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Sumitomo Electric Group Magazine

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Innovative Development,
Imagination for the Dream,
Identity & Diversity



Feature

The Future Created with CASE

Automobiles and the Society
Envisioned by Sumitomo Electric



CASE, an acronym for Connected, Autonomous, Shared & Services, and Electric, is the keyword of the revolutionary trend of changing what the automobile should be, or its concept, with the aim of restructuring the automobile society through powertrain innovation (power source), ecology (environmental protection), safety and security, and intelligence (information). The auto industry has been undergoing a once-in-a-century paradigm shift. Achieving CASE, which will shape the future of the automobile society, will trigger drastic changes not only in cars but also in lifestyles and across society in general. Automakers together with different industries are making efforts to create new mobility services around the world.

The Sumitomo Electric Group seeks to provide new value to society, setting the wiring harness as a core focus and capitalizing on its globally consistent manufacturing capabilities and high-quality technical and skilled personnel. Now the Group is taking on new challenges in the advent of the CASE era. In this article, four key people present the CASE strategy with a focus on mobility.

Once-In-A-Century Automotive Revolution

CASE, Shaping a New Future of Cars

Meeting the Needs of the Automotive Revolution

Transformation from a Supplier to a Partner

Wiring harness, the core business of mobility

The Sumitomo Electric Group has set the wiring harness as a core business in the mobility area. The wiring harness is a collective component that bundles multiple electrical wires for in-vehicle power supply and signal transmission purposes. It is akin to the blood vessels or the nervous system in a human body, and serves as the lifeline of an automobile. The wiring harness business has shown aggressive development since 2000. How will Mitsuo Nishida—who has engaged in the automotive business, including that of the wiring harness, for about 40 years—face this new era where CASE is promoted around the world?

“We have established three principles of action for the wiring harness business: Professionalism, Teamwork, and Challenge. Among these, I believe that Professionalism is particularly important and that PROin Professionalism stands for the three factors of Profit, Reliability, and Originality. Profit doesn't mean what is good will sell, but rather, what sells is good. Originality means 'Be a craftsman.' I think Reliability is most important, and have strived to ensure this. The Analects of Confucius say 'Without trust, we cannot obtain a foothold.' I think that the same applies in business. I have focused on establishing Reliability, such as trust relationships with stakeholders, manufacturing without cutting corners, and unrivaled technology in the wiring harness field. This will not change in the CASE era,” said Nishida.

Connecting partners will expand the Connected business

We set a vision for the wiring harness business in 2000. At first, the vision was to achieve the world's top market share. But after achieving the top share, we aimed to become a mega-supplier, setting the wiring harness as the core of our business.

“We have been a supplier thus far. We have supplied our products as a Tier 1 automotive supplier (prime contractor). We have manufactured products as an auto parts maker, emphasizing costs, quality, and delivery. However, we are facing a drastic paradigm shift in the CASE era.

To put it simply, automakers request that we consider how cars will change from now on from the viewpoint of an auto parts maker. To help shape a better future of the automobile society, they seek our cooperation and collaboration with them. Under these circumstances, we have set the aim of expanding the Connected business as a Connecting partner in mobility as a new vision in the wiring harness business. Transitioning from a supplier into a partner is a major change that CASE has brought about,” said Nishida.

To transition from a supplier into a partner, we must change our mindset. Furthermore, we must obtain a bird's-eye viewpoint, new knowledge, and skills to see the big picture of cars. The mobility business of the Sumitomo Electric Group has entered a new phase.

Started the CAS-EV Development Promotion Div. to become a partner

“Technology proposal capabilities are essential to becoming a partner of automakers. First, we started the predecessor organization, the CAS-EV Development Promotion Office, to improve and cultivate such capabilities. I requested staff members to thoroughly discuss how cars will change and what auto parts will be required. Since this is a for-profit business, we have to obtain a high evaluation of our proposal from automakers. Recently, the CAS-EV Development Promotion Division has gradually been producing favorable results, and I want to accelerate these activities. In addition, since we have many auto-related sections in our company, we will integrate them and launch new businesses under the initiative of the Automotive Business Unit,” said Nishida.

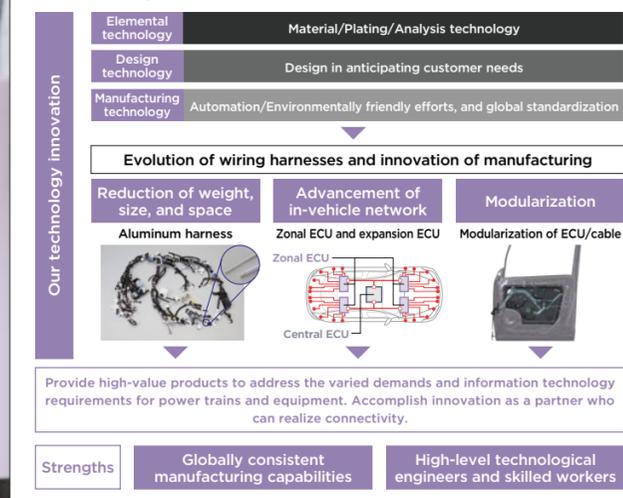
While focusing on CASE, Nishida points out that turning steady profits from existing products is important. The wiring harness, which is the lifeline of a car, will not be abandoned unless the structure of the automobile drastically changes.

