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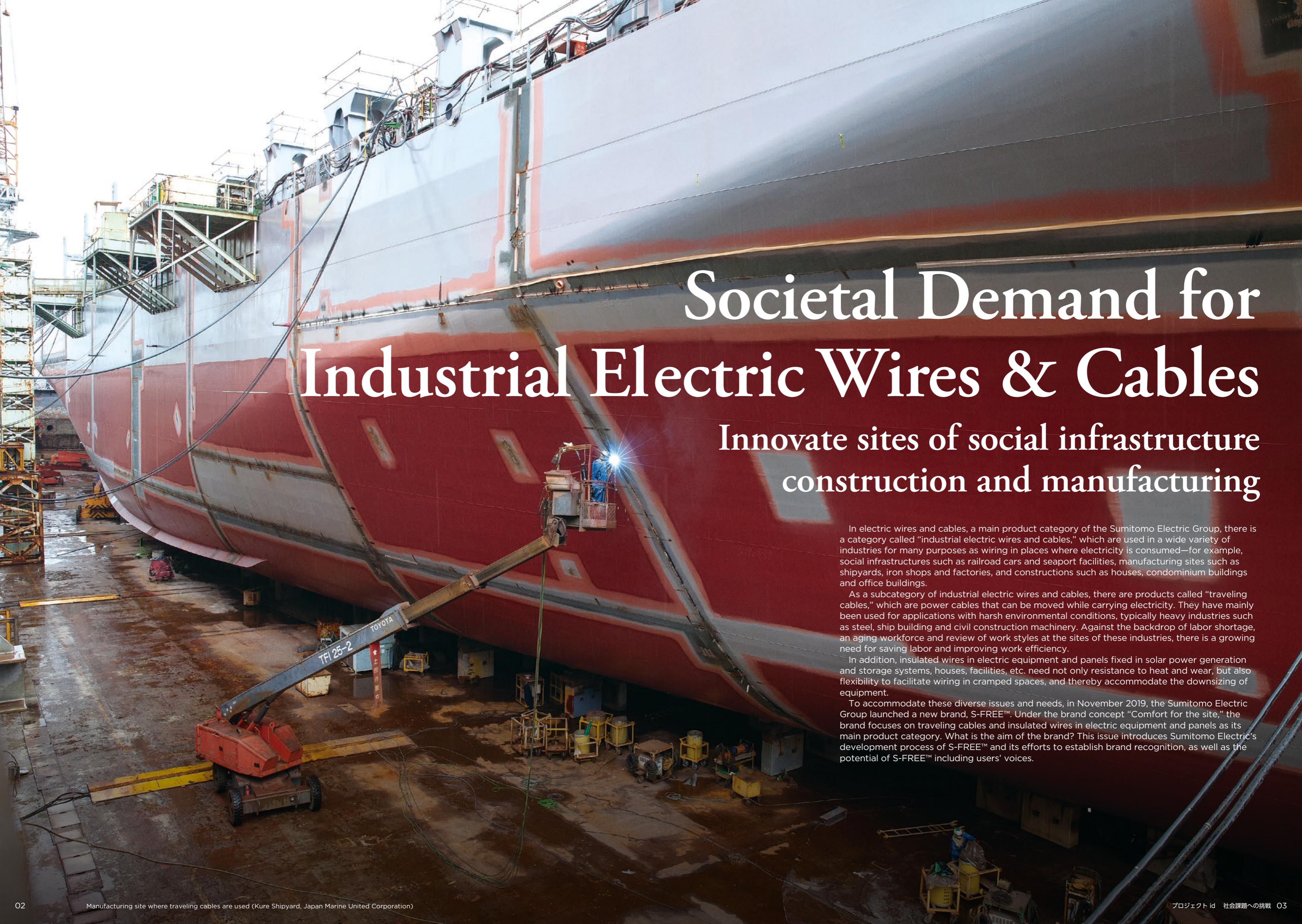
Sumitomo Electric Group Magazine

vol. 13

Innovative Development,
Imagination for the Dream,
Identity & Diversity

Feature

“Comfort for the Site”
—S-FREE™,
A Driver of the Evolution of
Industrial Electric Wires & Cables



Societal Demand for Industrial Electric Wires & Cables

Innovate sites of social infrastructure construction and manufacturing

In electric wires and cables, a main product category of the Sumitomo Electric Group, there is a category called "industrial electric wires and cables," which are used in a wide variety of industries for many purposes as wiring in places where electricity is consumed—for example, social infrastructures such as railroad cars and seaport facilities, manufacturing sites such as shipyards, iron shops and factories, and constructions such as houses, condominium buildings and office buildings.

As a subcategory of industrial electric wires and cables, there are products called "traveling cables," which are power cables that can be moved while carrying electricity. They have mainly been used for applications with harsh environmental conditions, typically heavy industries such as steel, ship building and civil construction machinery. Against the backdrop of labor shortage, an aging workforce and review of work styles at the sites of these industries, there is a growing need for saving labor and improving work efficiency.

In addition, insulated wires in electric equipment and panels fixed in solar power generation and storage systems, houses, facilities, etc. need not only resistance to heat and wear, but also flexibility to facilitate wiring in cramped spaces, and thereby accommodate the downsizing of equipment.

To accommodate these diverse issues and needs, in November 2019, the Sumitomo Electric Group launched a new brand, S-FREE™. Under the brand concept "Comfort for the site," the brand focuses on traveling cables and insulated wires in electric equipment and panels as its main product category. What is the aim of the brand? This issue introduces Sumitomo Electric's development process of S-FREE™ and its efforts to establish brand recognition, as well as the potential of S-FREE™ including users' voices.

Develop Flexible, Strong and Stress-Free Electric Wires & Cables

Story behind the development of S-FREE™

Accommodating diversified and advanced user needs

Industrial electric wires and cables used to be handled by the Power Cable Division as a part of its product category; however, the team in charge was separated as an independent division since the range of customers was highly diverse and the required quality and properties were becoming increasingly diversified in response to changes in society. A major turning point came in 2014. Among various industrial wires and cables, Sumitomo Electric focused on traveling cables and insulated wires in electric equipment and panels, which had been handled by its affiliated companies, restarting the business of the products under a new brand. "Behind this decision were changes in society and user needs," says Takahisa Hiura, President of Sumitomo Electric Industrial Wire & Cable Inc.

"Since the start of the 21st century, the need for improved productivity and efficiency has been growing more than ever; as a result, reformation of manufacturing sites and technical innovation are accelerating. In particular, the on-site needs of traveling cable users are highly diversified; therefore, it was a good business chance as well as an important mission for the Sumitomo Electric Group to develop and provide products that can flexibly and quickly accommodate their needs," says Hiura.

