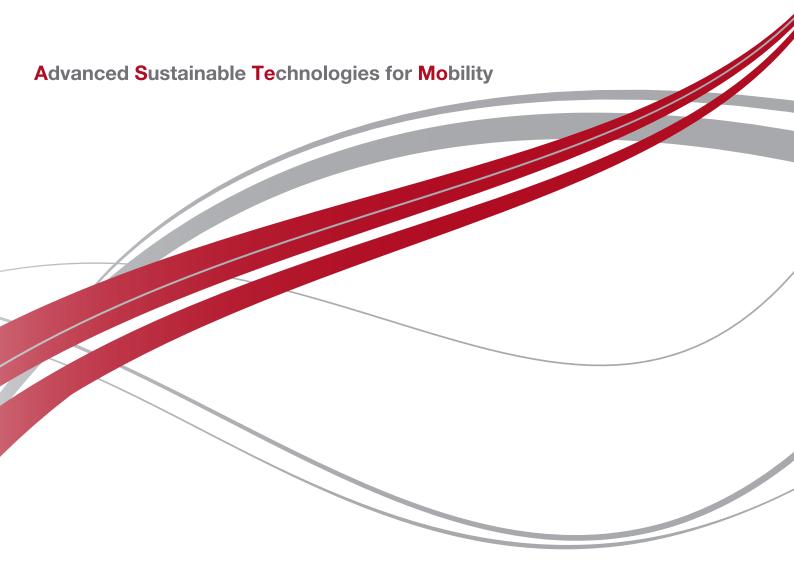


Corporate Profile





Ambition

We will contribute to a sustainable society and improved quality of life by providing world-leading advanced mobility solutions that satisfy our customers





Advanced Sustainable Technologies for Mobility

Company Profile

Company Name Hitachi Astemo, Ltd.

Representative Brice Koch, President & CEO

Capital 51.5 billion yen

Registered Head Office 2520 Takaba, Hitachinaka-shi, Ibaraki,

312-8503 Japan

Headquarters Shin-Otemachi Building, 2-1, Otemachi 2-chome,

Chiyoda-ku, Tokyo, 100-0004 Japan

Shareholder Composition and Share Ratio

Hitachi, Ltd. 66.6%

Honda Motor Co., Ltd. 33.4%

(As of April 1st, 2022)

Product Brands

Hitachi Astemo has a wide range of product brands, focusing on automobiles and motorcycles.

Each brand is proof of the technical prowess and trust we have cultivated over many years, and form the foundation of our advanced mobility solutions.

