peace of mind

External Environment	ICT Advancement and SDG Adoption, and Escalation of Social Issues
Social Needs	Conversion to CASE Vehicles / Contribution to the Resolution of Social Issues through Our Business

2030s and Beyond



Aiming for excellence in the domains of green and peace of mind

External Environment	Global Warming, Resource Shortages, and Escalation of Such Social Issues as an Aging Society
Social Needs	Recycling-Based Society Centered on Renewable Energy

Specific Initiatives

- Established the Fundamental Research Center (currently the Advanced Research and Innovation Center), which has created a large number of innovative technologies that have led to the development of world-first and world-best products
- Commenced Excellent Factory (EF) activities. We began to expand activities on a global basis to improve our factories, led by personnel on the front lines of production. These EF activities represent the origins of DENSO's activities focused on quality improvements.
- Utilized core technologies to develop products that contributed to eco-friendly lifestyles

Specific Initiatives

- Established DENSO Training Academy Thailand, our first overseas regional training center. This center helped us build a structure for educating engineers and technicians on a global basis.
- Formulated Eco Vision 2005 environmental management policy. Leveraged outstanding environmental technologies to accelerate the reduction of CO<sub>2</sub> emissions from business activities
- Marketed products for CASE vehicles to promote the introduction of electric vehicles and the popularization of safety products

Specific Initiatives

- Established technical centers in seven regions across the globe. Through these centers, we have set up a structure to create competitive products that can promptly meet diversifying local needs.
- Established the Electrification Innovation Center (EIC), which promotes efforts to strengthen the development and production of products powered by electricity, and Global R&D Tokyo-Haneda, which conducts the development of automated driving and other technologies. By doing so, we have accelerated our R&D activities in the domains of green and peace of mind.
- Developed high-performance advanced safety systems and improved the safety performance of existing vehicles through the provision of retrofitted products

Specific Initiatives

- Declared intention to realize 100% carbon-neutral *Monozukuri* and eliminate traffic accident fatalities by fiscal 2036. Worked to expand businesses and resolve social issues in line with management philosophy of green and peace of mind
- Commenced verification tests for the use of hydrogen, a form of clean energy that does not burden the environment, thereby accelerating efforts to realize a hydrogen-based society

Green Value and Peace of Mind Value Provided

- Focused on the development of car air-conditioning systems that use natural refrigerant to curb the destruction of the ozone layer caused by conventional refrigerant
- Developed the world's first electronic control-type common rail system. Pioneered the way with common rail systems that would later dominate the market
- Developed the world's first iridium spark plug using an iridium alloy center electrode, making for an ultra-fine electrode that also extends product lifespan
- Commercialized household heat pump water supply systems that contribute to energy savings



Iridium spark plug

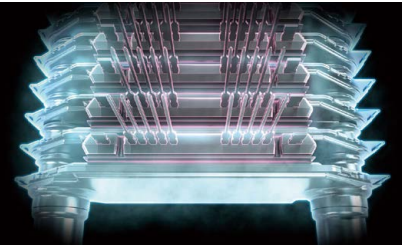
- Developed the QR Code® with large capacity and high-speed readability that is compatible with high-mix, low-volume production at plants



QR Code®

Green Value and Peace of Mind Value Provided

- Developed the world's first inverter with dual-side cooling. DENSO's technological capabilities, which help meet the needs for high output and compact sizes, were acknowledged through the development of these inverters, leading to a rapid increase in their production volume.



Structure for cooling both sides of the inverter

- Developed the world's first plant-derived resin (castor oil tree) radiator tank, serving as an eco-friendly product that helps reduce CO<sub>2</sub> emissions throughout the product life cycle

- Developed "Night View," the world's first nighttime driving support system with a pedestrian detection function that uses near infrared rays
- Developed the world's first forward-looking radar sensor using millimeter waves. Able to operate even in rainy and foggy environments, these sensors helped enhance the safety of automobiles.

Green Value and Peace of Mind Value Provided

- Developed motor generators adopting a proprietary winding structure. These motor generators realize highly efficient, eco-friendly power generation and driving.
- Saw cumulative production of inverters, which are our mainstay product in the environment field, reach 20 million units worldwide in 2021
- Developed our first inverter to use silicon carbide (SiC) semiconductors. These inverters help improve the energy efficiency and extend the driving distance of BEVs.



Inverter production site

- Developed Profarm T-cube, an environmental control device for agricultural greenhouses, with the aim of supporting agriculture in Japan and avoiding future food crises
- Developed Global Safety Package, an advanced safety system using a monocular camera and millimeter-wave radar sensor
- Developed Global Safety Package 3, which helps improve safety performance by recognizing the environment surrounding the vehicle

Our Vision for the Future: Long-term Policy for 2030