What are the "on-site needs," Hiura



Hiroshi Omi, Senior Manager, Engineering Dept., Industrial Wire & Cable Div.

mentions? For example, traveling cables are used at sites with harsh environmental conditions. In addition, they are used as power cables for moving objects, not as fixed wiring, so the cables themselves are prone to suffer external damage. For that reason, traveling cables have been required to possess various properties, such as wear resistance, shock resistance, water resistance, heat resistance, flexibility and fire retardancy. Meanwhile, the development of a new brand, afterward named "S-FREE™," had started.

Grasping "true" needs through communication with users

What issues should be addressed by the development of new brand products? Finding the answer to this question is a task of the sales staff, who closely communicate with users on the front line of the market. Hiroshi Omi of the Engineering Department, Industrial Wire & Cable Division is one of the staff members who support sales staff from the aspect of engineering. Omi has endeavored to grasp "true needs" by frequently analyzing market trends and communicating with users.

"We are always looking for clues about product development and modification. Naturally, the products developed or modified must provide a solution to an issue that users face. We often find a clue about product development by hearing requests from site workers or observing their work. I



Shinya Nishikawa, Manager, Polymer Materials Dept., Energy and Electronics Materials Lab.



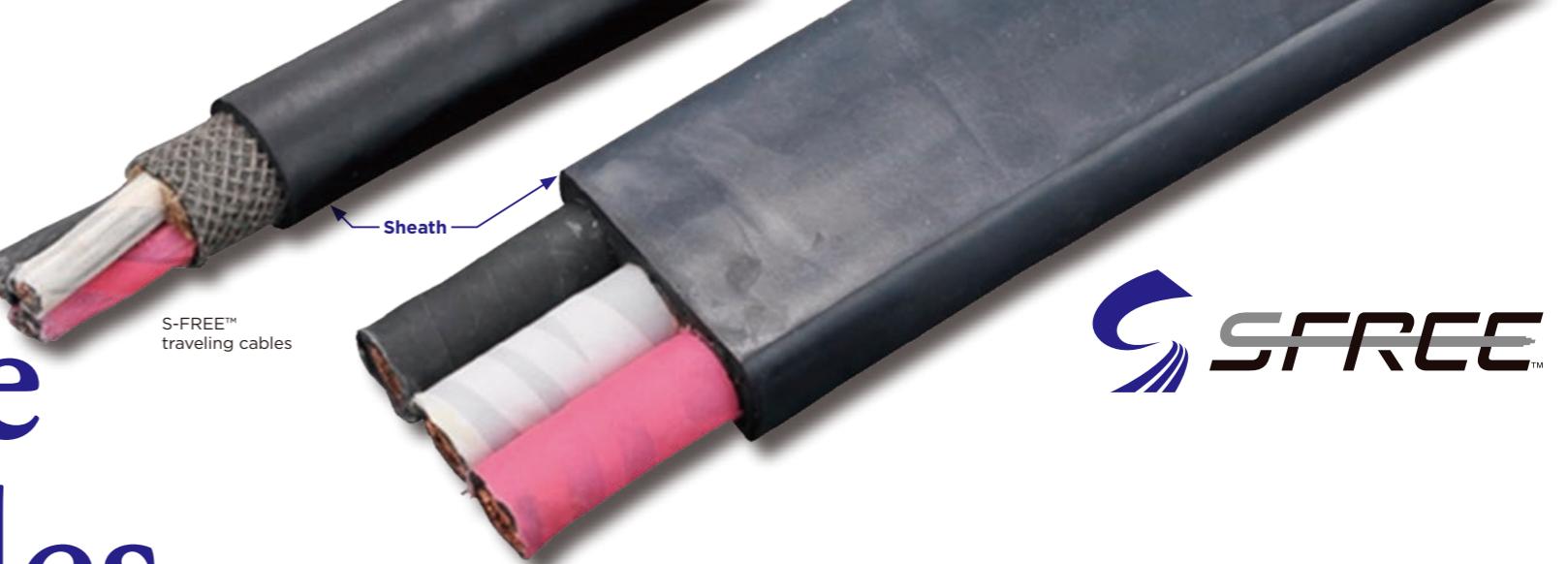
Takahisa Hiura, President of Sumitomo Electric Industrial Wire & Cable Inc.

realized that requests from users were not constant but variable, depending on their work environments and personnel organization," says Omi.

For example, after the Great East Japan Earthquake, the standards required for cables used at power plants became stricter. Fire retardancy was one of the raised standards. As a result, it became necessary to develop a sheathing material for traveling cables that can pass the vertical tray flame test, one of official flame test methods. Sheathing materials are made of chloroprene rubber (CR). To satisfy the required fire retardancy and other properties such as tensile strength at the same time, it was necessary to determine the optimal material formulation. How has this kind of issue been addressed?

Fostered formulation technologies

Even for sheathing materials, the Sumitomo Electric Group conducts all operations, from the research and development of material formulation to production, within the Group. Therefore, in order to develop easy-to-use electric wires and cables, all component materials, from conductors to sheathing materials, are thoroughly examined. Material technologies owned by the Group, including those for product categories other than industrial wires and cables, are fully utilized.



S-FREE™ traveling cables

"The sheaths of traveling cables and insulated wires in electric equipment and panels are made of polymer composite. Material development is an activity intended to create a new formulation, or the optimal "recipe" of materials and additives. The Sumitomo Electric Group owns advanced formulation technologies based on technical know-how accumulated over the years in various industries, such as electric power, automotive, information communication and electronics. Such technologies serve as our driving force to create products that meet customer needs. Of course, they were utilized to improve the fire retardancy of traveling cables," says Shinya Nishikawa, Manager of Polymer Materials Department, Energy and Electronics Materials Laboratory.

Features required for S-FREE™

Besides the required properties, what consideration was given to the design of traveling cables and insulated wires in electric equipment and panels released under the brand "S-FREE™"?

As a latest development, technologies for traveling cables were applied to cables for charging electric vehicles (EVs). EV charging cables are frequently dragged on hard ground surfaces such as concrete due to the repeated action of connecting and disconnecting the charging connectors, so they need to have resistance to drag (wear resistance). However, in general, as the wear resistance increases, the material becomes harder, consequently making the cable less flexible.

Sheathing materials for these cables



Core members of the Engineering Dept., Industrial Wire & Cable Div.



S-FREE™ traveling cable for charging EVs

were developed by the Polymer Materials Department, a team specialized in the research and development of polymer composite at the Energy and Electronics Materials Laboratory of Sumitomo Electric. Taro Fujita and Shigeyuki Tanaka of the Electronic and Electric Materials Group are core members of the development team.

