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Sumitomo Electric Group Magazine

vol. **09**

**Innovative Development,
Imagination for the Dream,
Identity & Diversity**

Feature

Freight Railway Construction Project

for India's Accelerated Economic Growth

A freight train passes by the freight railroad now under construction. The increasing transportation volume should be solved by suitable measures (near Jaipur).

With the largest territory in South Asia and the world's second largest population, India is a big country comprising diverse ethnic groups and cultures. Since its independence from the United Kingdom in 1947, the economy has grown, overcoming conflicts with its surrounding nations. Specifically, since the turn of the century, it has achieved rapid economic growth due to economic deregulation policies adopted in the 1990s. India achieved a GDP growth rate higher than 9% in real terms for three consecutive years beginning in 2005 (according to an IMF survey). Furthermore, according to a forecast by the Asian Development Bank, the nation is predicted to achieve 7% economic growth in 2019, which is at the highest level among the countries known as emerging economies.

As a result, India is facing the problem of a rapidly increasing volume of freight transportation due to economic growth. The country's freight transportation is growing at an annual rate of approximately 15%, so the current transportation capacity is approaching its limit. For this reason, it is an urgent challenge for the nation to develop or strengthen its freight rail network for mass rapid transit. Having considered the situation, the Indian government announced a course of action to improve the national railway infrastructure. As a long-time friendly nation, Japan decided to provide India with yen loans through intergovernmental negotiations. It is a major national project building a 1,500 km railway exclusively for freight transportation between the two big cities of Delhi and Mumbai to form, literally, a vital artery in India. For this project the Sumitomo Electric Group has shipped contact wires which transfer energy to railway vehicles.

This is a story about the challenges faces by the sales team in Japan and India, as well as the production team in Osaka plant, which produced and shipped contact wires on such an unprecedentedly large scale.

The Rapidly Growing Economy of Superpower India

—Build a vital 1,500 km artery between Delhi and Mumbai—



An inland container depot (ICD) that collects internationally traded goods. After clearing customs, the goods are loaded into containers and transported by trucks and freight trains (near Delhi).

A fleet of container trucks; Each of these containers hold two automobiles (near Delhi).



Project Backed by Good Relationship between Japan and India

—Freight railroad for a quantum leap in mass rapid transit—



Western Dedicated Freight Corridor with contact wires installed (near Jaipur)

Sumitomo Electric's contact wire drums transported from Japan

Proof of Friendship between Japan and India: Unprecedentedly Large Yen Loans

The background to the project is the friendship fostered between Japan and India. In old times, in the Meiji period (1868-1912), raw cotton from India helped Japan grow its textile business. After World War II, iron ore from India contributed to the growth of the steel industry in Japan. In 1958, Japan provided India with the first yen loans. Currently, Japan provides its largest yen loans to India, amounting roughly to ¥400 billion in fiscal 2017 and a cumulative total of approximately ¥2.64 trillion between fiscal 2008 and 2017. The two countries with their historical background began accelerating their relationship into

higher gear when Japanese Prime Minister Junichiro Koizumi visited India in 2005. At the time, Prime Minister Koizumi offered an aid for the construction of part of the planned freight corridor, approximately 2,800 km in total length. Later, the Japan International Cooperation Agency (JICA), in charge of yen loan projects, conducted a feasibility study. In 2008 when Indian prime minister Manmohan Singh visited Japan, Taro Aso, Japan's Prime Minister at the time, told him that Japan would provide India with yen loans for the construction of the approximately 1,500 km railway between Delhi and Mumbai. As aid given for a single project, the total amount was the largest in Japan's history.

Getting Business Opportunities from Freight Demand

For the approximately 1,500 km project between Delhi and Mumbai, Phase 1 focuses on special high-priority sections between Rewari and Vadodara (approx. 920 km) and Phase 2 works on sections between Dadri and Rewari and between Vadodara and Mumbai (approx. 550 km). In addition to construction of the freight railway, the project will provide fully automated signal and communication systems and introduce a railway electrification system.* Currently, freight and passenger diesel cars run in a mixed manner (at an average speed of between approximately 20

and 30 km/h) between Delhi and Mumbai, taking some three days. In comparison, the newly built rapid freight railway (at a maximum speed of approx. 100 km/h) will connect Delhi and Mumbai in about one day, boosting the transportation capacity three- to fourfold. About the significance of this project to Japan, Mr. Kenichi Kono, Representative at JICA India offices, said:

"The project is known as a special terms for economic partnership (STEP) project. It is a yen loan program provided on condition of procuring materials and equipment of Japanese origin to predetermined proportions. STEP projects employ Japan's superb technologies and expertise and facilitate face-to-face aid with developing countries. Accordingly, the project will help Japanese firms take part in the project and naturally become active in India. Japanese businesses entering the Indian market are increasing exponentially. There are more than 250 business sites operated by Japanese firms in areas between and in the vicinity of Delhi and Mumbai. Currently, a bottleneck in their business is poor transport infrastructure. When improved, the transport infrastructure is anticipated to provide substantial benefits. The project is part of the Delhi-Mumbai Industrial Corridor (DMIC) Project. DMIC is a general industrial infrastructure development project implemented jointly by Japan and India to develop the largest industrial

belt in India. It is expected to provide huge business opportunities in the future for Japanese companies." The project is also designed to reduce impacts on the environment. Replacement of diesel cars with electrified cars and increasing shifts from truck transport to rail transport are expected to reduce CO2 emissions.