HITACHI







TOKICO



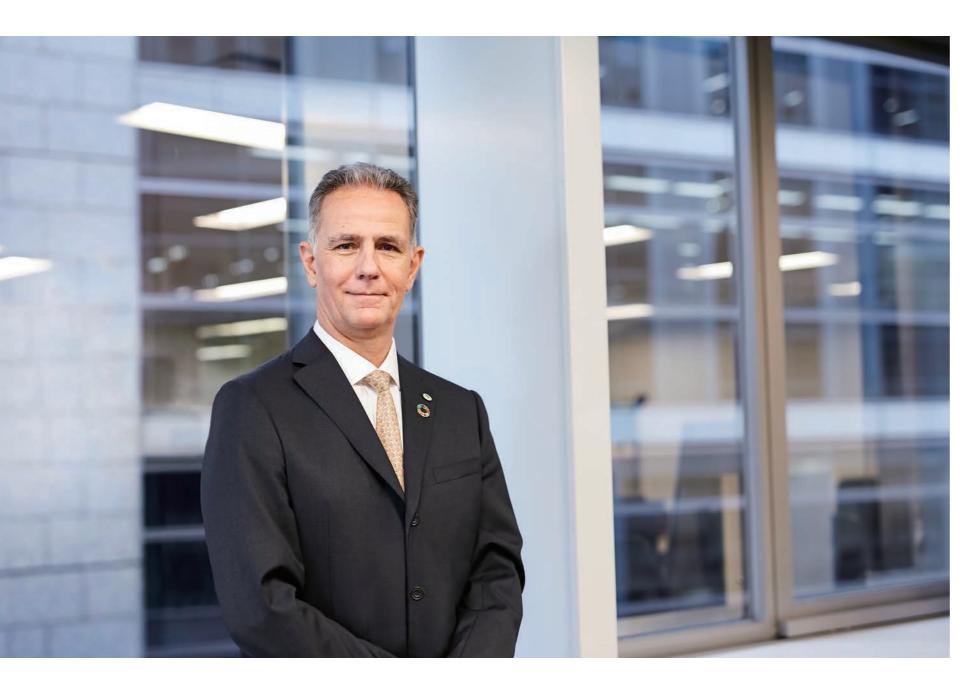


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Message from the President & CEO

Hitachi Astemo is a global, leading technology company committed to making our world a better place



Born in January 2021 from the merger of Hitachi Automotive Systems, Keihin, Showa, and Nissin Kogyo, Hitachi Astemo provides Advanced Sustainable Technologies for Mobility to the automotive and motorcycle industries as a leader in CASE technologies, which include connectivity, autonomous driving, and electrification.

With 90,000 employees spread across 27 countries, Hitachi Astemo has the scale and technical expertise to pursue rapidly changing technologies while providing comprehensive coverage to our OEM customers and partners across the globe. Building on the strengths of our four founding companies, our diverse human resources are committed to providing mobility solutions that reduce environmental impact, increase traffic safety, and improve comfort.

As a core member of the Hitachi Group, we are committed to achieving a sustainable society by providing environmental, social and economic value that sustainably improves our quality of life and makes our world a better place.

As governments and customers around the world strengthen their demands for safer and more sustainable mobility solutions, companies across the automobile and technology sectors are entering the market and investing in new business areas to catch up. For Hitachi Astemo, this is not new. We have the technologies and talent necessary to lead this era of technological innovation, together with our partners. Defining the technologies of tomorrow is what we do and is deeply ingrained in our DNA.

President & CEO Brice Koch 3/00

Autonomous Driving / Advanced Driver Assistance Systems

As a systems integrator, we provide autonomous driving and advanced driver assistance systems. This includes sensing technologies, which recognize the surrounding environment; and electronic controls that instantly respond to the surrounding situation, accurately controlling the vehicle to improve safety and security while reducing traffic accidents. Our connected technologies provide solutions for comfortable and autonomous driving, creating new value by connecting cars and society.

■ AD/ADAS, Connected Technologies

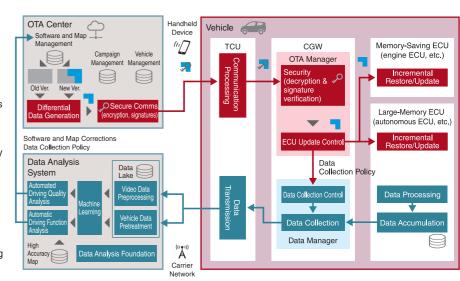


■ Over-the-Air (OTA) Technology to Update Control Software / Video and Vehicle Data Analytics Technology

The Hitachi Group leverages wireless OTA to develop various control software update technologies for automobiles, providing a system solution that includes OTA center distribution, automotive CGW and control ECUs. In addition, we analyze video and vehicle data collected from automobiles and provide solutions that will improve the function and quality of autonomous driving.

Key Technology Development

- Control Software Update by OTA
- · Incremental update technology to reduce software write and update time
- · Flexible update control technology that supports a variety of vehicle types and ECUs
- · Secure delivery technology to ensure security, from the OTA center to vehicles
- Video and Vehicle Data Analytics Technology · Flexibly collect data according to the
- analysis purpose · Synchronize video data with vehicle data
- and analyze the quality of autonomous
- · Improve autonomous driving function by analyzing vehicle travel trajectory and adding driving support information to map data



OTA: Over-the-Air CGW: Central Gateway ECU: Electronic Control Unit TCU: Telematics Control Unit

Software

We provide the specialized software and know-how required for each ECU to realize vehicle control. We develop technologies, design processes and environments that help provide reliability, and advance our software development.