"The primary requirement for EV charging cables was wear resistance, but considering handling by the public, the flexibility of the sheath was also important since it has an influence on the flexibility of the cable itself. However, as the wear resistance increases, the material usually hardens. It was important to realize a good balance between these trade-off properties," says Fujita.

Fujita focused on creating a composite of CR and mineral-based particles (filler). Hard filler dispersed into rubber prevents damage caused by drag, increasing the wear resistance. Fujita created an optimal recipe (formulation) that can realize satisfactory wear resistance and flexibility by discovering a special filler that does not harden the material.

As a latest trend, an increasing number of companies proactively adopt eco-friendly cables as a means of achieving the SDGs, initiatives to realize a sustainable society. Use of eco-friendly materials is also proceeding in the category of traveling cables; however, eco-friendly materials have the disadvantage that, in general, they are harder than conventional sheathing materials.

"CR used for conventional traveling cables produces harmful gas such as hydrochloric gas in the event of a fire. For eco-friendly traveling cables, ethylene propylene rubber (EPR), an olefin-based synthetic rubber, is used. Required fire retardancy and other properties such as mechanical strength can be satisfied by using halogen-free fire retardant, but there is inevitably a

trade-off with flexibility," says Tanaka.

Tanaka focused on the molecular structure of EPR. A large part of rubber has a non-crystalline molecular structure, and the remaining small part has a crystalline molecular structure. The flexibility can be increased by reducing the hard crystalline structure, but the strength decreases. Therefore, Tanaka increased the mechanical strength

by extending the chain of EPR molecules and enhancing the molecular entanglement. In this way, he developed eco-friendly traveling cables that are as flexible as conventional traveling cables and easy to handle.



Taro Fujita, Manager of the Electronic and Electric Materials Group, Polymer Materials Dept., Energy and Electronics Materials Lab.



Shigeyuki Tanaka, Assistant Manager, Electronic and Electric Materials Group, Polymer Materials Dept., Energy and Electronics Materials Lab.

Birth of welding cables using a high-strength aluminum conductor

The design and development of industrial electric wires and cables are managed by the Engineering Department of the Industrial Wire & Cable Division, in which Shinichi Uehara assumes the responsibility for managing the development of S-FREE™ products. They are being developed for not only sheathing material formulation, but also conductor materials. A typical example is welding cables using a high-strength aluminum conductor, with the total weight of the cable being considerably reduced. The products were developed as Japan's first welding cables using an aluminum conductor in place of copper. At manufacturing sites of large structures such as ships and bridges, workers repeatedly carry arc welding machines and welding cables. There was thus a compelling need to reduce the weight of welding cables.

"Among industrial wires and cables, welding cables can use aluminum, but many manufacturers have failed in their development due to the issues of durability and strength. Since the



Shinichi Uehara, Senior Manager, Engineering Dept., Industrial Wire & Cable Div.

Sumitomo Electric Group has experience of using aluminum for automotive wiring harnesses, we made use of technical knowledge obtained from the experience, developing welding cables about 50% lighter than conventional products. The products help to reduce burdens on workers as well as to extend the service lives of the cables themselves, since less friction is caused even when they are dragged on the ground. Since the electrical resistance of aluminum is higher than that of copper, the temperature of the conductor becomes higher. Therefore, we accommodated this issue by using cross-linked polyolefin with higher heat resistance as a sheathing material. Until we completed the products, we visited customers' work sites many times to hear their opinions. However, the release of the products is not our goal. We will continue to hear customers' opinions to see if there is anything we can make better to improve the user-friendliness of the products," says Uehara.