* The project planned by the Indian government reaches a total length of approx. 2,800 km, including approx. 1,500 km between Delhi and Mumbai (Western Corridor) implemented by yen loans and the construction of another freight railway between Delhi and Kolkata (Eastern Corridor) funded by the World Bank.

Sumitomo Electric's Track Record and its Pride Providing Contact Wires in Japan

As it is a STEP project, it was a predetermined course of action that contact wires would be delivered by a Japanese firm. A contact wire is an electric wire designed to feed power to electric cars via pantographs, a key part of electrification. The Sumitomo Electric Group began manufacturing and selling contact wires in 1914. For more than 100 years since then, Sumitomo Electric has contributed to the development of railway networks in Japan. Starting by supplying contact wires to Taiwan High Speed Rail in 2004, Sumitomo Electric is gaining speed in entering Southeast Asian markets. The Energy Solution Sales Division pursues electrical power cable related business, targeting the construction of overseas railway and

factories as well as renewable new energy generation plants, in Japan and abroad. Regarding the present state of the business, the division's general manager Hirokazu Kobayashi points out, "The railway market in Japan has matured. Demand is now mostly for replacements. While a number of companies have withdrawn from the railway business, the Sumitomo Electric Group continues to supply contact wires in Japan as it has an obligation to sustain the infrastructure. In contrast, demand for railway wiring is expected to be strong in emerging economies in Asia. In 2013, the Japanese government set the goal of "exporting high quality infrastructure," which spurred Sumitomo Electric to fully study overseas markets. The largest result of its efforts is this project. The amount of contact wires supplied to the approximately 1,500 km track length is the largest in the history of the Sumitomo Electric Group. The Indian market has huge potential. The order for contact wires serves as a platform for Sumitomo Electric to explore the market in India, and is certain to accelerate the Company's railway business in India in the future."

In a STEP project, Japanese companies in the same trade will be competing with us. The Energy Solution Sales Division in close cooperation with the local Indian affiliate strived to win the order.



Orderly rows of poles are erected alongside rails before installing contact wires on the railroad



Wires and a pole supporting them to electrify the railroad



Mr. Kenichi Kono, resident staff member, JICA India Office



Hirokazu Kobayashi, General Manager, Energy Solution Sales Div., Social Infrastructure Sales & Marketing Unit

A Fruitful Consortium between a Japanese Trading Company and an Indian Company

The project is implemented by Dedicated Freight Corridor Corporation of India Limited (DFCCIL), a freight railway corporation under India's Ministry of Railways. Installation of tracks and establishment of electrification, signaling and communications systems totaled ¥350 billion in contract sum. Part of it was won by a consortium formed between Sojitz Corporation (Sojitz), a Japanese trading company, and Larsen & Toubro Limited (L&T), the largest construction & engineering company in India. About the contract process, Mr. Ko Kiyama, Deputy General Manager, Sojitz Corporation WDFC Project Office, said "We began studying the project immediately after 2008, when the Japanese government decided to provide yen loans to the project. It was just after the global financial crisis, so some in the company felt that the project was risky. However, we viewed



Sojitz Corporation WDFC Project Office
Deputy General Manager Mr. Ko Kiyama

it as a new business opportunity and met the challenge. Close communications were established with L&T, our business partner, and we made utmost efforts to carry out the roles assigned to both parties. We worked proactively on analyzing strategies for winning the order and carefully prepared for bidding, which yielded results. In a positive sense, we worked unlike a regular trading company by establishing deeper relationships in India, which appears to have helped us gain the upper hand in the competitive bidding."

After winning a contract bid in 2013, the consortium between Sojitz and L&T began selecting suppliers. As it was a STEP project, they approached Japanese companies in sectors such as railway tracks, wires and transformers, as well as signal and communications systems. Needless to say, they made an inquiry to the Sumitomo Electric Group about contact wires, the key part of electrification.

Formidable Strength of Knowledge Fostered through Domestic Railway Business

In May 2014, Kei Kato joined the Environment & Energy Sales Team (present Energy Solution Sales



Concerted Enthusiasm to Win the Order for Contact Wires

—A bold attempt to conduct business in India—

Constant communication was ensured in meetings between L&T and Sumitomo Electric.

led our activities to win the order," said Kinoshita.

Dealing with Business Practices Specific to India

Kato, Hardesh and Kinoshita sat at the negotiating table with L&T to win the contract. While price is an important factor in any business transaction, the business practices in India are somewhat different from those in other cultures. In Europe, the United States and Japan, price negotiations are made through reasonable evaluation commensurate with the level of quality or technology. However, they found that in India, the price did not link with such an evaluation due to the huge volume of business. "L&T requested a radical price reduction, not just once or twice," recalls Hardesh. Kato and Hardesh were challenged quite a few times, and the negotiations reached a critical point in the Autumn of 2016. It was very difficult to foresee which electric wire manufacturer would win the bid and Kato and Kinoshita were

Installing contact wires

burnt out from negotiation after negotiation. At the time, it became a habit for Kinoshita to say "No" to the other party. It was a series of days full of tension and frustration. Even in those days, Kato carried forward with negotiations in a polite and sincere manner, following the Japanese style of opening the way for an agreeable point for both parties. However, at the last second, he faced a new challenge.