■ Common Software Platforms and Automation Technologies

As software development increases in scale, ensuring the efficiency and quality of software development is becoming increasingly important. In response, we are streamlining development by building and using a common platforms, where products share common features. By applying automation technology in our development and verification, we are able to provide high-quality software.

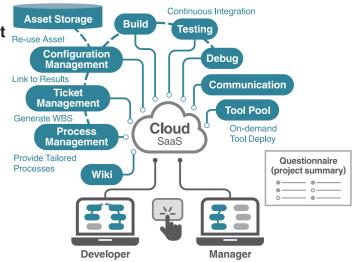
CI: Continuous Integration CT: Continuous Testing

Model-Based Application Common **Platform**

■ Cloud-Based Development Environment Re-use Asset **Enabling Global Collaboration**

In response to the need for a standardized global development process and environment, we have created a secure cloud-based development scheme that can be used from anywhere globally. We use this structure as a project environment and also provide our customers with access as a service.

WBS: Work Breakdown Structure SaaS: Software as a Service



Powertrain Systems

We create clean engine management systems with improved thermal efficiencies that reduce environmental impact, and electric powertrain systems with high environmental sustainability and driving performance.



■ Electric Powertrain Systems

We contribute to superior environmental performance with our compact, lightweight and highly efficient motors for electric vehicles, inverters with top-of-class output density and electronic control systems that precisely detect residual battery power for electric and hybrid vehicles optimizing control.











Battery Management System

■ Engine Management Systems

We are improving components and control technologies that optimize combustion, air intake, lubrication and thermal management to contribute to the realization of fuel-efficient and clean powertrains.

■ Control Systems



Engine Control Unit



Transmission Control Unit

■ Fuel Systems (Gasoline Engines)



High-Pressure Fuel Pump



Injector for Direct Injection

■ Intake / Exhaust Systems



Air Flow Sensor



Intake Pressure Control Valve



Electronic Control Throttle Body



Intake Manifold

■ Engine Components and Subsystems



Piston (Cooling Channel)



Valve Timing Control System



VTC Solenoid



Electromotive VTC



Multi-waterways Control Valve (MCV)



VCR Actuator



Variable Displacement Vane Pump (Chain Drive Type)



Balancer (VDVP Integrated Type)

■ Electrical Equipment Systems



Planetary Gear Reduction Starter

VTC: Valve Timing Control

VCR: Variable Compression Ratio

Plug Top Coil

Ignition Systems

VDVP: Variable Displacement Vane Pump

ű

Chassis Systems

In pursuit of improved safety and comfort, we develop integrated vehicle motion systems that include the latest electrification efforts in our brakes, steering, and suspension.

■ Suspension Systems

To respond to increasingly complex customer needs we are improving our dampers for enhanced responsiveness and reduced size. We are also increasing the sophistication and integration of our control systems, including the ECU and software to improve riding comfort and handling stability.



Suspension Strut



Mono Tube Shock Absorber



Frequency Reactive Damper



Semi-Active Suspension Systems

■ Steering Systems

To meet various needs, such as the increasing electrification of automobiles, our products provide high responsiveness and linearity, as well as a smooth steering feel. In addition, the use of fail-operational redundancy provides the safety that is increasingly in demand.



Electric Power Steering System (Belt Drive Rack Assist Type)



Electric Power Steering System (Dual Pinion Assist Type)



Manual Steering Gear for Column Assist EPS



Power Steering Pump (Variable Displacement Type)

■ Drivetrain Systems

We offer a wide range of products including compact, lightweight, and quiet differential gears, lightweight and high-rigidity CFRPs and aluminum propeller shafts, and propeller shafts with collision safety measures. Together these products contribute to improving the stability and driving performance.