“Although the CASE trends are developing, high demand for existing products will continue at least until 2030. In detail, we expect that sales of existing products will account for about 80% of sales in the mobility business in 2030, and CASE-related

Mitsuo Nishida

Representative Director and Executive Vice President
General Manager,
Automotive Business Unit

Business Domains and Our Strengths (Excerpt from 2030 Vision)



Challenges Toward 2030 (Excerpt from 2030 VISION)

	Electrification	Existing products	High-speed communications
Wiring harness	<ul style="list-style-type: none"> High-voltage harness, battery harness Bus bar module 	<ul style="list-style-type: none"> Low-voltage harness Aluminum harness 	<ul style="list-style-type: none"> High-speed communications harness Optical harness
Electric wire	<ul style="list-style-type: none"> High-voltage magnet wire for motor Leads for pouch Li-ion battery Module for interconnection in battery 	<ul style="list-style-type: none"> Magnet wire Metal materials for spark plug electrodes 	<ul style="list-style-type: none"> High-frequency FPC
Connector/terminal	<ul style="list-style-type: none"> High-current connector High-voltage JB 	<ul style="list-style-type: none"> Connector Junction box (JB) 	<ul style="list-style-type: none"> High-speed communications connector
ECU·G/W		<ul style="list-style-type: none"> ECU/Gateway (G/W) 	<ul style="list-style-type: none"> Zonal ECU
Semi conductor/device	<ul style="list-style-type: none"> SiC power device 		
Functional material	<ul style="list-style-type: none"> Steel cords for EV tires Sinter brazed parts (for E-Axis) Oil pump rotors (for motor cooling) Porous metal 	<ul style="list-style-type: none"> Steel cords Sinter brazed parts (for AT/CVT) Oil pump rotors (for lubrication of engine) Steel wires for springs Engine components 	<ul style="list-style-type: none"> Sintered ZnS lenses
Resin, rubber products, sensor, etc.	<ul style="list-style-type: none"> Cooling hoses Motor mounts High heat insulation material for battery Cross-linked fluororesin 	<ul style="list-style-type: none"> Hose for vehicles Anti-vibration rubber Heat shrink/resistant tubing 	<ul style="list-style-type: none"> Steering touch sensor Driver monitoring system
Infrastructure collaboration	<ul style="list-style-type: none"> Charging connector/inlet Rechargeable battery 	<ul style="list-style-type: none"> Traffic control system 	<ul style="list-style-type: none"> Expansion unit

products for 20%. We have determined to develop CASE-related products while earning steady profits from existing products as a group of professionals in the wiring harness field. Therefore, strengthening the wiring harness business is also a major challenge from the viewpoint of the whole mobility business. Recently, our group has been seriously damaged by the COVID-19 pandemic, the global semiconductor shortage, and the Russian invasion of Ukraine. We must attain flexibility and strength to address such various risks,” said Nishida.

Nishida has a strong attachment to the wiring harness. Currently, the wiring harness is produced in about 30 countries worldwide, and 2% of the total is produced at eight plants in Japan. Technical innovation, such as automation, is promoted at those plants.

“The plants in Japan have a mother function. As wiring harness manufacturing hubs, they support technical development and provide skill training and instruction. Manufacturing operations based on strong worksites are an aspect of Japanese culture we can rightly be proud of. Passing on Japanese manufacturing know-how is one of our missions,” said Nishida.

Mobility × Energy × Communication = Connected Society

Impact of CASE and the Goal of CAS-EV

Armed with the Sumitomo Electric Group's integrated power

The Sumitomo Electric Group does not think that addressing the CASE era is limited to developing and supplying new products requested by automakers. Using the Group's integrated power, it aims to build a new future city or Connected Society, which means a connectable society for everyone, at any time, anywhere. For example, in "creating new social infrastructure with technology integrating mobility and energy," "achieving liberated, safer, and more comfortable transportation with technology connecting people, cars, things, and society," and "permeating energy sharing throughout society with technology connecting cars, houses, and communities," the advent of CASE may well be a trigger for demonstrating the Sumitomo Electric Group's integrated power. Masataka Inoue, Deputy General Manager of the Automotive Business Unit, described the change as "normal evolution."

"While the advent of CASE is destroying the existing business program and bringing about drastic changes, I think Sumitomo Electric will seamlessly undergo normal evolution. In the 400-year history, Sumitomo has expanded its business catering to social changes and requirements. To accommodate the CASE-oriented changes in the global auto industry, Sumitomo Electric will operate its business, considering how to support communities. While facing difficulties in using traditional methods effectively, we want to overcome the barrier and produce results worthy of recognition by the market and customers. To address the new changes brought about by CASE, we have to gather the courage to enter into a new phase. The



Masataka Inoue

Executive Officer
Deputy General Manager,
Automotive Business Unit

forecasting viewpoints, or envisioning the future based on past results and current issues, have been effective, but from now on, backcasting thinking, or envisioning what future should be and deciding what should be done now in a backward-looking manner, is necessary. We have accumulated knowledge of electric cables and communication cables for a long time. High-speed communications that achieve 'Connected' in CASE and electrification in the 'Electric' area are our Group's strengths. In addition, our Group has a variety of elemental technologies. We are proud that only our Group has sintering, winding wire, various devices, information communications, and other elemental technologies that CASE requires, and I think we can exploit our full potential in CASE. In doing so, we must create new value by matching needs with seeds. We aim at producing high-value-added future wiring harnesses with new methods in our core business of wiring harnesses," said Inoue.

Establish a position of a partner

The vision Inoue talked about is being implemented by the CAS-EV Development Promotion Division, which is led by General Manager Hiroki Hirai. He has been involved in CASE since the predecessor organization of the CAS-EV Development Promotion Division, the CAS-EV Development Promotion Office, was established.

"Before CASE, the products we manufactured were based on drawings we received from automakers. However, the advent of CASE has completely changed the circumstances surrounding us. We have been requested to create new value of cars together with automakers. This means that we are no longer a Tier 1

automotive supplier and have become a so-called Tier 0.5 supplier. We need in-depth discussion on the value of cars, that is to say, requirements for cars, from a broad and bird's eye viewpoint," said Hirai.