Division) of the Global Business Department. He had worked in the railway sales business in Japan for six years since joining Sumitomo Electric and was promoted to the project for the knowledge he fostered through his experience. His mission was to win the order for contact wires for the Indian project. Kato proposed and quoted products to Sojitz and presented the Company's track record in the railway business and offered price proposals to L&T. In February 2015, he visited India to attend a meeting with L&T, his first visit to the country.

"It was my first visit to India. I was overwhelmed by the powerful and exciting city of Delhi. The scale of the business was far larger than any in Japan. I felt a rush of excitement from the settings in India and the significance of my task. At the same time, I was a little worried about negotiating with a foreign company and of my lack of knowledge on business practices in India," said Kato. He was right, as was proved by how things turned out in the actual negotiations.

A Solid Group of Professionals from India and Japan

SEI Trading India Pvt. Ltd. (SETI), the local Indian affiliate of the Sumitomo

Electric Group, worked in close collaboration with Kato and other head office staff members. SETI is a sales company in India that supplies copper wires and other products of the Sumitomo Electric Group. In July 2015, Hardesh Gupta joined SETI as a specialist in copper with experience in selling copper and aluminum products at a local company for more than 20 years. Like Kato, his assigned mission was to win the order for contact wires, in addition to working on sales promotion in the Indian market. He was at the negotiating table as an Indian staff member.

"My role was to bridge between



Kei Kato, Assistant Manager, Energy Solution Sales Div., Social Infrastructure Sales & Marketing Unit

Indian L&T and the Japanese Sumitomo Electric Group. I collected information at the negotiating table and worked to solve any misunderstandings and problems. Holding conversations between local Indian people is essential for smooth negotiations. It was an important task for me to understand the real intentions behind the other party's words and at the same time ensure their continued interest in the Sumitomo Electric Group. With the understanding that my task was to establish a relationship built on trust, I was determined to act fairly and openly," said Hardesh.



Hardesh Gupta, Manager Sales, SETI (SEI TRADING INDIA PVT. LTD.)

One month after Hardesh joined, Kan Kinoshita took the position of SETI's president. He had worked continuously for overseas sales sections, and is one of those who has worked all over the world, and been at the forefront of the Sumitomo Electric Group's global business.

"I fundamentally and absolutely trust and take pride in Sumitomo Electric's products. This belief supported me and helped me proceed with this project. Our task was to supply a huge amount of contact wires and the outcome of our work would be noticeable on maps. With a strong sense of responsibility and exaltation, I



Kan Kinoshita, President and Director, SEI Trading India Pvt. Ltd. (SETI)

Smelted red hot copper is the prime source material of contact wires.



Copper rod to be stretched into contact wire



Contact wire



Drawn contact wire spooled on drums for shipping to India



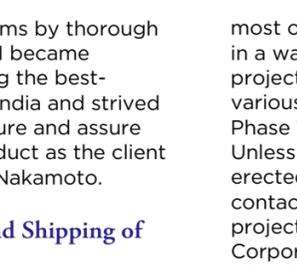
Contact wires destined for India undergo strict quality examination by an independent body every time they are shipped.



Taichiro Nishikawa, Manager, Osaka Electric Conductor Plant, Electric Conductor Div., Electric Conductor & Functional Products Business Unit



Minoru Nakamoto, General Manager, SEI Thai Electric Conductor Co., Ltd.



most of which, however, are dormant in a warehouse in India because the project has been delayed due to various factors. In early 2019, some of Phase 1 contact wires were installed. Unless rails are laid and poles are erected, it is not possible to install contact wires. The progress of the project is managed by DFC Corporation, and according to its official announcement, some sections of the railway are expected to open in March 2020, although whether or not this plan will be realized remains uncertain. Meanwhile, as Sano pointed out, a new project has been opened in India. Our course of future action depends on whether the Sumitomo Electric Group can make its presence felt in the new project.



Tadanori Sano, General Manager, Electric Conductor Division, Electric Conductor & Functional Products Business Unit

Manufacturing Site Fulfills a Set of Exacting Requirements.

–Contact wires delivered through strong collaboration between sales and engineering staff–

Request for Improved Performance Specifications

At the climax of contract negotiations, L&T presented us with new product specifications based on the latest engineering design change. The point was to improve the electrical conductivity of the contact wire. The project required Sumitomo Electric's product to be highly wear resistant, because it must endure contact with the pantographs made at high speed. However, there is a tradeoff between wear resistance and conductivity. Taichiro Nishikawa, a member of the Technology Development Group of the Osaka Electric Conductor Division at the time, addressed this challenge.