CFRP Tube Type (Propeller Shaft)



Impact Absorbable CVJ Type (Propeller Shaft)



Differential Carrier Assembly



Differential Assembly

■ Brake Systems

We develop innovative, reliable braking solutions that support electrification and weight reduction, contributing to greater safety and fuel efficiency.



Automated Parking Brake Disc Type



Disc Brake



Automated Parking Brake Drum Type



Drum Brake



Electric Servo Brake



Aluminum Knuckle

CFRP: Carbon Fiber Reinforced Plastics

CVJ: Constant Velocity Joint

Motorcycle Systems

We are driving the evolution of motorcycles through advanced technologies and products.

This includes electronic fuel injection systems delivering high environmental performance, suspensions that improve steering stability and riding comfort, and brake systems that improve vehicle safety.



■ Powertrain Systems

Our electronic fuel injection systems, compatible with a wide range of engine displacements, meet emission regulations of countries around the world and contribute to reducing the environmental burden.

■ Small Motorcycles









ector

hrottle Body

Electronic Control Unit

Fuel Pump Module

Large Motorcycles







Electronic Control Throttle Body

Electronic Control Unit

Fuel Pump Module

■ Suspension Systems

Leveraging the feedback from our professional motorsports relationships and combined with our proprietary technology, we provide high-functionality, high-performance products—including electronically controlled variable force dampers, which achieve superior handling stability and riding comfort.







Single Tube-Type Rear Cushion



Electronically Equipped Ride Adjustment

■ Brake Systems

Our braking systems, including ABS, provide stable braking power and excellent operability in all driving situations, and improve overall safety and comfort.













Anti-lock Brake System (ABS)

Disk Brake Caliper

Brake Master Cylinder

Aftermarket / Power Products / Industrial Equipment

Leveraging our expertise and technologies in developing automobile and motorcycle products, we deliver superior products that improve comfort and performance. We provide custom products, replacement parts, general-purpose products, products for railcars as well as seismic control products for housing and industrial equipment.

■ Aftermarket Products, Maintenance Products Automotive Products Brake Pad Power Steering Gear Brake Rotor Shock Absorber Power Steering Pump Water Pump Fuel Pump Electronic Throttle Body **■** Motorcycle Products Brake Caliper (6 Pot) Ignition Coil Glow Plug Relay Rear Cushion Brake Caliper

Front Fork

■ Maintenance Products

Brake Pad



Hitachi Diagnostic Tool



Brake Master

Battery Checker



Carburetor

Portable Power Source



Brake Fluid for

Racing

■ Power Products



Electronic Control Unit for Outboard



Single Cylinder Power Tilt and Trim for Outboard



Double Action Power Tilt and Trim for Outboard



Integrated Power Tilt and Trim for Outboard



Electronic Motor-driven Carburetor for Power Products



Electronic Control Throttle Body for Power Products



O-rings Containing Carbon Nanotubes

■ Railcar Components/Industrial Equipment





Vertical Damper



Horizontal Damper



Yaw Damper



Yaw Damper Car-to-Car



Variable Damper System



Leveling Valve



Vibration-Proof Damper for Housing



Atsugi Hydraulic Press

Research & Development

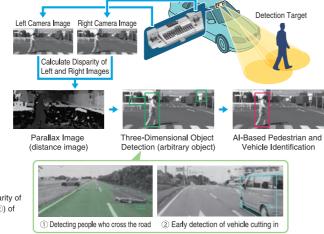
We develop the core technologies and advanced technologies that will define the future of mobility and contribute to realizing a sustainable society.