To consider the value of cars, we must examine not only the car itself but also the surrounding infrastructure. This inevitably leads to a study of the whole society. One thing we have to pay attention to is that the efforts of the Sumitomo Electric Group are not aimed at the development and production of CASE-compatible products from the beginning. The starting point is to consider what is needed to improve the value of cars and create new value. Therefore, the Group had to drastically change the traditional way it had done business. CASE was a trigger to establishing ourselves in the position of a partner with automakers. Hirai thought, "we have to change our mindset." The symbol of our mindset changes was the manufacture of an EV (electric vehicle).

Necessity of changing mindsets with a car-centric viewpoint

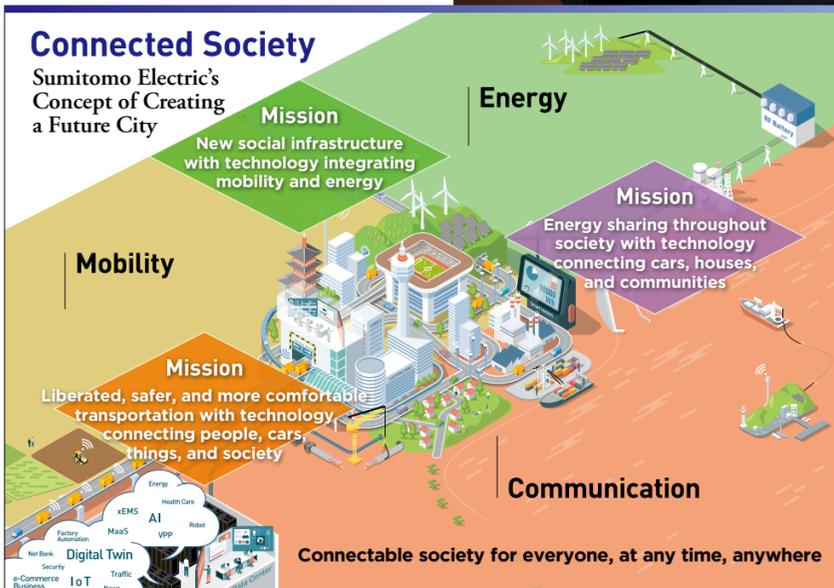
"To solve the problems and issues of automakers in the CASE era, we have to have a car-centric viewpoint. Since we had only a wiring-harness-centric viewpoint at that time, I called on our members to manufacture a whole vehicle. I thought that we could obtain a car-centric viewpoint through the work, which would lead to detailed

proposals that help improve the value of cars," said Hirai.

Hirai and the vehicle-manufacturing members bought an old Volkswagen bus and started remodeling it into an EV. They aimed at manufacturing an EV as easily as possible. They developed a concept of a basic EV platform with a motor and an inverter, battery packs, and a chassis. Then they designed, assembled, and evaluated the EV by themselves. Receiving support from an overseas engineering manufacturer, they completed the EV in about two years and test-drove it on a driving circuit.

"Thinking about cars from the viewpoint of cars has become their habit. I created opportunities for automakers to examine the EV. The fact that we manufactured a vehicle made a huge impact, increasing discussions with automakers in the upstream layer," said Hirai.

They opened the NEV showroom, where they invite automakers' workers to engage in discussion. Although this is a showroom for CASE-related products, Hirai says that it is a training center focused on discussion. Members are trained there to become partners for development. More than 700 workers of automakers have already participated in intensive discussions with members, who have learned a lot in the course of the process and experienced steady growth.



code of conduct for the CAS-EV Development Promotion Division includes facing challenges with a sense of ownership in this era of great transformation. Positive self-denying efforts will promote the growth of the CAS-EV Development Promotion Division and produce favorable results," said Inoue.

Strengths in electrification, high-speed communication, and elemental technology

What are the strengths of the Sumitomo Electric Group in the CASE era?
"We have to clarify use cases that show how cars will be used and what is required of cars. Until now,



VW bus electrified by CAS-EV Development Promotion Div.



Hiroki Hirai

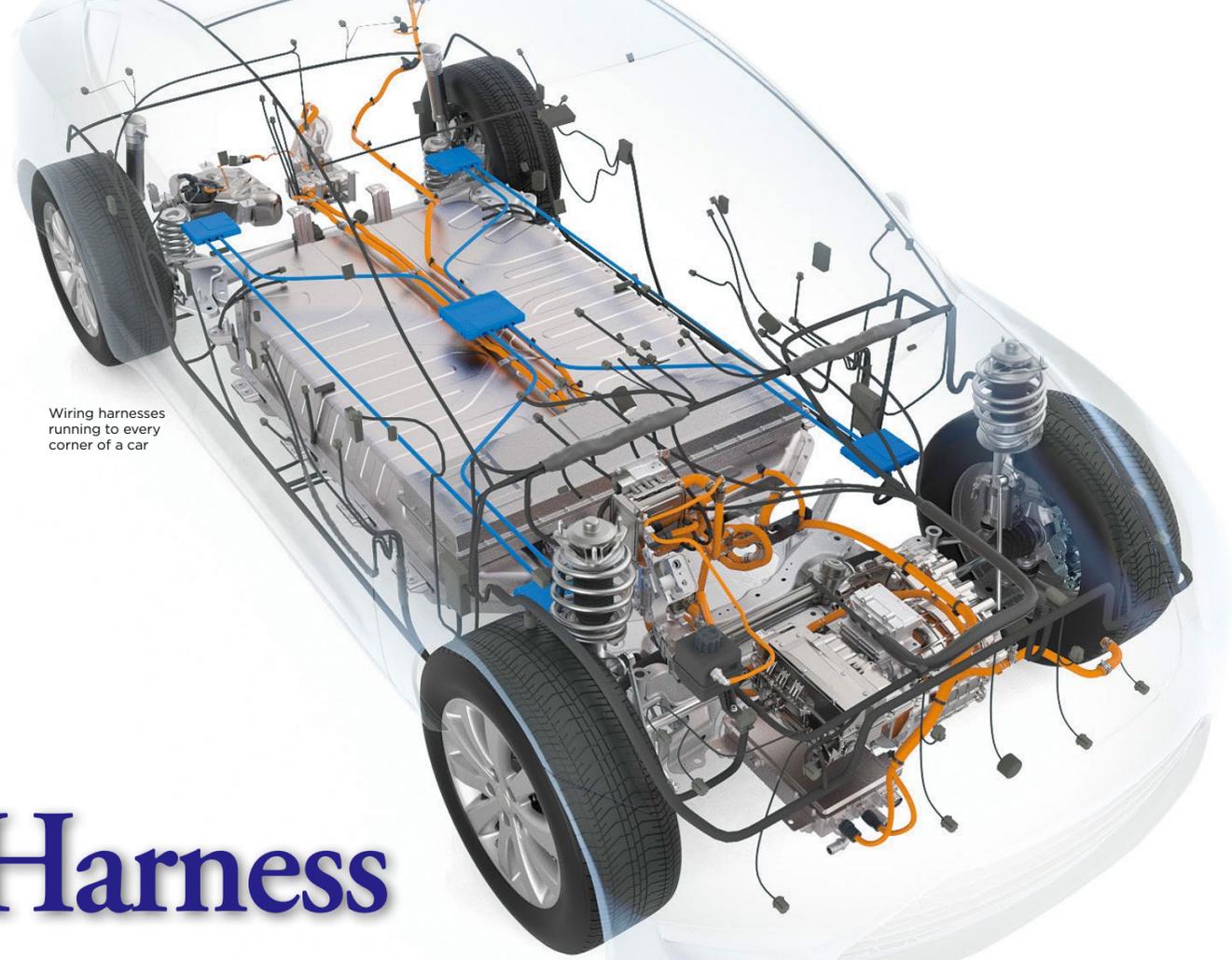
General Manager,
CAS-EV Development
Promotion Div.