"The material we proposed was an alloy of copper and tin. In India pure copper contact wire is primarily used, while in Europe it is an alloy of copper and silver. We thought that an alloy of copper and tin would be ideal because we had used it for the Taiwan High Speed Rail, therefore improving the conductivity of the contact wire meaning reduced wear resistance. Nevertheless, we fulfilled the client's request, making the best use of our various experiences, knowledge and expertise," said Nishikawa.

The negotiations were in the final phase of discussing the specifications and price. The person who gave the sales staff a big push forward was Kazuhiro Nanjo, the general manager

at the time of the Electric Conductor Division, which was producing contact wires. He told the sales staff that it was most important for them to have unwavering conviction, even if they failed in the negotiations. Both Hardesh and Kato were aware that it could be the last opportunity to negotiate the specifications and price. Then, in the evening, L&T contacted Hardesh to say that they wanted to meet the next day. Upon hearing that, Hardesh was convinced it was highly likely they would conclude the contract. Thus, in October 2016 Sumitomo Electric won the order for approximately 3,000 t of contact wires to be supplied in Phase 1.

Japanese Standards (JIS) vs. European Standards (EN)

Later, Kato interviewed L&T and according to him, L&T selected the Sumitomo Electric Group most importantly because of the Group's sincere attitude, as well as the price and delivery schedule. Moreover, the client described Sumitomo Electric as "a customer-friendly company."

"It was a battle that required us to overcome tough negotiations. However, we gradually established a relationship built on trust, which is fundamental in business, and boosted mutual understanding. This appears to be the decisive factor in winning the order. When I knew that we had won

the order, I felt a sense of relief and happiness, which, however, didn't last long. My next task was to enable coordination between the Indian customers and our plant in Osaka," said Kato.

While Phase 1 required approximately 3,000 t of contact wires, the overall project required a total of approximately 5,000 t. This meant a huge, nearly four-fold, increase in production output compared to when primarily meeting domestic demand. The challenge was to figure out how to achieve it. As a first step, Nanjo worked on improving the production framework. Among other things, it was very clear that the production framework would face a shortage of workers. He moved quickly



Kazuhiro Nanjo, Managing Director, SEI Thai Electric Conductor Co., Ltd

in starting development of personnel required to provide the needed production capacity. Nanjo was confident due to his experience in carrying out production for the Taiwan High Speed Rail construction project. In early 2017, Phase 1 production commenced, followed by the building of a fully-equipped production framework in July of the same year. However, he faced an obstacle. There was a difference between India and Japan regarding the concept of quality.

"As with Sumitomo Electric, it was an important and mega-project for the Indian customer as well. So, their specifications were very detailed. They checked whether our product was accurate and strictly conformed to the specifications. Moreover, their requirements were based on European standards rather than Japanese, which were new to us. One major challenge for our production site was to establish manufacturing technologies and a quality assurance system for mass production to meet the new standards," said Nanjo.

Minoru Nakamoto, Nishikawa's successor, tackled the difficulty. "At first, I was bewildered by the dissimilarities with Japanese domestic customer's needs and by the client's stringent requests. However, the Indian project was a test for the Electric Conductor Division to achieve subsequent leaps forward. I couldn't

fail. I identified problems by thorough studies and analyses. I became committed to shipping the best-possible products to India and strived to develop, manufacture and assure the quality of the product as the client demanded," recalled Nakamoto.

Steady Production and Shipping of Contact Wires

Tadanori Sano, the general manager of the Electric Conductor Division, took the post in January 2018 and began managing the production of contact wires.

"The Plant in Osaka manufactures pure copper wires used as general electric wires and copper alloy wires such as contact wires. It maintains steady production and shipping by suitably coordinating processes such as casting, wire-making and quality assurance. Moreover, it is a constantly important task to secure human resources. Accordingly, we direct our energies toward personnel development. In addition to the current project, India has concrete future plans for new projects, for which we are continuously striving to win orders. Furthermore, we intend to explore the railway business on a wider scale, for instance, in Southeast Asian countries," said Sano.

Since 2017 to date, the plant has produced contact wires daily and shipped them at appropriate times,

Introducing Japanese Technologies in a Market Dominated by European Standards

In the product inspection process, differences between Japanese and European standards became clear, allowing us to realize that in India railway had been installed and operated complying with European specifications and standards. This is a legacy of the country's times under British rule. The current project introduces Japanese technologies and products to such a market in India by virtue of yen loans. This, in a sense, is a wedge driven into India's railway market, which has relied exclusively on Europe. This trend is clearly indicated by India's first high-speed railway construction plan. The plan will use the Japanese Shinkansen system to connect Mumbai and Ahmadabad over a distance of approximately 500 km taking about two hours. An MOU for this project was signed at a top-level meeting between Japan and India held in December 2015. In September 2017, a groundbreaking ceremony was held, attended by Prime Minister Shinzo Abe. Symbolizing "exporting high quality infrastructure," this project aims to go into commercial operation in 2023, implemented under an All

Japan framework with yen loans (covering approx. 80% of the overall construction cost). Backed by a track record of shipping contact wires to the freight corridor between Delhi and Mumbai, Kato, Haradesh, Kinoshita and other sales staff members are committed to making efforts to win another order. Moreover, in addition to the high-speed railway, the Indian market has many railway construction plans on a waiting list. While major cities are promoting construction of urban rail systems, the country envisions arterial freight railway to flexibly connect between Delhi and Chennai, Chennai and Goa, Kolkata and Chennai, and other big cities. The Sumitomo Electric Group intends to contribute to modernizing India's railway infrastructure by meeting the country's robust demand for railway, exploiting the Group's years of technological experience and expertise.

