A Picture of Sumitomo Electric in Those Days

1897

Sumitomo Copper Rolling Works (Formation of the Company)

Full view of Sumitomo Copper Rolling Works in Ajigawa (Photo courtesy of Sumitomo Historical Archives)

Mutual Prosperity, Respect for the Public Good: Inauguration of Sumitomo Electric

Japan took a dramatic turn towards modernization during the Meiji Era. At that time, gaining momentum from the prospering Mt. Besshi Copper Mine, Sumitomo expanded its business into various fields, including electric wires, forestry, coal, construction, machinery, the chemical industry, and the metal-working industry.

Sumitomo Copper Rolling Works, the origin of Sumitomo Electric, was born in 1897 in Osaka. The post-Sino-Japanese War economic downturn caused Nihon Seido Co., Ltd. to fall into dire straits. Sumitomo acquired the company and founded Sumitomo Copper Rolling Works with the belief that shortages of copper products must not occur because they were essential to the modernization of the nation.

Meanwhile, smoke from copper smelters in Niihama, Ehime Prefecture was continuously wreaking fatal damage on agricultural fields and mountain forests. Sumitomo addressed this smoke problem by investing a large amount of money and relocating all the smelters to an uninhabited islet (Shisaka) off the coast of Niihama. While the encouraged rapid industrial development was leading to pollution problems, there were no other cases of pollution problems solved voluntarily on the part of the private sector.

That was an example of the realization of the Sumitomo Spirit “Mutual prosperity, respect for the public good.” We have been adhering to this spirit for years: “Sumitomo’s business must benefit not only Sumitomo itself but also the nation and society in general.”

id Sumitomo Electric Group Magazine vol.01

Information and videos not posted in this magazine are found on the "id" special site
http://global-sei.com/id/

Issue: Summer 2017
Publisher: Sumitomo Electric Industries, Ltd.
(Public Relations Department)
4-5-33, Kitahama, Chuo-ku, Osaka, Japan
Publisher in charge: Yuichiro Horiba
Editor: Universal Combo Inc.

SUMITOMO ELECTRIC

OSAKA-KANSAI JAPAN EXPO2025

id

Sumitomo Electric Group Magazine

vol.01

Innovative Development, Imagination for the Dream, Identity & Diversity

Feature article

International Submarine Cable Project

Installing the world’s highest voltage DC XLPE insulated cable across the English Channel

SUMITOMO ELECTRIC GROUP

Interconnecting European Grids to Allow Sharing of Renewable Energy

UK-Belgium Interconnector Project

There is a growing global trend of shifting away from the use of fossil fuels. Specifically, in highly environmentally conscious Europe, each country is promoting the construction of renewable energy facilities, such as wind, hydropower, solar, and biomass power generation plants. However, renewable energy sources are subject to unstable power output. The concept of a super grid is to keep a balance between supply and demand of energy and to efficiently use renewable energy by flexibly supplying and consuming it within the region. Based on this concept, many international interconnectors have already come into operation in Europe.

The UK implemented electricity deregulation ahead of other countries in the world. For a large part of its energy sources, the country relied on domestic fossil fuels such as coal, oil, and natural gas. However, due to decreases in the output of these fossil fuels, the UK has become an importing country. Consequently, electric power rates increased in the country as a result of soaring fuel prices in the world. Moreover, the EU countries have targets to achieve by 2020 of:

- A 20% reduction in greenhouse gas emissions (based on 1990 levels)
- 20% of EU energy supplied from renewables

The challenge, therefore, is to supply safe and secure electricity at low cost without relying on fossil fuels.

Meanwhile, Belgium is greatly interested in exploring new markets for its renewable energy. The purpose of the international UK-Belgium interconnector project featured in this article is to help reduce carbon dioxide emissions by utilizing renewable energy generated in Belgium and to supply low cost and stable electricity to the UK.

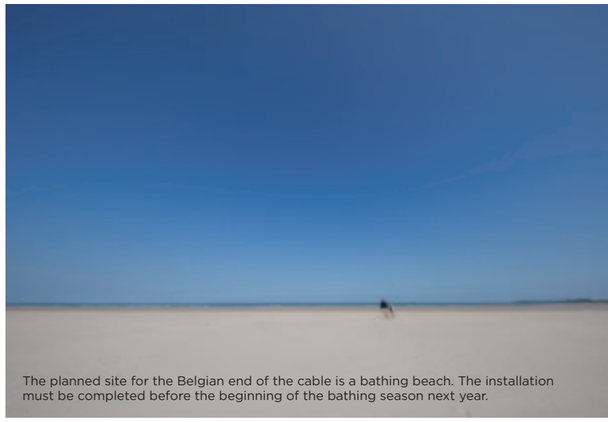
International Submarine Cable Project

London at dusk. A view of the city from The Shard, the tallest skyscraper in the EU.