Develop Flexible, Strong and Stress-Free Electric Wires & Cables

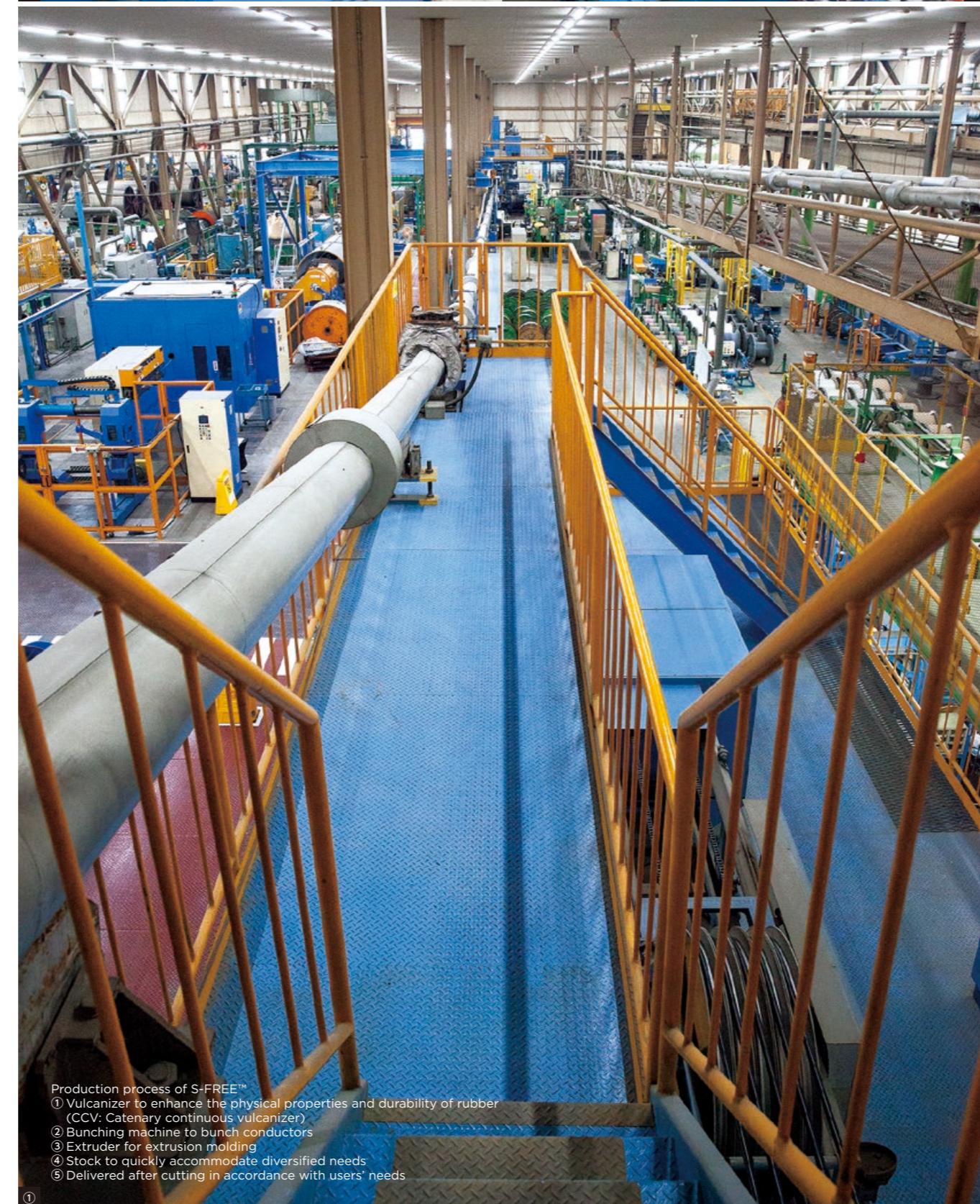
Story behind the development of S-FREE™



Masaki Tani, General Manager of the Wakayama Plant, Manager of the Rubber-Insulated Electric Wire & Cable Production Dept., Sumitomo Electric Industrial Wire & Cable Inc.



Takayuki Kurisu, Leader of the Wakayama Production Group, Rubber-Insulated Electric Wire & Cable Production Dept., Sumitomo Electric Industrial Wire & Cable Inc.



Production process of S-FREE™
① Vulcanizer to enhance the physical properties and durability of rubber (CCV: Catenary continuous vulcanizer)
② Bunching machine to bunch conductors
③ Extruder for extrusion molding
④ Stock to quickly accommodate diversified needs
⑤ Delivered after cutting in accordance with users' needs



In order to introduce a wide range of products developed by incorporating users' opinions in this way and disseminate the development philosophy of the Sumitomo Electric Group, in November 2019, the Group launched the new brand "S-FREE™" with the brand concept "Comfort for the site." The brand name "S-FREE™" reflects the Sumitomo Business Spirit ("S"), which values sincerity, and desires to "free" users from stress during work as far as possible.

Production base of S-FREE™—Wakayama Plant

The production base of S-FREE™ is the Wakayama Plant of Sumitomo Electric Industrial Wire & Cable Inc., where more than 300 kinds of S-FREE™ products of different sizes and items are produced. One of the features of the plant is that it produces not only cables but also sheathing materials such as insulators.

Masaki Tani, the General Manager of the plant, says, "We are now required to improve productivity by realizing speedy manufacturing. Both employees and organizations are flexibly trying new things, such as innovating production engineering including the use of IoT*, information sharing and a new method of quality control."

Mitsuaki Mukaiyama of the Rubber-Insulated Electric Wire & Cable Engineering Group, Electric Wire & Cable Engineering Department assumes the role of realizing products as physical objects.

"When a new material is developed, we need to determine optimal conditions for stable manufacturing and quality. It is necessary to repeat fine-tuning at the production site while checking the state of the product and considering the ability of the machinery. I feel a sense of achievement when new S-FREE™ products are released," says Mukaiyama.

Takayuki Kurisu of the Production Group assumes the responsibility for ensuring stable manufacturing by strictly watching for changes in product quality and hearing the voice of site workers.

"Our group mission is to manufacture stable, high-quality products. We will continue to seek stable quality and efficiency improvement by conducting thorough numerical data management. We also promote the digitization of quality control by using digital devices such as image recognition monitoring systems. However, observation by site workers is the most important. It is also necessary to raise their sensitivity to changes and pass down their experience," says Kurisu.

Tadashi Nishimura of the Production Control Group, who is responsible for affairs that could directly affect customers, such as delivery time management, stock control and



Wakayama Plant of Sumitomo Electric Industrial Wire & Cable Inc.

logistics, says that he aims to contribute to the improvement of customer satisfaction by flexibly responding to requests from customers.

"The strength of our company is the availability of a wide variety of product items in stock and the short production lead time. Since our products are high-mix and low-volume, we endeavor to conduct agile production management so that we can deliver products as quickly as possible. We need to flexibly respond to customer requests for sizing and delivery. Not only the features of the products, but all the services we provide are important to contribute to the realization of a comfortable site that S-FREE™ aims at," says Nishimura.

Tani, the General Manager of the plant says, regarding their vision for the future, "We aim to develop new markets of S-FREE™ and gain the top market share in the category of rubber-insulated electric wires and cables. To achieve this, we will evolve our production site so that we can quickly accommodate a wide range of requests from customers."



Tadashi Nishimura, Leader of the Wakayama Production Control Group, Rubber-Insulated Electric Wire & Cable Production Dept., Sumitomo Electric Industrial Wire & Cable Inc.



Mitsuaki Mukaiyama, Leader of the Rubber-Insulated Electric Wire & Cable Engineering Group, Electric Wire & Cable Engineering Dept., Sumitomo Electric Industrial Wire & Cable Inc.

* Internet of Things

01 Reduce Burdens on Shipyard Workers

—S-FREE™ Welding Cables Using a High-Strength Aluminum Conductor



Light, durable and heat resistant welding cables

Kure City in Hiroshima Prefecture, where there is a shipyard of Japan Marine United Corporation (hereinafter, JMU), has long been known as a city of shipbuilding. JMU is a leading shipbuilding company established in 2013 by a merger between two Japanese major shipbuilding companies—Universal Shipbuilding Corporation and IHI Marine United Inc. With a wealth of experience and advanced technologies, the company builds a broad range of ships centered on container ships, as well as tankers, naval ships, and passenger and car ferries. A ship body consists of steel plates joined by welding. Therefore, welding assumes the role of ensuring the quality of ship bodies and accounts for a large proportion of man-hours, being considered one of the most important processes in shipbuilding. S-FREE™ welding cables using a high-strength aluminum conductor have been adopted as traveling cables to supply power to welding equipment. We interviewed Mr. Masayuki Kikkawa of the Shipbuilding Department, Kure Shipyard, JMU about the process until the adoption.

"We have been using welding cables of various manufacturers. However, as the replacement of aged cables and the procurement of new cables proceeded, there was a growing opinion that we should narrow them down to a single manufacturer to avoid differences in product properties by manufacturers. Until then, the Kure Shipyard had not



A female clerk who joined the verification of handling highly evaluated S-FREE™ as light and user-friendly products (Kure Shipyard, JMU)

done any business with the Sumitomo Electric Group; however, the cables we used as a trial were easy to use due to their characteristic sheaths. Then, around 2014, welding cables using a high-strength aluminum conductor were proposed as new products," says Mr. Kikkawa.