Kenichi Urushibata
 President and CEO
 Sumitomo Wiring Systems, Ltd.
 Deputy General Manager
 Automotive Business Unit
 Sumitomo Electric Industries, Ltd.

Mission of Wiring Harness

in the CASE Era



Wiring harnesses running to every corner of a car

Commitment to Manufacturing, Changes in Manufacturing

Wiring harness required in the CASE era

Sumitomo Wiring Systems, Ltd. (Sumitomo Wiring Systems) develops and manufactures the wiring harness, which is the core business in the mobility area of the Sumitomo Electric Group. The most distinctive feature of

wiring harnesses is the fact that they are mostly handmade, labor-intensive products. Sumitomo Wiring Systems has production sites in about 30 countries around the world, with approximately 230,000 employees in total. Product quality hinges upon individual employee's technical expertise and skills. This means that the quality may vary depending on the region and the personnel involved. The Sumitomo Electric Group started addressing the challenges at an early stage. The Group aimed to achieve a globally common best quality and practiced Pika Pika (brilliant) manufacturing through Pika

Pika Activity (brilliant mind, actions, skills, equipment, and worksites) unique to Sumitomo Wiring Systems. As a result, its high reliability has been recognized by automakers around the world, which served as a driving force to achieve the world's top market share. "Evolution of the wiring harness is required in the CASE era. To respond to requests for vehicle weight reduction, we developed the aluminum wiring harness several years ago. Aluminum wires have helped reduce the total vehicle weight by about 12% and improve fuel efficiency, contributing to the reduction of CO2 emissions. We will also provide products that meet the needs of the CASE era for society," said Kenichi Urushibata, President and Chief Executive Officer of Sumitomo Wiring Systems. As Urushibata pointed out, the trends of CASE have opened a new phase of the wiring harness. For example, since EVs require a high current, enlargement of the diameter of cables, which consist of several thousand elemental wires arranged in a complex manner, is inevitable. Cables with longer service life and higher

reliability are required to avoid disconnection and other defects. In addition, achieving "Connected" requires higher-frequency signals to enable higher-speed and larger-capacity communications. The key is connectors. The connector shape must be optimal to ensure smooth high-frequency signal throughput. Thus, the impact of CASE on the wiring harness is not small.

Manufacturing turns the corner to a new business model

Urushibata also indicated that the manufacture of wiring harness is reaching a critical turning point. "Conventional business models are no longer valid due to the influence of the global semiconductor shortage and the COVID-19 pandemic. As one of the measures to break through the difficulties, we aim at local production

for local consumption. Wire harnesses used in the U.S. should not be produced in ASEAN countries but in North America. However, we had a big problem. Since wiring harnesses are mostly handmade, the quality depends on the individual employees' skills," said Urushibata.

They have ensured globally common best quality by improving employees' skills and knowledge in each region through steady efforts to improve skills, such as Pika Pika activity. That is because automated manufacturing of wiring harness was supposed to be impossible. However, the development group has started efforts toward automation to solve the problem. One of the outcomes is the set operation, which automatically sets cutting and crimping wires. The lead time for set operation is 2 hours, a significant reduction compared to 1.5 days for manual operation. Furthermore, they have achieved revolutionary automation.

"We implemented assembly automation using e-STEALTH W/H*. In addition, we aim at high-variety production with smaller part numbers by integrating e-STEALTH W/H* with a process that automatically assembles downsized harnesses, and changing the shape of the harness. Although the automation is now limited to specific areas, we will address local production for local consumption and preparation of a business continuity plan through these efforts and commonality of facilities

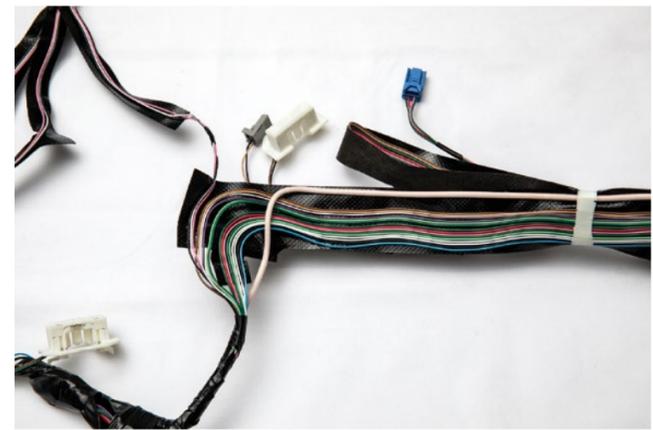
to establish a new paradigm in manufacturing," said Urushibata. The Sumitomo Electric Group is casting an eye on manufacturing in the CASE era.