Planned site for the UK end of the submarine cable

Power Transmission from Sea to Land and Between Countries Throughout Europe

Construction site information board



The planned site for the Belgian end of the cable is a bathing beach. The installation must be completed before the beginning of the bathing season next year.

Mega project put into motion over a distance of 141.5 km

Ramsgate, Kent (a one-hour express train ride from London) is located in the south east of Great Britain; it is one of the closest points to continental Europe. To the east across the sea is Zeebrugge, a port town in Belgium. An interconnector cable system is currently being installed between the two towns.

The project is being implemented by Nemo Link Limited. The company is a joint venture between National Grid plc and Elia, power transmission companies and system operators in each country. Nemo Link was founded to construct the UK-Belgium interconnector to be completed in 2019 and operate for at least 25 years. The installed interconnector cable will be at the core of the company's business.

The overall length of the UK-Belgium interconnector is 141.5 km. The project is a large one, with its submarine section alone being 130 km long. Sumitomo Electric and J-Power Systems of the Sumitomo Electric Group were awarded a comprehensive contract for the design, manufacture, installation, and maintenance of the interconnector cable system. We are the first non-European companies to win a contract for an international interconnector in Europe.

The UK-Belgium interconnector project will have a substantial impact on future power flows in both countries. It is no exaggeration to say that power generated primarily from renewable energy sources is the first step to build a sustainable future.

The submarine cable installation will commence in August 2019 and is scheduled to be completed by the end of the year. This article describes the various challenges we needed to address during the process of winning the contract for the project and its significance.

Key companies working for UK-Belgium interconnector project and their roles

Nemo Link	A joint venture between British National Grid and Belgian Elia; the operator of the project
Sumitomo Electric / J-Power Systems	With overall responsibility for the project, in charge of cable manufacturing, system design, and installation management. J-Power Systems developed the XLPE insulation material selected for the project. This material exhibits the world's highest performance and versatility.
Balfour Beatty	British construction company, in charge of installation on UK and Belgian on-land sites.
DeepOcean	Darlington-based offshore construction company, in charge of submarine cable laying.

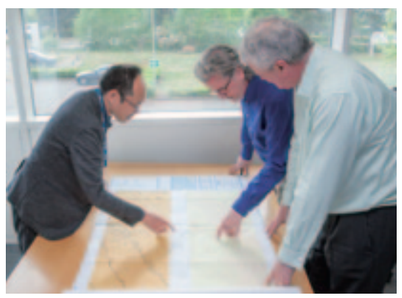
Starting from scratch

"What is going to happen if I continue failing to win contracts?" In London in 2011, Toshiyuki Furuhashi was fighting a series of hopeless battles. An increasing number of renewable energy facilities such as of offshore wind power generation plants were being constructed in Europe. In the region, there was growing demand for interconnector cables used to transmit electricity from sea to land and across national boundaries. The Sumitomo Electric Group was determined to gain entry to the European market. Furuhashi's mission was to explore the market.

However, the Sumitomo Electric Group had almost no brand name recognition or sales track record in the European power cable market. Furuhashi visited Europe a number of times a month with engineering and construction staff to approach transmission companies. Although it was not easy for him to meet the right people in these companies, he was sure that a market certainly existed in Europe. Additionally, the Sumitomo Electric Group possessed high-voltage DC (HVDC) interconnector cable system technology unavailable from any of its competitors. Furuhashi was supported by these two convictions. He says that he was sure to find a breakthrough, despite feeling frustrated from multiple failures to win contract.

Toshiyuki Furuhashi, project sales representative

At the end of 2011, Furuhashi came across tender information for the UK-Belgium interconnector project. The project description appeared favorable to demonstrate the potential of the Sumitomo Electric Group's DC cable technology. The team led by Furuhashi visited the prospective client frequently to provide them with general information about the Group, including the corporate philosophy, technical prowess, performance, and financial strength. However, the team received no invitation for the bidding. "We had no proven track record in the European market. To gain trust in us as a cable manufacturer, it was vital to invite them to Japan, introduce them to Japanese culture, show our manufacturing process on site, and help them to become familiar with Japan and Sumitomo Electric." With this notion in mind, he strived to arrange a tour of the cable factory. Consequently, in a company-wide effort involving the sales, engineering, and installation sections, he managed to gradually build the client's trust in Sumitomo Electric. These efforts finally led to a tender invitation. In 2012, Sumitomo Electric was prequalified and lined up at the same starting line with its competitors for the bidding.