Before then, light welding cables using an aluminum conductor had been proposed by multiple manufacturers. However, in the end they were not adopted due to their insufficient durability. Lightness was not the only reason for the acceptance of the welding cables using a high-strength aluminum conductor supplied by the Sumitomo Electric Group. To verify whether the products have the same level of properties, such as durability, corrosion resistance, heat resistance and drag resistance, as conventional cables using copper (annealed copper), various tests were conducted for a year under conditions assumed to occur in actual use. As a result, the "lightness" and "equivalence to

conventional cables using copper" of the products were verified, which led to JMU's decision to adopt the products. Compared to conventional products, the properties of the products are as follows: the cable weight is lighter by 50% or more; the heatproof temperature is improved from 60°C to 90°C; and the wear of the sheath is less by 60% or more.

Workers' voice of joy—"It's so light!"

The full-scale introduction of the products started in August 2016. What changes have the products produced at welding sites? Mr. Takuya Kusaba, a colleague of Mr. Kikkawa in the Shipbuilding Department and a team leader, says that the introduction of the products has considerably changed the work environment.

"Site workers say that the products are so light that they are much easier to carry. Welding involves hard work such as walking up and down stairs with heavy cables. Not a few welding



Mr. Masayuki Kikkawa, Welding Engineering Team, Planning Group, Shipbuilding Department, Kure Shipyard, Japan Marine United Corporation



Mr. Takuya Kusaba, Leader of the Welding Engineering Team, Planning Group, Shipbuilding Department, Kure Shipyard, Japan Marine United Corporation

Arc welding. S-FREE™ also contributes to high-place work, for which greater safety and comfort are required. (Kure Shipyard, JMU)



performed differently for each ship, and therefore manpower is indispensable. To further reduce burdens on workers and improve work efficiency, I expect the Sumitomo Electric Group to further develop thinner and lighter welding cables," says Mr. Kusaba.

The aforementioned Mr. Kikkawa also expects a lot from the Sumitomo Electric Group.

"We are now proactively introducing welding cables supplied by the Sumitomo Electric Group. In this process, we requested the Group to develop welding cables with further advanced features, such as cables with colored sheaths for identification purposes and a wider variety of cable sizes. As a partner to improve our work sites together, I expect the Group to develop welding cables that make it possible to further improve work efficiency with innovative technologies and ideas," says Mr. Kikkawa.

In the future, what features will be required for welding cables? Mr. Kusaba points to the characteristics of welding work unique to the shipbuilding industry.

"Unlike other industries in which the line production method can be used, in the shipbuilding industry, welding is



Solution Case

02 Constituting Stable and Reliable Drainage Pump Systems

—S-FREE™ Traveling Cables

Driving submersible axial-flow column pumps

Tsurumi Manufacturing Co., Ltd. (hereinafter, Tsurumi Manufacturing), known for the brand "Tsurumi Pump," is a traditional pump manufacturer established in 1924, which develops and manufactures various types of pumps for a broad range of applications, such as construction and civil works, agriculture and irrigation, river engineering and flood control, water supply and sewage systems, and environmental systems. In particular, in the category of submersible pumps, the company boasts a leading share of the Japanese market as a pioneer. Tsurumi Manufacturing has production bases in Kyoto and Yonago in Japan, as well as in China, Taiwan and Vietnam. In particular, the Kyoto Plant, which boasts the largest scale and the most advanced facilities in the pump industry, conducts every operation from

development to production, accommodating diverse needs for pumps, from small to large sizes and special types. Tsurumi Manufacturing and the Sumitomo Electric Group have had a business relationship for about 40 years since the time when Hannan Electric Wire & Cable Co., Ltd., the predecessor company of Sumitomo Electric Industrial Wire & Cable Inc. was in operation, and traveling cables are part of products supplied by the Group to Tsurumi Manufacturing. Recently, Tsurumi Manufacturing adopted power supply cables for the driving motors of submersible pumps called "submersible axial-flow column pumps," which are mainly used as sewage pumps to pump rainwater and wastewater, agricultural irrigation pumps, and high-volume lift/discharge pumps. The pumps boast the highest capacity in the category of submersible column pumps, being able to discharge a volume of water equivalent to a normal 25-meter

swimming pool in only two minutes. We interviewed Mr. Ikuo Ishida, a unit leader in the Design Department of the Kyoto Plant, about the background to their decision to adopt Sumitomo Electric traveling cables for the pumps.

"Since before this project, we had great confidence in Sumitomo Electric traveling cables. One of the important issues in this project was accommodation to special specifications designated by our client. The Sumitomo Electric Group accommodated special requirements regarding the diameters and lengths of cables appropriately and quickly. That was one of the reasons why we decided to use their cables. In addition, we were also very impressed with the cables' properties. They are so flexible and easy to bend, as well as being light and easy to handle when performing cable terminal work. The packing of the cables is also very compact, allowing us to save on transportation costs," says Mr. Ishida.

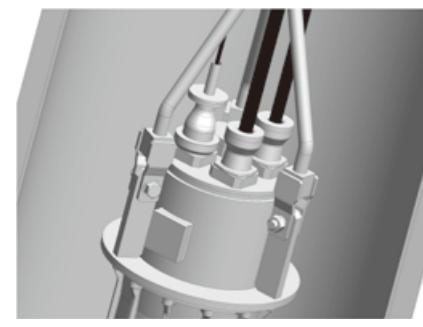


02 Constituting Stable and Reliable Drainage Pump Systems

—S-FREE™ Traveling Cables



Installation of the pump and the inside of the pump. Highly accurate diameters of the S-FREE™ cables (black cables) ensure water sealing. (Photo and illustration courtesy of Tsurumi Manufacturing Co., Ltd.)



Submersible axial-flow column pump of Japan's largest-class diameter using S-FREE™ traveling cables (Photo courtesy of Tsurumi Manufacturing Co., Ltd.)

Highly accurate cable diameters ensure water sealing

One of the requirements of Tsurumi Manufacturing that the Sumitomo Electric Group accommodated is the arrangement of sealing for the penetrating section of cables. Perfect water sealing is one of the characteristics required for submersible pumps to prevent water from entering the pumps. Mr. Yasushi Miyagawa, the Deputy Manager of the Material Section, Procurement Department, Kyoto Plant highly evaluates the Sumitomo Electric Group's adaptability.

"To arrange sealing, the accuracy of the cable diameters is very important. Although our requirements for water sealing were very strict, the Sumitomo Electric Group managed to meet them. In addition, the Group proposed a very innovative technology to stabilize cable diameters by using pressure produced

by a cable material that the Group had specially arranged," says Mr. Miyagawa.

Mr. Hideyuki Aikyo, a section manager in the Quality Assurance Department of the Kyoto Plant, expressed his own view of the Sumitomo Electric traveling cables, saying, "I don't have any particular impression of the products."