Product packages from Sumitomo Electric's railroad business

Sector	Product(s)	
Electrical	Wiring	Contact wire, messenger wire, feeder, protective wire
	Substations	High-voltage power cables
	Stations	Medium- to low-voltage power cables, control cables
Signaling	Signal security equipment	Signal cables, optical fiber cables
Communications	Traffic control systems	Optical fiber cables, control cables
	Information & communications systems	

Supplying Sumitomo Electric's Product as Packages

The railway -related business of the Sumitomo Electric Group is active not only in India but elsewhere abroad too. It has shipped products to railway projects in Indonesia, Vietnam and Thailand roughly at the same time as the current project. It should be remembered that for the current Indian project, Sumitomo Electric is producing and shipping contact wires alone. Kato scrutinizes the situation. "Electric wires that Sumitomo Electric can supply to railway projects are not limited to contact wires. The Company

has a rich line of products, such as variety of power cables, signaling cables and optical fiber cables for telecommunication, to name but a few. I am exploring the possibility of supplying these products as a package, by which the volume of business should increase significantly. Indeed, we have already successfully supplied our products on a package basis to projects in Thailand and Vietnam. Currently, we are actively making package-based proposals and proactively approaching ASEAN countries, as well as India. I hope that supplying product packages will become a novel standard in our railway-related business."

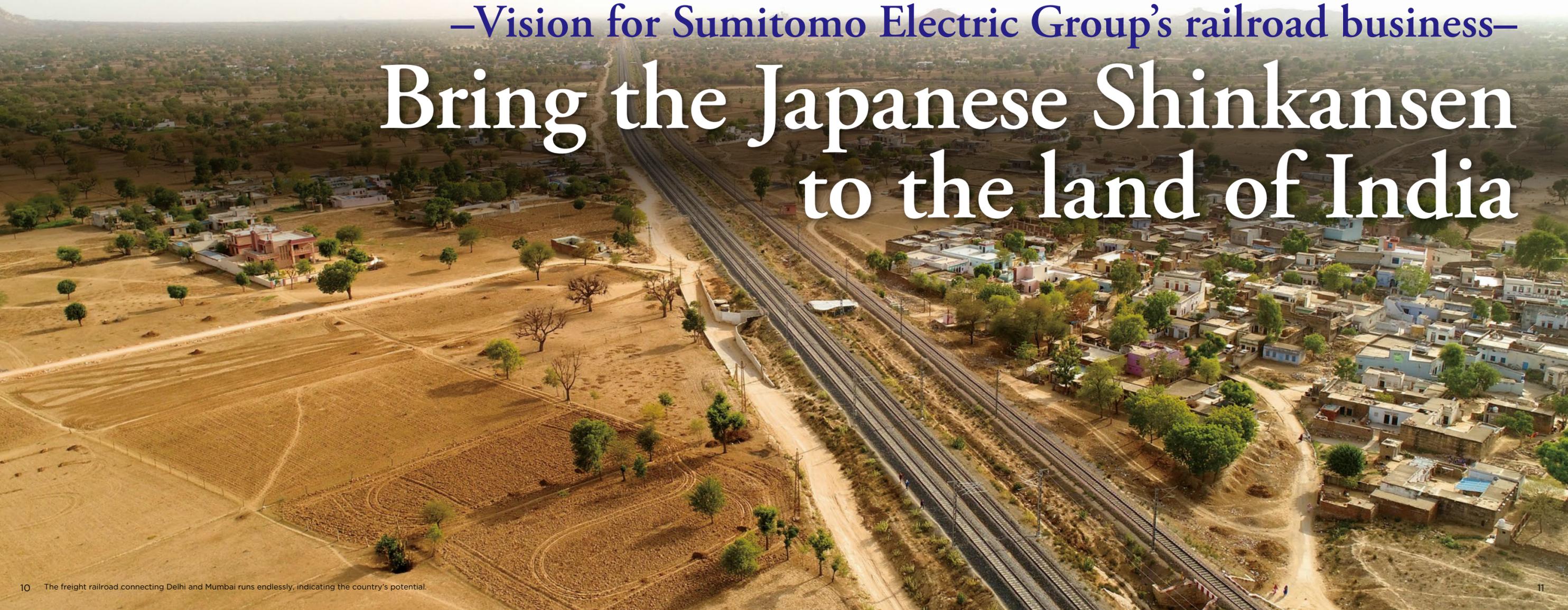
The railway-related business of the Sumitomo Electric Group once supported Japan in its own modernization and contributed to the nation's subsequent rapid economic growth. The Group's technologies and expertise fostered through these experiences have entered a new phase, substantially contributing to economic growth and improved standards of living in emerging countries. Newly laid railways in which the Sumitomo Electric Group is involved represent the firm steps of its railway business and are tracks that symbolize dependable possibilities leading to the future.