Changing manufacturing worksites through DX promotion

DX promotion has the potential to drastically change the business model. "First, we will digitize design work. To reduce lead time, we have relied on individual know-how and skills; however, digitization is essential to radically reduce lead time. Making full use of tools, such as 3D CAD and VR, we will promote digitization. I want to digitize all of our design work in the 2030s. Vietnam is one of the countries that have produced excellent results in manufacturing. We are also trying to use AI for analyzing work and data to design the optimal worksite layout, allowing employees around the world to learn the best practice. Production management is more important. We will reduce waste and improve efficiency by centrally managing and visualizing the processes of order taking, production, storage, and delivery. These efforts will help change our conventional business scheme and make our corporate structure more sustainable, and are part of our efforts to keep up with manufacturing in the CASE era," said Urushibata. The wiring harness business of the Sumitomo Electric Group will maintain the top market share, fulfill the supplier's responsibilities, and continue to create high added value using technical and manufacturing expertise that is becoming the de facto standard in the CASE era.



Production lines of wiring harness (SDP plant in Paraguay)



e-STEALTH W/H

Development organization that focuses on a project

The principles of the CAS-EV Development Promotion Division (CAS-EV) for CASE are to integrate the Environment and Energy business and the Infocommunications business with the Automotive business, and to create new products and technologies for connecting cars with energy and communications infrastructure. They will expand their business in the Electrification and Energy area and the Connected and Info-communications area, the strengths of the Sumitomo Electric Group. Specifically, they will produce future wiring harness-related products on the basis of the core

business of the wiring harness. This is because they have a project-based organization structure. CAS-EV has several sections, but does not use a vertically divided structure to work on CASE. They first examine areas of CASE from the upstream layer, such as infrastructure, then classify issues into architecture, Autonomous (driving), Electric (electrification), MaaS,* Connected, and other CASE-related areas, and finally start development in specific projects. Major on-going projects include high-speed communications, vehicle structure, battery-related, architecture, and infrastructure projects. The following are the results and products produced by these projects.

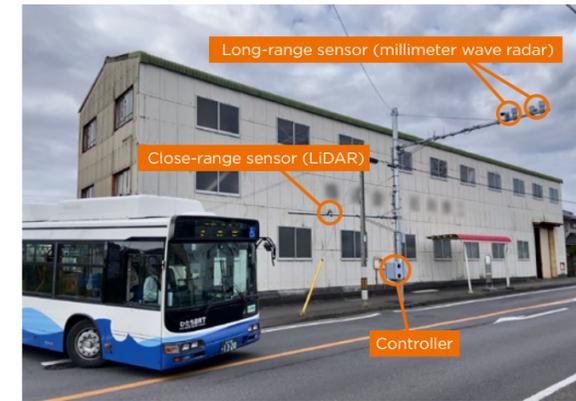
Achieving high-speed and large-capacity communications essential to autonomous driving

“Connected” in CASE refers to “connected cars.” Various kinds of data, including the vehicle conditions and road conditions around the vehicle, are obtained from sensors, and are accumulated and analyzed through networks. When advancement of “Connected” is achieved and safety is secured, “Autonomous” or fully autonomous driving will be realized. CAS-EV has been committed to high-speed and large-capacity communications to realize autonomous driving with connected cars. They have verified all the requirements for high-

current and high-speed communications connectors and high-speed communications harness to realize “Connected,” which enables autonomous driving level 3. Autonomous driving level 3 is a driving mode where the system is in charge of all driving operations under certain conditions and the driver intervenes in an emergency. (Level 5 is fully autonomous driving.) A high-speed wiring harness/100 M ethernet, a wiring harness compatible with level 3, is supplied to automakers for implementation. In addition, they joined a demonstration project introducing autonomous driving buses in Hitachi City, Ibaraki Prefecture, as part of efforts to achieve “connected cars” communicating with the outside. They

installed road-side sensors and vehicle-to-road communication devices cooperating with vehicles to explore issues relating to autonomous driving buses running on specified roads. In the future, many cameras and detection sensors of other surrounding objects will be installed on vehicles, in-vehicle communication speed will be further enhanced, and eventually conventional electronic communications must be replaced with optical communications and an optical harness. Through high-speed, large-capacity communications, they aim to realize connected cars communicating with devices inside and outside the vehicle.

* MaaS is an abbreviation for Mobility as a Service, and means the next-generation transportation service that incorporates existing transportation modes and services with various technological solutions, such as automated driving and AI.