■ Sensing Technology Leading Evolution of Autonomous Driving and Advanced **Driver Assistance Systems**

To evolve autonomous driving and driving assistance functions, it is important to develop technologies for external sensing that recognize the driving environment. To provide reliable sensing of complex driving environments including the public roads, we are developing advanced technology that achieves both safety and security. This includes a stereo camera with a three-dimensional awareness of the driving environment, a sensor fusion function that stably detects an object in multiple sensors, and technology for in-vehicle equipment that incorporates AI for the massive amount of calculations required.

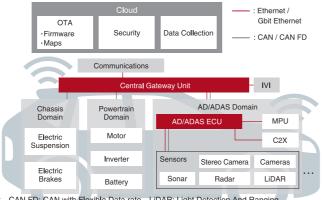
The measurement principle of stereo camera:

Two cameras placed side-by-side generate a parallax image from the disparity of the two images. The system then detects the stereoscopic object (1) and (2) of the arbitrary shape. Objects are identified through AI technology.



■ Vehicle Electronic Control Unit for Autonomous Driving Provides Both Safety and Comfort

We are developing automotive units for autonomous driving and connected cars that provide safety and comfort. The central gateway enables feature upgrades through the control software update function, which is connected to the communications center. It's also equipped with information security functions to protect vehicles from threats inside and outside the vehicle. The autonomous driving control unit, which is equipped with two CPUs for recognition and vehicle control, achieves high-precision vehicle integration control, with both safety and high-speed arithmetic performance conforming to ASIL-D functional safety standards.



ASIL: Automotive Safety Integrity Level C2X: Car-to-X CAN: Controller Area Network CAN FD: CAN with Flexible Data rate LiDAR: Light Detection And Ranging Ethernet is a registered trademark of the Fujifilm Business Innovation Corporation.

■ Compact and High-Power Electric Powertrain Components

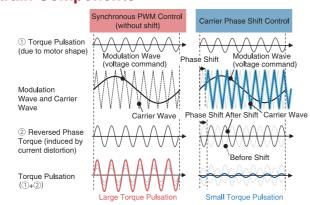
We develop small and high-power electric powertrain components to meet the diverse needs of electric vehicles. We realized a small inverter by implementing a double-sided, direct water cooling system that efficiently cools the power module. A 800V system is also available to reduce charging time. For motors, we are developing technology to reduce the size while maintaining output by improving vibration reduction control technology and the maximum rotational speed.



15

Power module with heat dissipation fins

on both sides

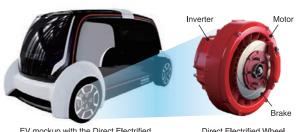


Motor Vibration Reduction Control Technology

The torque pulsation caused by the motor shape (1) can be canceled by the reversed phase torque from the current distortion (2).

■ In-Wheel Type Direct-Drive System for EVs (Co-Developed with Hitachi, Ltd.)

With EVs becoming more mainstream as society shifts towards de-carbonization, we have developed with Hitachi, Ltd. a small and lightweight direct-drive system for EVs. To address the weight issue inherent to in-wheel solutions, we achieved top-class power density by lightening the motor. In addition, even with a combined inverter and braking configuration, our in-wheel system doesn't require significant changes to existing components such as the suspension. Through our ongoing research towards making this a production reality, we will contribute to realizing an in-wheel EV that enables for greater interior room and battery space.



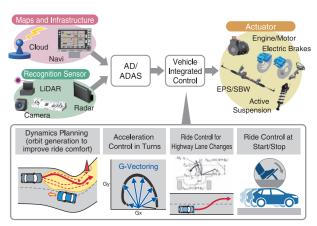
EV mockup with the Direct Electrified Wheel inside the wheel

Direct Electrified Wheel direct-drive system

■ Integrated Vehicle Control for Safe and Comfortable Driving

The chassis/powertrain devices that produce the fundamental vehicle movements of running, turning, and stopping play an important role in improving vehicle safety, especially with the continual progression towards electrification and autonomous driving. We integrated the control of these devices, controlling the rate of acceleration/deceleration through dynamics planning while detecting the optimal driving path. Whether the car is starting, stopping, or passing a car on the highway, the technology we're developing provides safety, comfort and peace of mind through its smoothness and balanced control.