Freight Railroad Construction Project for India's Accelerated Economic Growth



Sales staff promoting Sumitomo Electric's railroad business already at work on next projects

**—Vision for Sumitomo Electric Group's railroad business—
Bring the Japanese Shinkansen to the land of India**





Another Strategic Move in India: chosen by Meidensha to ship transformers

—Creating new business opportunities in an all Sumitomo framework.—

Meidensha delivered four transformers to this substation.

Meidensha Corporation is a member of the Sumitomo Group. The company has a track record that places it among leading transformer manufacturers in Japan. For the current project, Meidensha shipped 192 transformers in Phase 1 and has won an order for Phase 2. The manufacturer got its business into full gear in the Indian market when it supplied substation equipment to Japanese-affiliated automakers' factories. One crucial turning point for Meidensha occurred when it invested in a local Indian transformer manufacturer. This served as a background factor that enabled them to win the order for the project.

"We won the order for the current project jointly with Prime Meiden Limited, an India-based transformer manufacturer. Currently, the world's transformer market is shared by



Mr. Haruo Hirakawa, Director, Prime Meiden Limited



Substation built in a desert beside a railroad; To ensure stable power supply, substations are built equidistantly within a total distance of 1,500 km.

global major companies and local businesses. Against this backdrop, Meidensha made an investment to a local firm considering it important to gain a firm foothold in India. The local firm named Prime Meiden has promoted sales to power companies and other customers. Acquiring more than 50% stake in Prime Meiden in June 2016, Meidensha established close Japan-India collaboration for production. The resultant framework positively responded to the "Make in India" slogan advocated by the Indian government. It is highly likely that we won the bid due to the client's high assessment of safety-minded Japanese standards and quality, as well as our track record in Japan," said Mr. Haruo Hirakawa of Prime Meiden.

Meidensha won the order without

any collaboration with the Sumitomo Electric Group. However, there may be some opportunities for both to cooperate in the future for another project. Mr. Hirakawa positively expects such development in an All Sumitomo framework.

"Prime Meiden has an eye toward the global market, as well as the Indian domestic market. Africa is one region in the company's mind. Although large-scale infrastructure projects in the region have been conquered by China, there remain areas still unreached by China. Meanwhile, we are confident that there are needs for power infrastructure, although on a small scale. I hope to secure new business opportunities in these areas with the power of the Sumitomo Electric Group," says Mr. Hirakawa.

Toward Continuous Contribution for Future Traffic Growth of Optical Fiber Communications Networks - The world's first field deployed multi-core fiber testbed for optical communications installed in L'Aquila, Italy -



Ribbon cutting at completion ceremony
Mr. Gianluca Vacca, Undersecretary of Ministry of Cultural Heritage and Activities,*1 Toshiaki Kakii, Managing Executive Officer, Sumitomo Electric, Mr. Keiichi Katakami, Ambassador of Japan to Italy, and Professor Paola Inverardi, Rector, University of L'Aquila (from left)



Network traffic is growing by 30% to 50% every year due to the rapid spread of smartphones and the growth of data centers. To address this challenge, a great deal of research is taking place into how to boost network capacity. Space-division multiplexing (SDM) is attracting a lot of attention, which realizes multiple spatial channels within a single optical fiber. Among various types of optical fibers for SDM, multi-core optical fiber (MCF) is one of the most promising candidates for the next-generation transmission medium.

Sumitomo Electric has been at the forefront of MCF research since 2009. Recently, we collaborated with the University of L'Aquila to build the world's first field-deployed MCF cable testbed in the city of L'Aquila, Italy. Various experiments using MCFs have been conducted in labs so far, but this testbed realize the experiments in an actual working environment, and will accelerate the practical realization of MCF communication systems.

The inauguration of the testbed was marked with a ceremony attended by local dignitaries, including the President of the Abruzzo region, the Mayor of L'Aquila, and the Rector of the University of L'Aquila. Mr. Toshiaki Kakii, Managing Executive Officer of Sumitomo Electric, said, "Sumitomo Electric is much honored to take part in the world's first field demonstration experiments of MCFs. We expect that the evaluation of the

transmission performance of the MCFs in the actual usage environment will bring us many novel findings."

The Ambassador of Japan to Italy, H.E. Mr. Keiichi Katakami, also attended the ceremony and delivered the message expressing his hope resting on the operation of the testbed. "I am certain that the opportunity of the Italy-Japan joint demonstration test of this leading-edge technology is crucially significant for promoting future technical and economic exchange between both countries."



MCF-equipped underground tunnel in city of L'Aquila

Sumitomo Electric will continue to contribute to infrastructure construction for building an advanced information and communications society, through research and development of next-generation optical fiber cables.