Meeting using a sea floor map; Takuya Miyazaki in charge of installation on the left

Significance of the world's first HVDC XLPE insulated cable operating at maximum of 400kV

"Without Sumitomo Electric Group's insulation technology, we would not have won the order," says Takuya Miyazaki in charge of installation for the project. The project selected the world's first HVDC XLPE insulated cable operating at a maximum of 400 kV commercialized by the Sumitomo Electric Group.

Shinya Asai, General Manager, Nemo Link Project Office comments on the XLPE insulated cable.

The Sumitomo Electric Group has worked on the development of proprietary polymer-based insulation technology since the 1980s. In the area of XLPE insulation materials for use in DC transmission cables, the Group was conducting research a step ahead of its competitors. Nemo Link indicated a voltage requirement of 400 kV for the current project. Sumitomo Electric was the only company that had developed a DC XLPE cable system rated for such a high voltage, completed a long-term (one year) operation test in accordance with the applicable international standards, and made it available as a commercialized product.

Moreover, XLPE was a major contributing factor to winning the contract for the project due to its cost competitiveness as exemplified by its higher allowable operating temperature than conventional cables, permitting higher transmission capacity for a given conductor size. In addition, the client highly valued the eco-friendliness of the polymer-insulated XLPE cable in comparison with conventional oil-insulated cables.

The world's first use of the 400 kV DC class XLPE insulated cable certainly meant that the project would be landmark for the electricity industry.

One reason that we selected the Sumitomo Electric Group despite its lack of proven track record in Europe was our agreement on the contract conditions. Besides, our series of negotiations showed that they were firmly determined to successfully complete the project. In a factory tour I once participated in, I saw their perfect way of managing the most important process of cable manufacturing. We were concerned about the world's first use of 400 kV DC XLPE insulated cable.

Mike Elmer
Project Director
Nemo Link Limited

However, the product was suitable for the highly environmentally conscious European market. Therefore, we felt it was very important to try and support the manufacturer's time and development expenses spent on the new product. Ultimately, it was the combination of Sumitomo Electric's expertise, commitment, and overall commercial package that allowed them to win the tender.

Since the launch of the project, I have seen that they are highly motivated to meet challenges in all aspects and therefore feel confident about their performance. Sumitomo Electric is not a company that always says yes in negotiation. They do say no, yet with reasons and alternative solutions. This is very important. We would like to build a long relationship with the Sumitomo Electric Group.

We set new standards for HVDC cables

The opportunity had come for Sumitomo Electric to participate in the bidding. We were confident about our cable technology and process management from manufacture to shipping. However, there was a huge difference in the standard business practices between Europe and Japan. In Europe, it was standard to sign a package contract known as "engineering, procurement and construction (EPC)" covering system design and installation, with it being rare to simply provide cable manufacturing and supply. Consequently, it was necessary for us to build the framework and expertise required for completing cable installation.

Furuhashi and Sumitomo Electric team members made every effort to find construction companies that had the required experience and knowledge of projects in Europe. Since the Sumitomo Electric Group had no track record in the region, it was extremely difficult to find a construction company that would collaborate with the Group. There were times when even our request for a quotation was declined. Several months had passed since we began the search for construction companies everywhere in Europe. Then finally, we encountered Balfour Beatty plc capable of undertaking installation on land and DeepOcean specializing in subsea installation. Danny Kelker of DeepOcean explains why they accepted our request: "DeepOcean has installed cables manufactured by Sumitomo Electric on previous projects. We were impressed by the quality of the technology, so are pleased to be working again with Sumitomo Electric to deliver this contract with them." It was their trust in the Sumitomo Electric Group that convinced them to be our partner. The construction companies provided us with their views and support, which were indispensable for preparing the bid documents. It took one year for us to complete the bid documents, which amounted to a stack of files 10 cm thick, containing 20 volumes, a very substantial package.

This was only the beginning of the real challenge. The bid documents were regarded as a proposal. After bidding, negotiations took place between the client and bidders, through which the client determined the winning company.