SBW: Steer-By-Wire



■ Electric-Controlled Braking System for Motorcycles

The ABS system—which is an electric control braking system for motorcycles—is based on our four-wheeled vehicle technology. By greatly reducing weight and volume, we enhance its application potential, and it is combined with a control system optimized to the motion characteristics of two-wheeled vehicles. To elevate the safety of motorcycles, we have developed a one-channel system for smaller motorcycles that controls the front wheels, in addition to the two-channel system for large motorcycles that control both the front and rear wheels.

ABS: Anti-lock Brake System



■ Demonstration Tests for a Variety of Driving Environments

Through rigorous testing at our facilities, we aim to raise the bar on the responsiveness of road-going cars while advancing system development, and meet the diversified market needs through reliable products and systems.

Our Main Facilities







Sawa (Ibaraki)

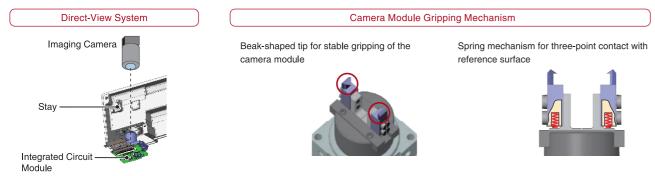
Shioya (Tochigi)

Monozukuri—Our Manufacturing Culture

We provide high-quality products that combine cutting-edge technologies such as IoT and AI with the skills of craft masters to customers all over the world.

■ Camera Module Automated Assembly Technology

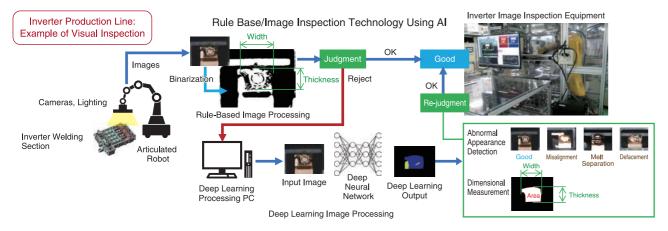
Since stereo cameras stereoscopically process the left and right images to recognize the external world, this requires the precision assembly of the two cameras. We developed the direct-view system for an optical axis/roll angle adjustment process to adjust the X/Y axis and roll angle of the camera. To ensure camera stability, we employed a spring mechanism with three points of contact on the reference surface.



■ High-Efficiency Production Using Deep Learning

(Used by motor and inverter production lines for visual inspection)

The process of joining precision parts demands a full inspection of the product appearance, in addition to monitoring the process conditions. A false alarm rate (the rate an acceptable product is judged to be defective) is used to prevent the release of defective parts. We are now promoting activities to utilize deep learning to improve this rate to one percent or less. For existing lines, we are working on hybridization with existing rule-based image inspection, as in the case of inverters.



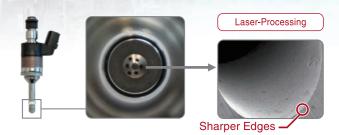
■ Batch Assembly Method in the Manufacturing Process

We employ a batch-assembly method powered by the latest technology to manufacture intelligent power modules, which reduces numerous steps for highly streamlined manufacturing.



■ Adopting a Laser-Processing Method in Next-Generation Products

Conventional products use electrical discharge machining to bore injection nozzles, but our next-generation injectors use a high-precision laser-processing method that results in sharper edges and smoother surfaces. It also reduces production time by 82 percent.