*1 Sottosegretario del Ministero per i beni e le Attività Culturali

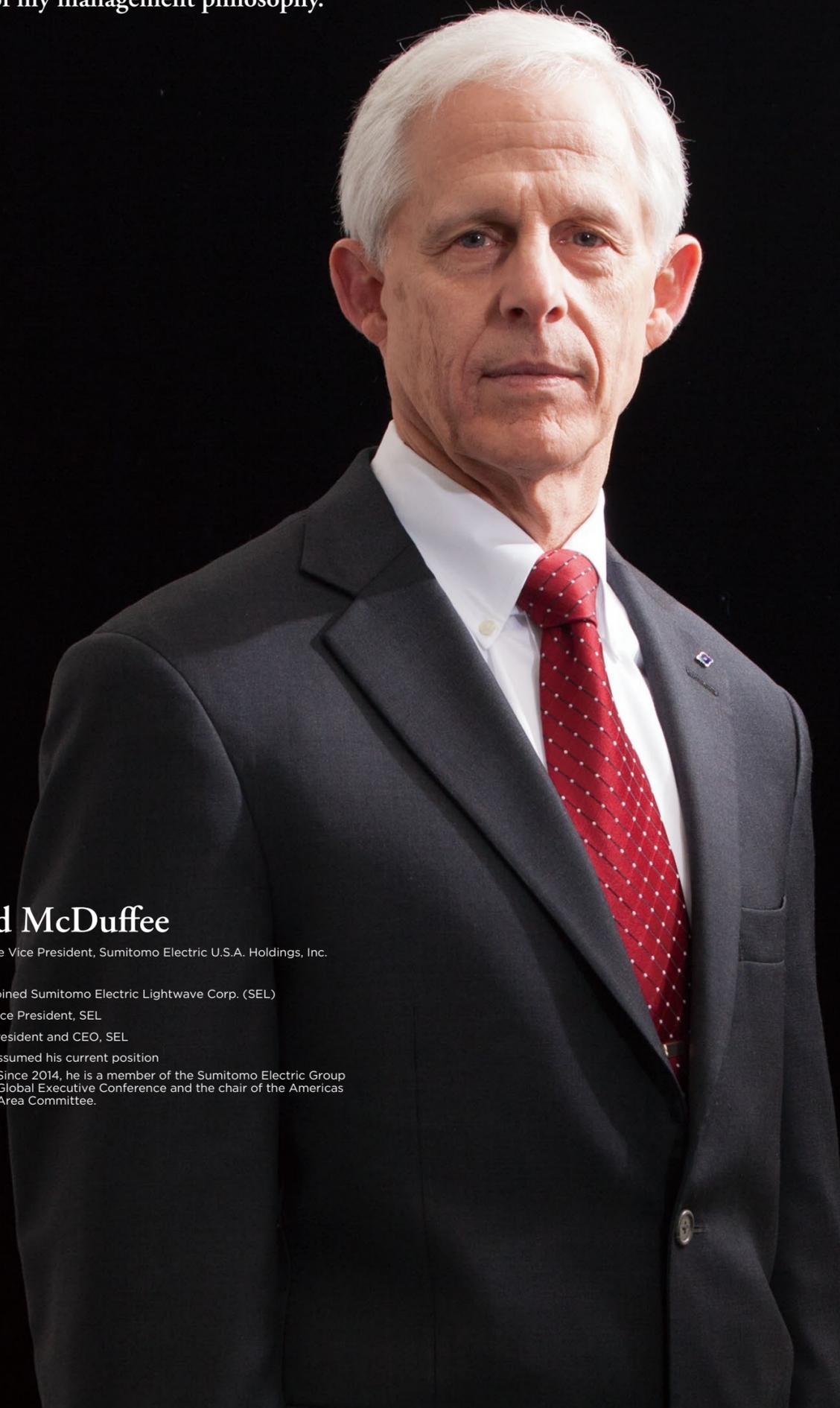
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Topics from
the future-shaping
Sumitomo Electric
Group

View Press Release: The World's First Field Deployed Multi-Core Fiber Testbed for Optical Communications Installed in L'Aquila, Italy
<https://sei.co.jp/company/press/2019/06/prs043.html>

“Every time I face a difficulty, I return to the Sumitomo Spirit. To put it into action, I emphasize transparency, which constitutes the cornerstone of my management philosophy.”



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Featured person

Fred McDuffee

Executive Vice President, Sumitomo Electric U.S.A. Holdings, Inc.

1985: Joined Sumitomo Electric Lightwave Corp. (SEL)

1999: Vice President, SEL

2003: President and CEO, SEL

2017: Assumed his current position

* Since 2014, he is a member of the Sumitomo Electric Group Global Executive Conference and the chair of the Americas Area Committee.

Mutual Understanding and Respect for Each Other.

Management philosophy that the global leader continues to carry into action

Keep on moving forward for 32 years with the history of optical fiber

I was born and brought up in New Jersey, near New York City, in the northeastern part of the U.S. My university, Virginia Polytechnic Institute and State University, is located in a green environment in the mountains. I would often enjoy canoeing and hiking on weekends. I still really love doing exercise; actually, I've run the Osaka Marathon twice.

At university, I majored in physics, raising my interest in optical fiber, which was just beginning to be commercialized in those days. Since I was interested in how the physics theories that I had learned at university could be actually applied to products, I joined a major U.S. international telephone and communications company, in 1978. At the company, I had an opportunity to work in a group lead by Sir Charles Kao, who was recognized as the father of optical fiber and later won the Nobel Prize in Physics and this was inspirational to my career in optical fiber. I became increasingly absorbed in the latent potential of optical fiber. In 1982, I moved to a new company involved in lightwave network products located in the New England region of the U.S.. At that company I served as the leader of an R&D team and was engaged in a wide variety of technology development projects. Then came a key turning point in my professional career. My wife and I did not adapt to the cold New England weather and wanted to move to a more temperate climate, making me decide to change jobs. After working at the lightwave network product manufacturer company, I entered the company presently called Sumitomo Electric Lightwave Corp. (SEL) in 1985.