"For example, the products of the Sumitomo Electric Group are seldom a topic in our meetings on quality

assurance because their quality is extremely stable. That proves their high reliability. Some time ago, during terminal wiring work, a cable was torn because a worker applied excessive force to it. In response, the Sumitomo Electric Group, not content with the existing product specifications, adjusted the properties of the sheathing rubber material to allow the cables to

withstand potential excessive force and become easier for workers to handle, finally providing us with cables with higher tear resistance. This response shows the culture of the Group," says Mr. Aikyo.

We asked the aforementioned Mr. Ishida what he expects from the Sumitomo Electric Group in the future. Submersible pumps are equipment that can make the most of the advantages of S-FREE™ cables, such as flexibility, bendability, durability, and ease of handling for cable terminal work, and therefore the products strongly supported the development of pumps that we aimed to create. I expect the Sumitomo Electric Group to evolve the features of S-FREE™ and develop even lighter and more cost-effective traveling cables," says Mr. Ishida.

"Submersible pumps are equipment that can make the most of the advantages of S-FREE™ cables, such as flexibility, bendability, durability, and ease of handling for cable terminal work, and therefore the products strongly supported the development of pumps that we aimed to create. I expect the Sumitomo Electric Group to evolve the features of S-FREE™ and develop even lighter and more cost-effective traveling cables," says Mr. Ishida.

"Our main competition field is not the market for commodity products, but the market for products customized according to customer needs. Therefore, it is important to appropriately and quickly capture customer needs and problems as well as changes in the market, and then develop products based thereon. We will directly hear customers' voices and provide effective solutions by offering products that customers truly require, rather than merely distributing



Tsurumi Manufacturing Co., Ltd.

Mr. Ikuo Ishida, Unit Leader, Design Dept., Kyoto Plant, Tsurumi Manufacturing Co., Ltd.



Mr. Yasushi Miyagawa, Deputy Manager, Material Section, Procurement Dept., Kyoto Plant, Tsurumi Manufacturing Co., Ltd.



Mr. Hideyuki Aikyo, Section Manager, Quality Assurance Dept., Kyoto Plant, Tsurumi Manufacturing Co., Ltd.



Tsurumi Manufacturing Co., Ltd.



Picture at the top: Core members of sales staff in Tokyo

Picture on the left: Redox flow batteries, or storage batteries that perform electric charge and discharge by using the redox reaction of vanadium ions or other ions. S-FREE™ cables are used in this system.

Potential of S-FREE™ to Support Next-Generation Society

—From Environmental Conservation to Data Centers

Appropriately capturing customer needs and changes in the market

Efforts to develop a brand of traveling cables have been made since before November 2019, when S-FREE™ was launched as a new brand, and one of the current issues is the improvement and establishment of brand recognition. To do this, the members of the Industrial System Sales Department are struggling on the front line of the market. We asked Masahiko Kato, who leads them as the Department Manager, about the strengths and advantages of S-FREE™.

"Our main competition field is not the market for commodity products, but the market for products customized according to customer needs.

Therefore, it is important to appropriately and quickly capture customer needs and problems as well as changes in the market, and then develop products based thereon. We will directly hear customers' voices and provide effective solutions by offering products that customers truly require, rather than merely distributing

products. While pursuing this approach, we aim to clearly differentiate our products from others," says Kato.

Development of potential and new markets for S-FREE™

High evaluation of S-FREE™ in the market has also been reflected in figures. Compared to FY2014, when the business of relative products was restarted under the brand of Sumitomo Electric, sales revenue of FY2019 grew by 20%. In addition, the Sumitomo Electric Group aims at 20% growth by FY2022 compared to FY2019. In the meantime, what issues does S-FREE™ face and what visions does it have?

Toshihiko Terao, the Division Manager of the Industrial Wire & Cable Division says, "The market for rubber insulated cables, including traveling cables, is a mature market. Therefore, in order to expand sales of S-FREE™, we need to develop potential and new markets for the brand. Since traveling cables have been regarded as power supply cables for traveling equipment, they have been used mainly under harsh environmental

conditions, such as manufacturing sites of large structures and construction sites. However, we need to develop new markets according to the changing times. For example, in response to the spreading utilization of regenerative energy, we have already started to provide S-FREE™ cables for large storage battery systems. Also, as data traffic increases due to the spread of IoT and telework, an increasing number of data centers are established in urban areas. In response to the start of the 5G era, the number of mobile communication base stations is also increasing. Since these facilities often require wiring in cramped spaces, the features of S-FREE™ cables, such as flexibility and ease of handling for cable terminal work, should be advantageous. In the future, we aim to continue to offer user-friendly products."

Developing the potential of S-FREE™ means nothing more than providing comfort to various sites. As an innovative cable brand, the growth and evolution of S-FREE™ will further change work sites, work environments and work styles.



Masahiko Kato, Department Manager, Industrial System Sales Dept.



Core members of sales staff in Osaka



Toshihiko Terao, Division Manager, Industrial Wire & Cable Div.

Masaharu Kayano

Office Manager, Tool Development Department
Sumitomo Electric Sintered Alloy, Ltd.

- 1984: Joined Okayama Sumiden Seimitsu Ltd.
Involved in a tool development project, which started that year
- 1991: Company renamed Sumitomo Electric Sintered Alloy, Ltd.
- 1993: Appointed as an examiner of the Okayama Prefectural Proficiency Test Commission
- 2004: Received a testimonial from the Governor of Okayama Prefecture (for contribution to the proficiency test)
- 2006: Received a commendation from the Chairman of Japan Vocational Ability Development Association (for contribution to the proficiency test)
- 2014: Received a commendation from the Minister of Health, Labour and Welfare (for contribution to the proficiency test)
- 2015: Chief Engineer, Product Development Department
- 2016: General Manager, Tool Development Department
- 2020: Received the Order of the Sacred Treasure, Silver Rays

Accumulating Expertise in a “Consistent and Steady” Manner

Dedicating Myself to Press tool Design and Manufacture as the “Origin of Manufacturing”

“I have consistently been engaged in press tool design and manufacture, honing my expertise by accumulating technical skills step by step. Efforts to achieve an objective improve our professional skills and job quality, thereby motivating us even further and promoting our growth.”