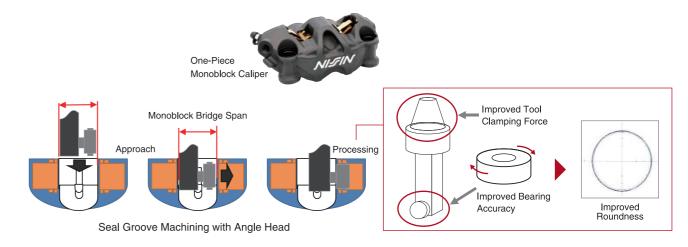
■ Evolution of Product Transfer Technology in Suspension Assembly Lines

As the number of vehicles expand, the number of suspension specifications follows suit. In response to these changes we have introduced our own product transfer equipment, which eliminates the need for special jigs and setups—enabling us to have a flexible system to quickly adjust to market specialization.



■ Processing Technology to Improve Performance of Motorcycle Disc Brake Calipers

The world's smallest monoblock bridge span is made using a special tool that suppresses vibrations during the complex and high-precision cutting of the piston cylinder holes and seal grooves. This technology processes the monoblock calipers as one piece and does not use fastening bolts, thereby meeting the need for smaller, lighter and more rigid brakes.



Global Network

H Headquarters D R&D/Design P Manufacturing S Sales

A global network ready to address the needs of our global customer base.



Network in Japan

Creating new value with our deep and broad expertise.



Hitachi Astemo, Ltd. H S Headquarters (Chiyoda-ku, Tokyo) Tokachi Branch (Obihiro-shi, Hokkaido) Akita Plant (Yokote-shi, Akita) D P Miyagi Site (Kakuda-shi, Miyagi) D S Miyagi No. 1 Plant (Kakuda-shi, Miyagi) Miyagi No. 2 Plant (Marumori-machi, Igu-gun, Miyagi) Miyagi No. 3 Plant (Kakuda-shi, Miyagi) Miyagi No. 4 Plant (Shibata-gun, Murata-machi, Miyagi) Miyagi No. 5 Plant (Kakuda-shi, Miyagi) Fukushima Plant (Koori-machi, Date-gun, Fukushima) DP Sawa Plant (Hitachinaka-shi, Ibaraki) D P Tochigi Site (Takanezawa-machi, Shioya-gun, Tochigi) DS Haga Site (Haga-gun, Tochigi) Nasukarasuyama Site (Nasukarasuyama-shi, Tochigi) D Shioya Branch (Shioya-machi Shioya-gun, Tochigi) D Gunma No. 1 Plant (Isesaki-shi, Gunma) DP Gunma No. 2 Plant (Isesaki-shi, Gunma) Sayama Plant (Sayama-shi, Saitama) Saitama No. 1 Plant (Gyoda-shi, Saitama) D P S Saitama No. 2 Plant (Namegawa-machi, Hiki-gun, Saitama) DP Shinonome Site (Koto-ku, Tokyo) S Daiba Site (Koto-ku, Tokyo) Yokohama Site (Yokohama-shi, Kanagawa) D S Atsugi No. 1 Plant (Atsugi-shi, Kanagawa) DPS Atsugi No. 2 Plant (Atsugi-shi, Kanagawa) Hadano Plant (Hadano-shi, Kanagawa) Niigata Plant (Tainai-shi, Niigata) Joetsu Plant (Joetsu-shi, Niigata) Yamanashi No. 1 Plant (Minami-Alps-shi, Yamanashi) DP Yamanashi No. 2 Plant (Minami-Alps-shi, Yamanashi) DP Tomi Plant (Tomi-shi, Nagano) D P S Yaehara Plant (Tomi-shi, Nagano) Gotemba No. 1 Plant (Gotemba-shi, Shizuoka) Gotemba No. 2 Plant (Gotemba-shi, Shizuoka) Fukuroi Plant (Fukuroi-shi, Shizuoka) D P S Suzuka Plant (Suzuka-shi, Mie) P S

Kyushu Plant (Koge-cho, Chikujo-gun, Fukuoka)