Business customs were completely different from those in Japan. One day, Furuhashi arrived at the negotiating table by himself. The client was accompanied by a team of attorneys at the table. "They looked at me probably wondering why I had showed up without legal experts.

I was completely ignorant about the proper form of negotiation in Europe," he recollects. He immediately hired attorneys and consultants well-versed in contracting in Europe to prepare for a full negotiation process.

The post-bidding negotiation continued for two years. In Europe, contract conditions are far more detailed than in Japan due in part to differences in historical and cultural backgrounds. In the course of the negotiations, Furuhashi nearly gave up a number of times. Nonetheless, he persevered because he had confidence in the technical prowess of his company. "Once the contract is concluded, our project team will overcome any challenges and complete the assigned tasks. I had no doubt about this."

Negotiations were protracted. Furuhashi responded to the client's concerns by suggesting solutions repeatedly in collaboration with the executives and many relevant staff in the company and clarified each condition. The 1,000-page contract was finally completed in 2015 although there had been many twists and turns. A big signing ceremony was held in London with the attendance of officials from both the British and Belgian governments, executives of Nemo Link, its stakeholders National Grid and Elia, and of the Sumitomo Electric Group. The Nemo Link and Sumitomo Electric Group staff looked back with deep emotion on the long course of the contract negotiations. It was the moment when the Sumitomo Electric Group became the first Japanese firm to enter the European interconnector cable market.

Sean Phillips, who once worked as an engineer, takes charge of the installation work.

400 kV DC XLPE insulated cable samples: land cable (left) and submarine cable (right)

On-site installation team led by Teruaki Kawaguchi (front row, third person from left) Experts from European countries and Japan developed a good team

In-depth communication in place to build mutual trust

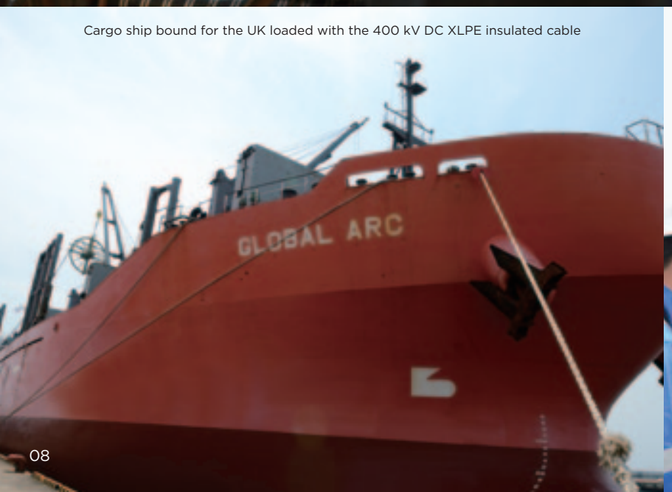
Bonds Created by Overcoming A Number of Challenges

Workers at the cargo bay of the ship bottom check that the cables are properly wound to prevent cargo shift.

400 kV DC XLPE insulated cables are loaded onto the freighter. The cables are wound in layers at the bottom of the freighter using a rotating machine.

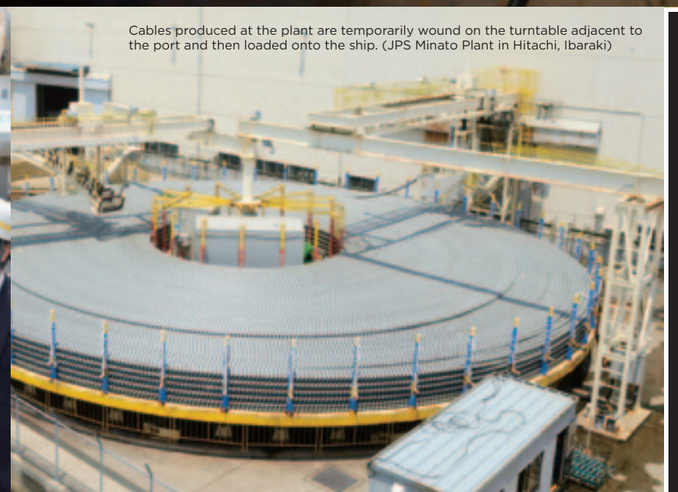
Reaching out to People Longing for the World's First Technology

–400kV DC XLPE insulated cable across the ocean–

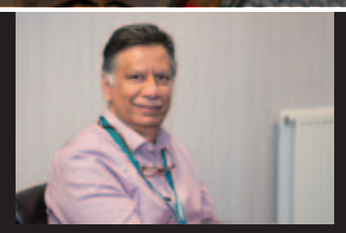


Cargo ship bound for the UK loaded with the 400 kV DC XLPE insulated cable

Inspection tour members from the Belgian company Elia watch the systematically performed shipping work, guided by Takahiro Nakano (third from left), Managing Executive Officer and Shinya Asai (far right), General Manager, Nemo Link Project Office of Sumitomo Electric.