Press tools—A key item for manufacturing sintered components

I have consistently been engaged in press tool manufacture since I joined Okayama Sumiden Seimitsu Ltd. (current Sumitomo Electric Sintered Alloy, Ltd.). Tools are metal frames to accurately mass-produce industrial components, which support our daily lives, by pressing or using other process methods. Tools are called “the origin of manufacturing,” since the quality and performance of a product are greatly affected by the quality of the tool. The tools on which I have worked are used to manufacture “sintered components,” as you may see from the name of our company. Sintered components are manufactured by a powder metallurgical process, in which fine powder of multiple metals such as iron is compacted by compressing it in tools and sintered at high temperatures over 1,000°C. Due to their high dimensional accuracy, sintered components are widely used as key components of various products such as automobiles, agricultural machinery, office equipment and home appliances.

Although our company used to outsource press tool manufacture, in 1984, when I joined the company, a project of in-house manufacture started, and I was appointed as a member of the project team. So I am an inaugural member of press tool in-house manufacture in our company. Since I majored in welding at university, I did not have any knowledge about press tool. To acquire technical skills and know-how, I received on-the-job training in the tool department of Sumitomo Electric in Itami for a year, and in 1985, we started full-scale in-house manufacture of tools. As mentioned earlier, the quality of tools significantly affects the quality of the products; therefore, extremely high accuracy is required for tool manufacturing. Since it takes about a month to complete tooling, failure could significantly affect the delivery time of the products. The in-house manufacture of tools was a big project, so mistakes were not allowed. We started the operation with a sense of tension.

Trying a challenging task is a highly meaningful process

Press tool manufacture is a highly professional job category, in which cutting-edge equipment and expertise are required. I have developed my expertise by steadily absorbing



His motto is to encourage young people to try challenging tasks.

technical skills and know-how. I once had an impressive experience. Although the strength and other properties of tools are sufficiently verified at the stage of design, unexpected problems, such as breakage, cracking or chipping, could occur in the process of compacting.

For example, we manufactured cemented carbide tools for compacting by shrink fitting, in which compressive stress is produced beforehand by confining a tool with a steel outer ring to increase the strength. The tools frequently broke due to insufficient strength because our manufacturing process relied only on experience at that time. To solve this problem, which was a huge burden on our plant, we repeated finite-element method analysis, which was still in the early stage at that time and difficult to understand, and verification tests, finally developing a drum-shaped tool shrink fitting method that could maximize and optimize the strength and drastically extend the service lives of the tools. It was then innovative to solve a technical problem of tooling by tracing back its origin to the tool design.

In 1993, my ninth year after joining the company, I was appointed as an examiner of the Okayama Prefectural Proficiency Test Commission, which became one of the turning points in my career. The proficiency test is a national examination system to evaluate the level of skills required to work as a professional in 130 categories, such as machining and carpentry, and successful examinees are permitted to title themselves as “certified technicians.” Proficiency test examiners assume the responsibility for developing testing procedures, scoring and supervising at testing sites, and other various things to implement the test. To tell the truth, I did not originally aim to become a proficiency test examiner. At that time, machining and electrical discharge machining were added to the job categories of the proficiency test, so our company encouraged employees to take the test. That was the start of my involvement in the proficiency test. The company expected that employees would develop their self-confidence by obtaining the certification, but at the same time, it believed that trying such a challenging test by itself was meaningful. Those who decided to try the proficiency test earnestly and continuously practice until the day of the test. During the test, the examinees operate machines with intense expressions on their faces. The series of efforts needed to pass the test is an extremely important process, improving the employees’ professional skills and job quality, thereby motivating them even further. When I was involved in such an in-house training program, the company was requested by the Okayama Prefectural Government to recommend a proficiency test examiner, for which I was appointed. Since then, I have assumed the position for about a quarter of a century. Our company has produced about 50 certified technicians to date.



Commendation certificate of the Order of the Sacred Treasure, Silver Rays

Received the Order of the Sacred Treasure, Silver Rays for my contribution to the proficiency test and other work

I received several commendations for my contribution to the proficiency test, but when I was informed I had received the Order of the Sacred Treasure, Silver Rays at the Spring Conferment of Decorations*, I was surprised rather than pleased. It gave me a feeling of tension and determination. As a proficiency test examiner, I was evaluated as having contributed to the education and development of younger people, and improvement of the technical level in the powder metallurgy industry. However, it was all a result of the guidance I received from many superiors and the support of my colleagues and subordinates. In this sense, I consider that I was granted the award as the representative of all my fellows, including my superiors and subordinates.

Tool manufacture that makes full use of powder metallurgical technology is like the world of the tortoise in the fable “The Tortoise and the Hare.” It is impossible to instantly accomplish a goal like a hare. We can succeed as a tool manufacturing technician only by steadily accumulating skills and know-how step by step like a tortoise. Making “consistent and steady” efforts is my style and method as a technician. I will make young people aware of the importance of making efforts in a “consistent and steady” manner. Meanwhile, there is a huge difference in tool manufacturing technology between now and the time I was involved in it for the first time. It is now possible to control many things that used to require manpower by using cutting-edge equipment. It is expected that AI and other technologies will accelerate mechanization and automatization in the future. Therefore, I expect young people to think creatively without being bound by conventional methods. To return the favor I have received from many people involved in the industry, I will communicate the attractiveness and fun of tool manufacture while providing young people and women with opportunities to work actively and supporting them.

* Bestowed upon individuals of merit, in recognition of their national or public services, and in honor of their distinguished accomplishments in various areas of society.

Making Efforts toward the Utilization of 5G Technology in Factories

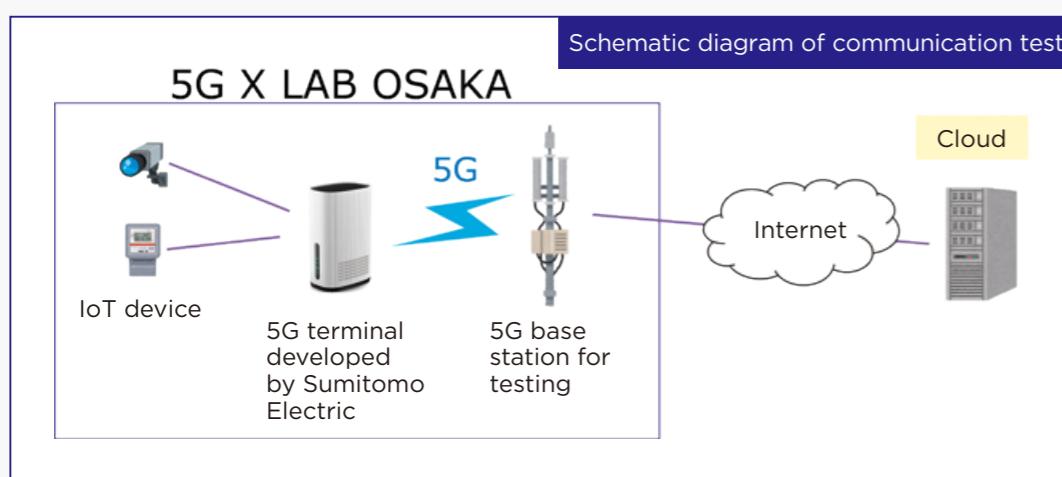
Demonstration experiment on 5G terminals for factory IoT conducted at 5G X LAB OSAKA

A movement is under way to realize DX (digital transformation) through IoT (Internet of Things) communication, which enables information exchange between various interconnected things, and thereby build a highly efficient social system. Playing a key role in such transformation is the fifth-generation mobile communication system, also known as "5G." Sumitomo Electric is making various efforts toward the creation of new products and business using 5G, which enables high-speed, high-volume communication.