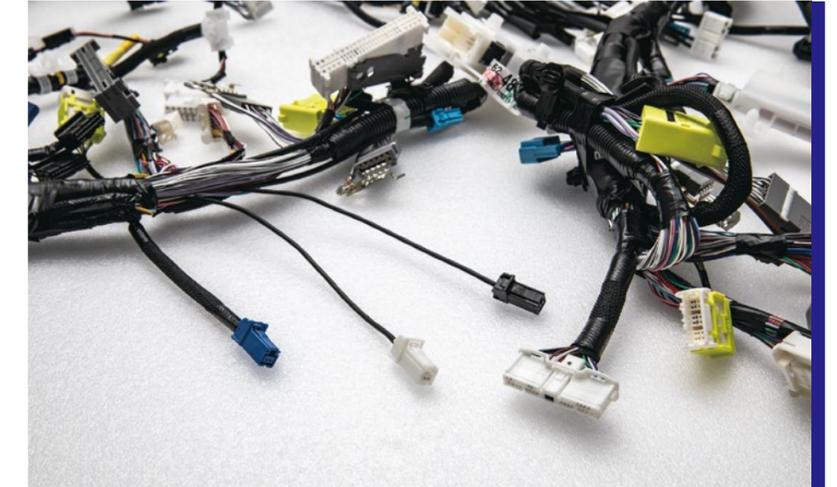
Field trial for an autonomous driving bus in Hitachi City

Great Challenges Toward Improving Automotive Value and Creating New Value CASE-Related Products Using the Group’s Integrated Power

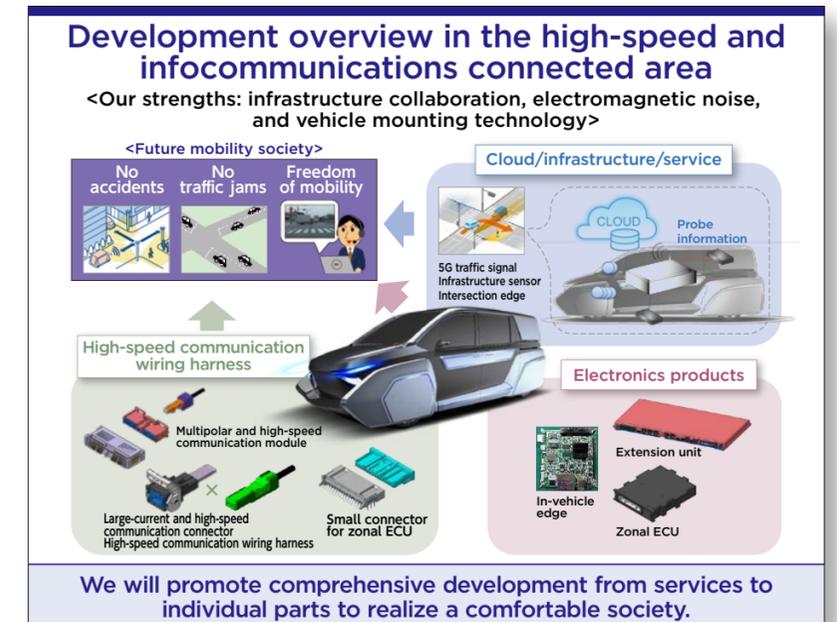


General Manager Hirai and members of the CAS-EV Development Promotion Div.

Research and development in the CAS-EV Development Promotion Div.



Connectors for a high-speed communication wiring harness



Great Challenges Toward Improving Automotive Value and Creating New Value

CASE-Related Products Using the Group's Integrated Power



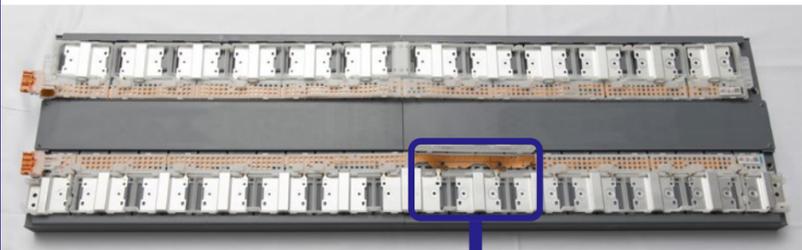
Inside of the electrified VW bus (miniature)

Battery pack and e-Axle for EVs



Battery bus bar module (BBM)

Batteries incorporated into EVs comprise a group of laminated and connected single-unit batteries called "cells," which are sufficiently powerful to generate power for driving. The bus bar module is used to connect the electrodes of the cells and the voltage detection circuit. This is an essential part allowing the flow of a large current, and affects charging and discharging efficiency. CAS-EV has contributed to low-resistance connection between the electrodes and the bus bar, and a space-saving design.



Adopted FPC (orange part)

Since more cells are used to increase the capacity over a longer range, parts in a pack are required to save more space. To solve the issue, FPCs (flexible printed circuits) are adopted. FPCs, which allow wiring to be denser and thinner than electric wire, contribute to reducing the thickness of battery packs.

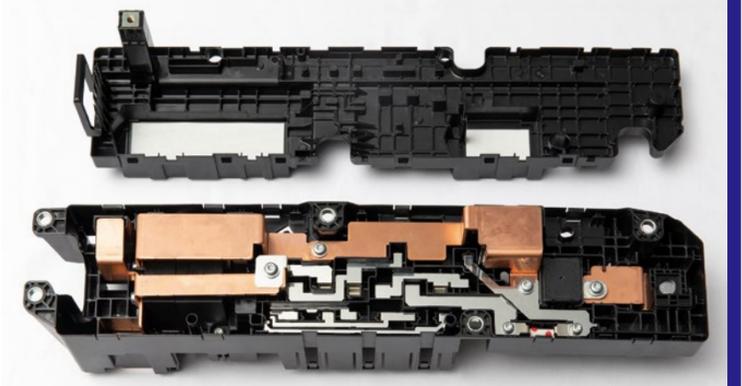


High-voltage connector

Waterproof and electromagnetically shielded connectors suitable for high-voltage wiring used in EVs, HEVs, and FCVs. They are used for electrical connections between inverters, motors, and batteries.

High-voltage junction box (JB)

Equipped with circuit protection devices, such as relays and fuses, JB centrally connects electric circuits in battery packs. With a function that trips circuit breakers when an abnormality is detected, JB plays an important role in securing high-voltage safety. In addition, a technique to dissipate heat from complicated circuits is required.