Sales Offices S

D R&D/Design

Headquarters

Ota Branch (Ota-shi, Gunma)
Asaka Branch (Asaka-shi, Saitama)
Mitaka Branch (Musashino-shi, Tokyo)
Hamamatsu Branch (Hamamatsu-shi, Shizuoka)
Nagoya Branch (Nagoya-shi, Aichi)
Kansai Branch (Osaka-shi, Osaka)
Hiroshima Branch (Hiroshima-shi, Hiroshima)
Kumamoto Branch (Ozu-machi, Kikuchi-gun, Kumamoto)

P Manufacturing

S Sales

Group Companies in Japan Hitachi Astemo Aftermarket Japan, Ltd. S

Hitachi Astemo Electric Motor Systems, Ltd. D P S Hitachi Astemo Hanshin, Ltd. DPS Hitachi Astemo High Cast, Ltd. P S Hitachi Astemo Business Solutions, Ltd. S Hitachi Astemo Akita Misato, Ltd. P Hitachi Astemo & Nagano, Ltd. S Hitachi Astemo Atsugi Brake Systems, Ltd. D S Hitachi Astemo Watari, Ltd. P Hitachi Astemo Nasu, Ltd. P Hitachi Astemo Sendai, Ltd. D Hitachi Astemo Valve, Ltd. DPS Hitachi Astemo Uki, Ltd. P Hitachi Astemo Seiko, Ltd. P Hitachi Astemo Ueda, Ltd. DP S Hitachi Astemo Sanada, Ltd. P Ishii Corporation Co., Ltd. DPS

(As of June 30th, 2022)

Sustainability

We are committed to addressing societies' fundamental issues and contributing to the realization of a sustainable society.









■ Environmental Activities

As a leading provider of mobility solutions to the automobile and motorcycle industries, it is our mission to contribute to the realization of a sustainable, decarbonized society. We will continue to grow the number of our products that help reduce environmental impact, promote energy conservation and the use of renewable energy.

Targets by 2030

Achieve carbon neutrality in production lines
Reduce CO₂ emissions through advanced technologies

- Carbon Neutrality in Factories
- Improve production efficiency, including optimization of manufacturing sites
- Retrofit and renew equipment for energy savings
- Reduction of CO₂ through the use of renewable energy and LED lighting

Solar power facilities for manufacturing sites





Sawa, Japan

Chonburi, Thailand

- Reduction of CO₂ Emissions Through Advanced Mobility Technology
- Provide highly efficient electrification components
- Contribute to improved fuel economy
 Engine management technology
 Fuel economy improvement through AD/ADAS
 Weight reduction of chassis components









Motors

Inveters

■ Corporate Governance

We have established the Governance Office, led by the Chief Governance Officer and reporting directly to top management, to maintain strong governance across the company.

Enhancing Risk Management

We mitigate foreseeable risks and seek to minimize damage of incidents that do occur.

Maintaining the trust of stakeholders with a robust risk management structure









■ Relationship with Society

Local Greening Activities
 We endeavor to leave a rich green environment for the future.

Preserving ecosystems







Tree planting

Abrantes, Portugal

 Support for Developing the Next-Generation of Engineers

We provide products to teams participating in Formula Student activities and experience-oriented courses for children, striving to raise the engineers who are responsible for our future.



Kid Engine

■ People

global leader.

- Diversity, Equity & Inclusion: Improving the Company's Ability to Solve Issues to Ensure Sustainable Growth

 For Hitachi Astemo, Diversity, Equity & Inclusion means leveraging diverse perspectives across different nationalities, cultures, genders, ages, orientations, religions and lifestyles. By building on each employee's unique way of thinking, the company unlocks its full potential to become a
- Let us be aware of the biases and habits we unconsciously hold by challenging our decision-making and working beyond our comfort zone.
- Collaborating globally and being mindful of our communication.
- Staying transparent by helping to create an open work environment where people feel valued and empowered to innovate.



Sports Sponsorships

Through our racing sponsorships we improve the technology of our products and promote motorsports. We also support athletic sports, and promote the Hitachi Astemo Rivale volleyball team



Astemo

www.hitachiastemo.com