In November 2019, Sumitomo Electric announced that it would implement demonstration experiments to utilize 5G



Scene of a communication test at the testing site



QUARTERLY id

Topics from
the future-shaping
Sumitomo Electric
Group

Supporting Tohoku Region as Part of Our CSR

Ten years have passed since the Great East Japan Earthquake

The Great East Japan Earthquake in March 2011 caused devastating damage to Japan. As part of this social contribution, the Sumitomo Electric Group has been holding Tohoku Product Fair annually since 2012, the year after the disaster. In 2020, conventional in-house sales events with physical showcases were canceled due to the COVID-19 pandemic.

Instead, in the Tokyo area, easily enjoyable foods produced in the Tohoku region were introduced through pamphlets for mail



"Kinka Saba" (canned mackerel), specialty of Miyagi Prefecture

"Umakute Shogane" (ginger-based seasoning), specialty of Fukushima Prefecture

"Momo no Megumi" (peach juice), specialty of Fukushima Prefecture

technology in factories jointly with Softbank Corp. In addition, in December 2020, the Company conducted a demonstration experiment on 5G terminals it had developed for factory IoT at 5G X LAB OSAKA,* a public-private partnership facility established to promote 5G utilization. Both activities drew attention as efforts to gather huge volumes of real-time data about the operation status of machinery, and thereby improve productivity and safety at factories.

Sumitomo Electric will continue to seek core technologies that support social system transformation using cutting-edge information communication technologies, thereby contributing to the realization of a comfortable society capable of sustainable growth.

* 5G X LAB OSAKA is a facility jointly established in October 2020 by four organizations—Osaka City, Softbank Corp., Osaka Business Development Agency and i-RooBO Network Forum—to enable companies to implement technical verification of 5G and experience its benefits. The facility is promoting demonstration experiments and business matching to expand the use of 5G. The demonstration experiment conducted this time was the first verification test for the facility.

Sponsored China's 1st National Vocational Skills Competition

Products indispensable for constructing information and communication infrastructures provided to support the event



Gold medalist:
Mr. ZHANG Honghao



Silver medalist:
Ms. CUI Yanxia

Sumitomo Electric served as an official sponsor of the First National Vocational Skills Competition of the People's Republic of China, held by the Chinese Government in December 2020. This event, in which contestants competed in 86 categories and a congratulatory message from Chinese President Xi Jinping was presented, garnered much attention across the nation. Top performers in this competition were selected as representatives of China for the 46th WorldSkills International Competition, to be held in Shanghai in 2022.

Sumitomo Electric provided optical fiber fusion splicers, optical wiring materials and technical support for the information network cabling competition, in which contestants competed on accuracy and speed to construct an information wiring system suitable for factories, buildings and houses. Contestants who used the Sumitomo Electric products gave remarks like, "The product performs well at fusion splicing and is highly reliable," and "It's easy to use because

it can splice so quickly." The organizing committee also highly evaluated the company's products and support.

Sumitomo Electric will strive to line up a wide range of products indispensable for constructing information and communication infrastructure, and provide high-quality products with features that satisfy customer demand. The Company will also support activities to improve the industrial base of Japan and other countries.

Main products provided by Sumitomo Electric



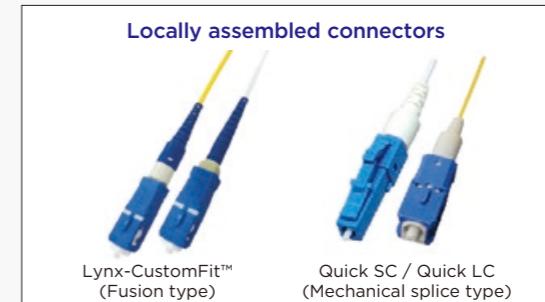
Gold medalist
Representative of Tianjin
Mr. ZHANG Honghao

I practiced for eight to 12 hours every day to win the gold medal. Sumitomo Electric's fusion splicer is so reliable due to its high accuracy and quality that I could participate in the competition with complete peace of mind. I will continue training to win the gold medal in the WorldSkills International Competition, which will be held in Shanghai in 2022, so I highly appreciate Sumitomo Electric's continued technical support.



Silver medalist
Representative of Guangdong
Ms. CUI Yanxia

To participate in this competition, I needed to win the preliminary competitions in my district, city and province. I have continued to practice for a year to overcome these difficult hurdles. Sumitomo Electric's fusion splicer that I used in this competition could splice very quickly, and the Company's optical fiber cleaver was also very easy to use. I also appreciate the incredible technical support provided by the company.



Reference: Information related to fusion splicers



Web site

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A Picture of Sumitomo Electric in Those Days

1970

Osaka Expo



Traffic Game at the Automobile Pavilion

Products of Sumitomo Electric Utilized at the Japan World Exposition

In 1970, the Japan World Exposition was held in Osaka as the first international exposition in Japan, arousing a ripple of excitement throughout the nation. The "Traffic Game," exhibited by Sumitomo Electric as the primary feature of the Automobile Pavilion, was a unique style of exhibition that visitors could take part in and enjoy. Players drove a mini car on a grid track in an open circular space, within which the other players' colorful mini cars drove around, and aimed to travel between a base on one side and another base on the opposite side within a time limit of about two minutes. Players who could successfully cross over three times in a row received a gift. Among some 250,000

participants, only 3% succeeded. The exhibition was visited by members of the Imperial Family, including the then Crown Prince, on as many as five occasions. In addition, the Company's power cables and steel cords (for moving walkways) were also used for the Osaka Expo. It is said that moving walkways started to spread around the world following the Osaka Expo.

More than half a century has passed since Osaka Expo. In 2025, the World Exposition will be held again in Osaka, Kansai under the theme "Designing Future Society for Our Lives." It is expected to trigger once again the birth of new technologies and products that enhance our lives.

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

<https://global-sei.com/id/>



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