End-to-end electrification from infrastructure to batteries/motors

Electric (electrification), an aspect of CASE, is an area where the Sumitomo Electric Group has competence, and CAS-EV has been developing many parts in the area. First, it addressed the increase in capacity of batteries installed in EVs. A high-voltage battery pack integrates a battery with an electronic control unit (ECU) that regulates a high voltage of approximately 400 V, a sensor that measures the voltage, and a wiring harness that connects them to achieve weight reduction, high durability, safety, and cost efficiency in EVs. The ultimate aim is to produce housing-free, vehicle-integrated battery packs. Another result of CAS-EV is a high-voltage junction box, which connects more complicated electric circuits of a battery pack.

Electric power is controlled by an inverter to drive a motor, which rotates tires through the use of gears. The powertrain is integrated into an e-Axle, which has great advantages of reduced size, weight, and cost. Rectangular magnet wire improves motor driving efficiency, a powder magnetic core contributes to downsizing, and a bus ring simplifies wiring operations. Around an inverter, a reactor maintains a constant current, and a terminal block eliminates the effects of generated noise on circuits. CAS-EV have been developing harnesses for sensors, terminal modules, and other various parts and devices essential to an e-Axle.

Other efforts are focused on building charging infrastructure and developing product technologies specific to EVs, including high-power charging connectors and inlets to reduce charging time, energy management systems to efficiently supply electricity to power grids and households, and battery reuse to pursue sustainability. Thus, CAS-EV have actively promoted the development and sales of products for electrification.

Driving the times with the integrated capabilities of the Group

It has been about two-and-a-half years since CAS-EV officially started as a division. General Manager Hirai described their efforts thus far. "We have sincerely made efforts to become a development partner of automakers. The results are highly evaluated by automakers. However, I really feel that we have not gone far enough with our attitude and mindset toward the job, not as a supplier but as a partner. I believe that members have steadily grown since CAS-EV started, but we must reach a higher level of awareness and thinking. We must always have a car-centric perspective and awareness that our job is to improve the value of cars. We will continue efforts to receive a high evaluation from automakers as a partner," said Hirai.

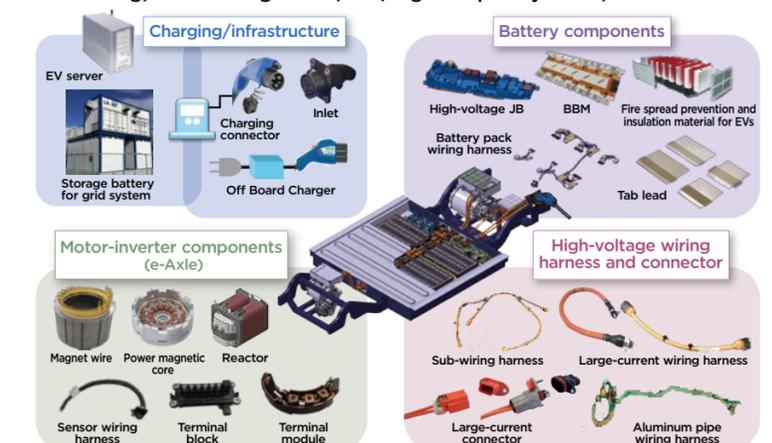
What is needed to accelerate the efforts of CAS-EV and to establish a solid presence of the Sumitomo

Electric Group? "The primary issue of CAS-EV members is to grow into a higher-level partner different from other companies by accumulating experience and gaining knowledge and skills. The next issue is to exploit various seeds in the Group, and to optimally transform them into a powerful driving force. Efforts on CASE cannot be pursued only by the Automotive Business Unit. I think it is important to collaborate with other Business Units or to involve affiliate

companies. When we use the Sumitomo Electric Group's integrated power, I am sure that we can work with automakers in the CASE era and become a driving force," said Hirai. The advent of CASE has impacted every aspect and is introducing drastic changes in the auto industry. As cars and society enter a new era, the great challenges the Sumitomo Electric Group has taken on should yield encouraging results in the future.

Development overview in the electrification area

<Our strengths: infrastructure/communication/energy management, wiring, heat management, low/high frequency noise, vibration>



We will innovate with an overall view from infrastructure to in-vehicle systems

Mikiya Kobayashi

Leader, Facility Improvement Group, Wire Plant
Manufacturing Dept., Electronic Wire General Managing Div.
Sumitomo (SEI) Electronic Wire, Inc.

- April 2009: Joined Sumitomo Electric Industries, Ltd., Trained at the Itami Works
- October 2009: Joined Sumitomo (SEI) Electronic Wire, Inc. Assigned to the Manufacturing Dept., Wire Plant, Maintenance Group (currently Facility Improvement Group)
- 2017-2019: Traveled to Suzhou, China three times and experienced construction supervision of installation of new electron beam processing systems
- January 2018: Promoted from an engineering position to a supervision position
- 2019-2021: Traveled to Johor Bahru, Malaysia three times and experienced construction supervision of installation of new electron beam processing systems
- April 2022: Certified as an Expert*
* Expert: Focusing on skills supporting our manufacturing base, Sumitomo Electric has certified employees demonstrating important skills as an Expert to maintain, improve, and pass on skills. Kobayashi is the youngest-ever certified Expert.

Failure is not an option in the maintenance job. What I convey to younger employees is that the accumulation of correct ways will foster growth as an engineer and yield rewards.

Be Honest, Earnest, and Appropriate

Accumulated Knowledge Supports and Maintains Irradiators

Appeal of maintenance I felt through an internship

Since my father worked in machining, I was surrounded by machines and tools in my childhood. I naturally became interested in manufacturing and went to an engineering high school. After graduation, I searched for a job at a manufacturing company. To understand actual worksites, I participated in an internship at Sumitomo (SEI) Electronic Wire in my hometown of Kanuma, Tochigi. This experience determined my career path. On a plant tour, I saw workers working on the repair of large facilities wearing coveralls and helmets as black as coal. Their attitude was so cool. I wanted to do a job like that and I determined to enter Sumitomo Electric, hoping to become a worker like those who thoroughly understood their facilities and machines. When I was asked where I wanted to be assigned after the induction training, I clearly requested the Maintenance Group, where I had learned how to repair facilities and machines during my internship. Since then, I have engaged in troubleshooting and maintenance of various facilities and machines at all times.