Cables produced at the plant are temporarily wound on the turntable adjacent to the port and then loaded onto the ship. (JPS Minato Plant in Hitachi, Ibaraki)



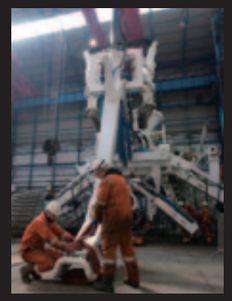
DeepOcean specializes in the challenging delivery of offshore power cable projects.

The current project uses DeepOcean's unique cable lay vessel, the Maersk Connector, and the DeepOcean's unrivalled trencher, the T3200, to lay the cables a depth of 3m below the seabed. Unexpected difficulties may be encountered. It is also necessary to use a technique to cross other existing cables.

A mega project of this scale poses a formidable challenge to us. Boosting the morale of all the team members, we will meet the challenge and are determined to achieve success.

Danny Kelkar

Senior Project Manager
DeepOcean Limited



Trenching machine T3200 designed for laying the submarine cable

Meeting Tough Challenges to Be a World Leader

Cable shipping work progresses steadily according to schedule. This cable unites Europe.

Development of the project draws the world's attention

In June 2017, a large cargo ship left Hitachi Port, Ibaraki Prefecture, Japan. The load was transmission cables 118 km in length and 5,200 t in gross weight destined for laying between the UK and Belgium.
Satoshi Nishikawa, General Manager, Engineering Department says: "It took about one year to manufacture the cable. We could not afford to fail in the production of the world's first product. Accordingly, we constantly adhered to the quality first principle." The cable will arrive in the UK by the end of July to start subsea installation in August.

Submarine cable installation is subject to a number of uncertainties, including adverse weather, unexploded ordnance and seabed mobility.
A lot of work has been undertaken to mitigate these risks in advance of the installation operations. For example, a seabed survey in the UK offshore sector of the cable route discovered five mines remaining from the First and Second World Wars.

There are also significant 'local' program constraints such as no access to the beach in Belgium due to the tourist season and no access to the beach in the UK between October and March due to environmental restrictions.
"All of the aforementioned factors mean that considerable effort is required in the planning of the works in order to avoid delay to the project completion date (31 January 2019)" says Sean Phillips, the person responsible for the installation work.

The current project team consists of 25 members. They are specialists of various nationalities including the UK, Belgium, the Netherlands, and Ireland. They can be compared to a professional football team. Teruaki Kawaguchi, who supervises installation on site believes: "The members will function as a team if they play their roles properly in their assigned positions. The key to success lies in pursuing total optimization while taking the most advantage of partial optimization."

The Sumitomo Electric Group's winning contract for the international UK-Belgium interconnector project had a large impact on the European electricity industry. Everyone in the sector now knows the Sumitomo Electric Group brand. It is of great significance that Sumitomo Electric has gained a position as a player. Both the British and Belgian governments, as well as the electricity industry, are following, with considerable interest, how the construction project develops.

Furuhashi states "Successful completion in January 2019 of this project will let us rise up in public esteem even more. That would leave us with great proven performance in installing the world's first HVDC DC XLPE insulated cable operating at a maximum of 400 kV. Moreover, what makes me happy is the notion that through this project we will be able to help solve some social challenges in Europe. I will continue to make the most of the technology and human expertise of the Sumitomo Electric Group from a global perspective."

Furuhashi is ready to meet the challenge of the next project.

"If a leader gives up,
the subordinates always sense it.
If the leader says ' It can't be helped,'
they give up making further attempts.
That's why I never say timid words."

id
Featured person

Osamu Inoue

President & COO

1975: Joined Sumitomo Electric Industries, Ltd.
1990: Worked at Sumitomo Electric Wiring Systems, Inc. (U.S.).
2001: General Manager, Automotive Division, Sumitomo Electric Wiring Systems, Inc.
2006: Director, Managing Executive Officer, Sumitomo Wiring Systems.
2007: Director, Senior Managing Executive Officer, Sumitomo Wiring Systems.
2008: Managing Director, Sumitomo Electric Industries, Ltd.
2009: Director, Sumitomo Electric.President, Sumitomo Electric Bordnetze GmbH (Germany)
2012: President and Chief Executive Officer, Representative Director, Sumitomo Wiring Systems.
2017: Appointed as President & COO, Sumitomo Electric.

The origin of business management that I learned from bookkeeping job

I joined Sumitomo Electric in the early days of fiber optics because of anticipated further growth in the communications business.

I was assigned to the Accounting Department. My first task was cost accounting for brake products at the Itami Works. Looking at brake drawings and checking each part, I entered its cost in a part conversion chart. At that time, the Accounting Department office had only five large computers. As such, I used an abacus for the calculations. It was then that I began my career as an accountant.

As I learned the basics of work at the Accounting Section of Osaka Works, I believe I gained valuable experience during the 12 years I was there. I took charge of bookkeeping for power transmission cable installation projects. The Company was then busy implementing construction projects overseas, such as a transmission cable installation in Iran and an underground line installation in Saudi Arabia. Our bookkeepers in charge of the construction projects received bankbooks and cashbooks from the overseas project site staff and, in Japan, recorded the information as accounting items. My task was to inform the construction staff of the then current expenditures vis-à-vis the overall construction budget. Through that work, I was able to learn what operations were carried out on site and what kinds of expenses were incurred.

Meanwhile, in our tax inspections, tax inspectors were most interested in construction-related expenses. Construction site expenditures included entertainment expenses. In addition, we needed to deal with remaining materials once the construction was completed. Our bookkeeping was appropriate and of no concern. However, the tax inspectors asked us detailed questions. I gathered the required information and provided them with explanations to their satisfaction.

At the Osaka Works, I took charge of bookkeeping in almost every department related to product sales and R&D, in addition to construction bookkeeping.

All these years of bookkeeping experience helped me acquire the basic skills needed in promoting projects. I believe that, through careful checking of figures, I have honed my ability to gain insight into the true nature of each issue.

Meticulous Checks and Bold Decision

Resuscitate an unprofitable overseas subsidiary

In 1990, I reached a turning point.

I was transferred as a bookkeeping manager to our wiring harness manufacturing subsidiary in the United States, because the company began to incur excessive debt. Although soon after my joining Sumitomo Electric I had worked in Nigeria as a bookkeeper, this was my first time to work on loan as an executive.

My subsequent experience abroad shaped me as a corporate manager.

The first challenge I faced in the U.S. was, to my surprise, the task of payroll calculation and the payment of withholding income tax to the government. The challenge involved making weekly payroll calculations and writing checks for some 10,000 employees due to the weekly salary system prevalent in the U.S. The workload was quadruple that I had performed in Japan, where monthly salary systems were common. Without my experience in Osaka, I wouldn't have been able to cope with the challenge.

The revitalization process was a succession of difficult challenges.

To solidify the company's financial base, I requested Sumitomo Electric to implement a capital increase, while implementing price increases to rebuild the company. To cut the manufacturing cost, I accomplished a buyout of a low-labor-cost Mexican company and carried out factory relocation. That was my first M&A experience.

After the company's revitalization in the U.S., which took six and a half years, I returned to Osaka. After some time when I had adjusted to my life in Osaka, I was notified that I would work in Indonesia. The purpose of this mission was to resuscitate a wire manufacturing company, a Sumitomo Electric affiliate, which was suffering from poor performance due to the Asian Financial Crisis.

In 1998, I was assigned to the new post two weeks after the 1998 Tragedy. Two years later, however, the Indonesian domestic market was still stagnant.

As a solution to that situation, I developed a system to export and sell products manufactured in Indonesia to customers in Japan. The system was quite successful. The company's business began to recover. I also worked as the President of a locally incorporated subsidiary of the wire manufacturing company and learned about difficulties associated with sales and cash flow.

In 2001, I returned to Japan. I was later transferred to Sumitomo Wiring Systems and subsequently promoted to an officer. Soon after that, I was recalled to Sumitomo Electric.

That was in 2008, the year of the global financial crisis. Sumitomo Electric's subsidiary in Germany had entered insolvency. I have the impression that I was assigned to an overseas post just at the time when the world economy was undergoing drastic change. In Germany, I restructured the senior management. Since the top executives showed their commitment to revitalizing the company, the subordinates became motivated.