Heart of the electronic wire business

Of various types of facilities and machines, the electron beam processing system (hereinafter, an "irradiator") is the heart of the electronic wire business of Sumitomo Electric and the core of product development and production. An irradiator is a device that triggers a chemical reaction called cross-link bonding (strong intermolecular bonds) by irradiating high-energy accelerated electron beams on polymer materials. This attains excellent characteristics, such as heat resistance and wear resistance, and products derived from this process are used in various fields, including home appliances and automobiles. One of our important missions is to achieve stable operations with this irradiator. Since an irradiator works under an extreme environment of high vacuum and high voltage, sudden failures and troubles are inevitable. When that happens, we check an electronic chart that visualizes the conditions of the irradiator using current, voltage, and vacuum waveforms, to determine which part is in trouble. We aim to identify the cause and achieve recovery as soon as possible. For example, a power supply tank consisting of an irradiator treats an ultra-high voltage of 20,000 V, so a problem in electrical discharge tends to become serious. We

examine the cause of a problem by developing a hypothesis based on the acquired knowledge; however, ultimately visual checks are required. We collect environmentally hazardous insulation gas in a power supply tank, and enter the tank after checking the oxygen concentrations. Then, we check the problematic portion and troubleshoot the problem. This is a job that puts the value of maintenance engineers to the test.

My turning point: experiences in Suzhou, China

I gained knowledge and skills concerning irradiators through training from my passionate seniors. I felt their passion in wanting me to make an immediate contribution. I sought guidance from specialists of irradiator manufacturers during regular inspections, collected information by myself, and assimilated knowledge through every opportunity. However, I often made mistakes at first. I wrongly arranged the elements installed in the power supply tank, or damaged the lid of the vacuum device during operation, which required the reproduction of a high vacuum. Thanks to the support of my seniors, these mistakes did not turn out to be serious but at that time I became acutely aware of my inexperience, and worked to improve my expertise.

One of my turning points was my first overseas business trip to China. I was in charge of installing new irradiators in response to the start of mass production in Suzhou, where Sumitomo Electric has production sites for electronic wire and fine polymer. I also installed auxiliary facilities, while utilizing the comprehensive knowledge I had accumulated in Japan. Perplexed by the language barrier and differences in culture and business practices, I overcame the problems through good communication with local staff members. Since it was a new installation project, I checked and examined all the machines and parts that comprised an irradiator. I gained invaluable experience through this. As a construction



Growing numbers of the younger generation are learning the right way



supervisor, I focused on securing complete safety. After returning to Japan, I enhanced my awareness of Safety First. My experience in Suzhou helped me mature a lot.

The youngest-ever certified Expert

The plant is conducting failure reduction activity, which has continued since I entered the company. Currently, as part of the implementation of IoT, we are shifting from our previous reactive maintenance to proactive maintenance, such as the use of sensors and maintenance boards for failure prevention, with the help of technological innovation in order to minimize failures. In the spring of 2022, I was certified as the youngest Expert, highly regarded for my skills in troubleshooting irradiators. From now on, my role in training and fostering the younger generation will become more important. I strive to hand down correct knowledge and methods to improve facilities in the proper manner. An irradiator in particular, which works under high vacuum and high voltage, is a very dangerous facility and must be treated with extreme care and reliability. Wrong treatment will complicate the cause of a failure and can be hazardous to workers. Therefore, correctness must come first. A restored facility may fail again. My experience confirms that this fact will strongly discourage maintenance workers. However, another try will help them grow as an engineer. I try to hand down this important attitude to the younger generation.

The nature of maintenance work requires us to be honest and earnest. This practice will contribute to productivity improvement and give us fulfillment. I will continue to acquire expert knowledge and skills concerning facilities including irradiators, to grow up to be a recognized professional to improve facilities. My goal is to become a maintenance worker who is relied on by those around me and required by worksites.

Sumitomo Spirit and Sustainability

Sumitomo Spirit in Action: Implementing Measures Against Smoke Pollution



Mt. Besshi in 1881
(Photo courtesy of Sumitomo Historical Archives)



The Besshi Copper Mines restored as lush green forest
(Photo courtesy of Sumitomo Forestry Co., Ltd.)

Sustainability Management Began over 100 Years Ago

While the Besshi Copper Mines were rapidly modernized during the mining expansion in the Meiji Era, smoke pollution from sulfur dioxide gas from the smelter started to ruin nearby crops. In 1893, local farmers were outraged. Environmental pollution problems were taken up in the Diet, which determined that the Ashio Copper Mine was the problem in the east and the Besshi Copper Mines were the problem in the west.

To deal with this problem, the second director-general Teigo Iba invested a huge amount of money to relocate all the smelters to Shisakajima, an uninhabited island in the Seto Inland Sea, as a drastic measure against the smoke pollution. At the same time, he advocated a reforestation drive based on the principle that we must restore the Besshi mountains to their original verdant state, which had been ravaged by deforestation and smoke pollution due to the rapid increase of mining and smelting. The number of saplings

planted annually was over one million.

Sumitomo Electric has always conducted business in harmony with the public interest based on the fundamental spirit of “gratitude toward society,” or giving back to local society. Teigo Iba embraced this business principle over 100 years ago.

The Sumitomo Spirit has been inherited by the Sumitomo Electric Group to this day. With an eye on social issues, including global warming, depletion of natural resources, and severe natural disasters, the Sumitomo Electric Group established the Fundamental Policy for Sustainability Management in April 2022, and has promoted business activities by demonstrating its commitment to providing value that is environmentally friendly, safe, secure, and comfortable, and which will lead to the realization of a growing society.

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Information and videos not posted in this magazine are found on the “id” special site

<https://sumitomoelectric.com/id>



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