At Sumitomo Electric Wiring Systems, Inc. (U.S.).
For my 40th birthday, I received a present from local staff members.
With the company's return into the black, the atmosphere of the workplace gradually became more cheerful.

This is the philosophy I constantly adhered to: If a leader gives up, the subordinates always sense it. If the leader says "It can't be helped," they give up on further attempts. That's why I never say timid words.

Thus, in a unified effort, all the employees paved the way for revitalization.

Each task of resuscitating an overseas subsidiary was tough. But I now think they gave me valuable experience. As soon as the company returned to the black, the employees looked different. I strongly felt the importance of making a business truly profitable.

I would like to help the Sumitomo Electric Group grow into an assemblage of companies with happy workplaces that are a joy to work for. This notion probably stems from my experience at the Group's overseas subsidiaries.

Proper business management to ensure contribution to society and profitability

I believe that there are two essential things for a company to pursue.

One is to continually provide its customers with quality products; in other words, to contribute to society through its products. The other is to be constantly profitable. To achieve these goals, in my opinion, proper business management must be in place. I use this expression, "Conduct meticulous checks and make a bold decision."

I have acquired the habit of looking up details through my years of cost calculation and other experience. In addition to cost data, acquire as much information as possible, including customer and equipment data, to carry out an assessment and make a decision immediately whenever the need arises. This is essential for business management.

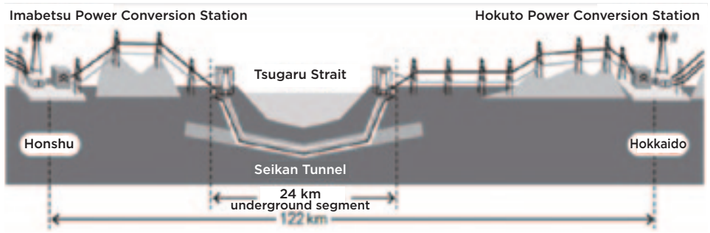
For instance, consider what items you should focus on for development and evolution for the sake of our customers. It may sometimes be necessary to slow down the development process. In such a situation, it is very difficult to make an optimal decision. Therefore, you need to examine the situation from multiple perspectives.

Since its founding 120 years ago, the Sumitomo Electric Group has achieved solid growth. The Group has steadily striven to manufacture items useful for society. It is not necessary to imitate someone's way or try to achieve a big hit. Rather, it is important to improve the present situation little by little to provide products with increased potential to contribute to society.

Working steadily for substantial achievements must thus be essential to the way of a business that makes all of its customers, shareholders, local communities, and employees happy.

Contribution to Stable Interregional Electricity Supply

After being pulled into the tunnel, the cable is placed on supports mounted on the ceiling.



Cross-sectional view of Hokuto-Imabetsu DC trunk power line route
(Source: Hokkaido Electric Power Co., Inc. website)

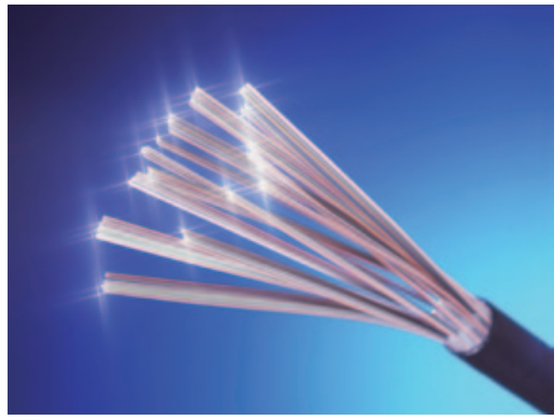
Nowadays, stable electricity supply is a formidable challenge. Bipolar submarine cables (total transmission capacity: 600 MW) are installed across the Tsugaru Strait between Hokkaido and Honshu islands in Japan. To make electricity supply more reliable in Hokkaido, Hokkaido Electric Power Co., Inc. has additionally planned the installation of a 300 MW interconnector, which is the Hokuto-Imabetsu DC Trunk Power Line connecting Hokuto Converter Station in Hokkaido with Imabetsu Converter Station in Honshu. Of the line length of 122 km, Sumitomo Electric won a contract for a 24 km underground power transmission cable installation in the Seikan Tunnel. The cable selected for this project was a 250 kV XLPE cable with excellent DC characteristics. This is the world's longest ultra-high-voltage cable installation in a strait tunnel.

One major feature of this project is the installation work in a long undersea tunnel. The installation work will take place in the service tunnel provided along the main tunnel through which Shinkansen bulletin trains run. It is necessary to coordinate the work carefully with other contractors to avoid the duplication of operations, accidents, or trouble. Sharing this awareness among all those concerned, Sumitomo Electric is promoting the project in a concerted effort toward the commencement of service scheduled for March 2019.

Infrastructure for Networked Society of Big Data Age

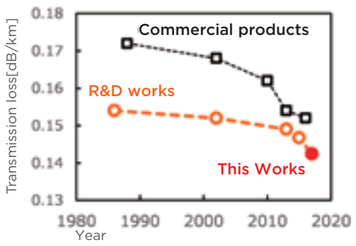
Since communications networks have come into widespread use, various things are connected to networks in the form of cloud computing, including automobiles and industrial equipment, as well as smartphones. This is the development of the Internet of Things (IoT). The IoT produces big data. New services emerging from the use of big data are expected to improve the quality of our life and productivity. In the era of big data, high-capacity and high-reliability networks are increasingly important as infrastructure.

The volume of global network traffic in 2020 is predicted to increase to more than 200% of the 2016 level. Meanwhile, available energy and space are limited. Hence, the industry has been facing the need to improve the performance of optical fibers that carry information.



Since the 1980s, Sumitomo Electric has been a world leader in the development and commercialization of optical fiber technology, including low-loss transmission. Our latest development is an optical fiber that breaks the world record for transmission loss* by a large margin. This optical fiber reduces transmission loss to 0.1419 dB/km at the lowest-loss wavelength of 1560 nm, and to 0.1424 dB/km at the prevalently used communication wavelength of 1550 nm. Both of these are world-record-breaking figures. Low optical signal loss translates to increases in transmission capacity and an extended transmission distance. Take, for example, the application of the optical fiber to submarine cables crossing the Pacific. The results include reduced construction and energy costs made possible by using a reduced number of repeaters. Sumitomo Electric will work on the development of ultra-low-loss optical fiber products for the further evolution of communications networks.

History of transmission loss reduction



* The rate of decrease in optical energy. When light is passed through an optical fiber, its optical energy decreases due to partial scattering and absorption. With a lower transmission loss, optical signals can be transmitted over a longer distance.

Advanced Wastewater Treatment for Aquatic Conservation

The issue of water contamination is a challenge currently facing the international community. The Sustainable Development Goals (SDGs) published by the United Nations refer to the issue of water quality, setting a goal of reducing emissions of untreated water by half by 2030. Specifically, in economically fast growing nations, rivers polluted with industrial and domestic wastewater have adverse effects on human health and the ecological system, due to industrialization and urban population concentration.

Sumitomo Electric has been manufacturing POREFLON* filtration membrane modules since 2003 for the treatment of industrial wastewater and sewage. Features of the module include superb chemical resistance, high strength, high permeability and heat resistance. The product has been shipped to many projects in the industrial wastewater sector in Asia and North America, as well as in Japan. Using the POREFLON™ module as a key part, Sumitomo Electric has built a membrane-separation wastewater treatment system consisting of a membrane tank, pumps, an aeration blower, and a control board.

This treatment system was selected by Kaihara Co., Ltd., a leading manufacturer of high-quality denim, and is already in operation, for wastewater treatment at the company's Kisa Plant and the newly constructed Thailand Plant.

In cooperation with Kaihara and Sinyu Co., Ltd. (a trading company dealing in industrial machinery and chemicals), Sumitomo Electric conducted a pilot test for about 18 months treating wastewater containing persistent polyvinyl alcohol (PVA, a synthetic resin), which readily contaminates the membrane. The client evaluated the system's performance favorably and made a decision to use it. Since the commencement of operation, the treatment system has exhibited stable performance free from the effects of changes in wastewater volume, concentration or weather. In addition, it has brought significant improvements in terms of energy cost and installation footprint. Sumitomo Electric will continue to contribute to aquatic conservation, making optimal use of the features of POREFLON ™.

* A porous material made of 100% polytetrafluoroethylene (PTFE) resin

QUARTERLY
id

Topics from the future-shaping Sumitomo Electric Group

Wastewater treatment system installed in the Kisa Plant

Wastewater treatment system installed in the Thailand Plant