Since I had already had some contact with Sumitomo Electric as a business partner while working at the company in New England, I knew that the Sumitomo Electric placed a high priority on the development of optical fiber, meaning that its environment was ideal for me. After joining SEL, I was engaged in technology development as a design engineer of optical fiber cables. Afterwards, I was

assigned to various departments, such as customer service, marketing, product management and operation management. In 2003, entrusted to provide effective leadership to manage the company, I took the posts of President and CEO. After entering SEL at the dawn of commercial optical fiber, I was involved in the development of many products that succeeded in the North American markets; my 32 years at SEL were very exciting.

Always return to the Sumitomo Spirit and the transparency

While managing SEL, I emphasized nothing more than the Sumitomo Spirit. Placing prime importance on Integrity and respect for each other - this is what I have always wanted to realize and tried to carry into action. When I face a difficulty, I return to the Sumitomo Spirit, which leads me to the right decision and action. The Sumitomo Spirit constitutes the cornerstone of my management philosophy.

In the early 2000 timeframe, I delivered a keynote lecture at a seminar in front of customers. During the lecture, I briefly mentioned the Sumitomo Spirit, and many audience members commented after the event that they had been impressed by that mention. In particular, the concept that "things important to customers are important to the company (Profit for Self and Others, Private and Public Interests, are One and the Same)" seemed to have struck a chord among them; as they appreciated strong values of Sumitomo Electric. Although the idea is typically Japanese, its essence has something in common with American business. Sumitomo has been following this tenet and putting it into action, which I think is truly wonderful.

Another thing that I would like to emphasize is the importance of transparency. I believe that the requirements of leaders are to clarify the decision-making process; to indicate the purpose and reason for doing things, namely to give the grounds; and to establish an open environment for taking action.

Every time I face a difficulty, I tell staff members about the entire vision, while keeping the common targets in mind. For example, when the bankruptcy of Lehman Brothers triggered a worldwide financial crisis in 2008, many of our customers were negatively affected, making them avoid investment and delay placing orders. To handle this crisis, we stuck to the policy of remaining competitive and providing support for customers by



reducing our entire business costs. Although we shed our blood in layoffs, all the remaining members became united toward accomplishing our goal. By increasing our business efficiency and our customer service quality, we overcame the crisis.

As one of the global leaders, I would like to be always open

Presently, as one of the global leaders, I'm in the position of seeing Sumitomo Electric's business from an even wider and higher perspective. Since 2017, I've been the Executive Vice President of Sumitomo Electric U.S.A. Holdings, Inc. (SEUHO). As the regional corporate office supporting the Northern American business area, SEUHO strives to reinforce cross-sectional management transcending the boundaries of the group companies in the area. In addition, I also serve as the chair of the Americas Area Committee. Area Committees have been designed so that global executives selected in the companies of the Sumitomo Electric Group form a network to share their knowledge and experiences accumulated in their business units and regions. By doing so, the committee strives to contribute to enhancing the entire group's performance. My role is to encourage group companies to participate in the committees, provide advice and serve as a bridge between the group companies and the board of directors.

To this end, I would like to listen to many more voices. So far, I have shared the same sense of purpose with my fellow workers and cooperated in solving problems. There is nothing that I can accomplish alone. As one of the global leaders of Sumitomo Electric, I would like you to know that I'm always open and value your ideas. Sumitomo Electric is a global company operating in a wide variety of markets by leveraging a wide variety of technologies. I'm convinced that listening to each voice from each region and business site around the world will lead to the realization of our corporate strategy and vision.



With Masayoshi Matsumoto (left), Sumitomo Electric Chairman & CEO, after reaching the goal of Osaka Marathon 2016.

A Picture of Sumitomo Electric in Those Days

1961

Construction of Power Transmission Line across the Naruto Strait



Laying a power transmission line to the opposite bank using balloons

Unconventional Construction Method No One Had Ever Imagined

On June 6, 1961, a power transmission line was constructed across the Naruto Strait between Awaji Island, Hyogo and Tokushima. The construction project was later in the news around the world including in the U.S., Canada and Australia. Balloons were used to lay a power transmission line to the opposite bank across the strait spanning about 1,700 m.

Balloons 2.7 m in diameter were attached to a messenger wire 9 mm in diameter (weight: about 500 kg) at 20 m intervals at the bottom of a steel tower in Tosaki, Awaji Island. The wire was towed by a tugboat and extended while allowing the wire to float in the air. The messenger wire was

suspended by 77 balloons in total. The red, yellow and pink balloons appeared to be flowers blossoming over the sky of the Naruto Strait. The wire reached the other side of the strait two hours later. The construction project, including the subsequent work, was completed safely and successfully.

Years later, Kazue Kitagawa, president of Sumitomo Electric at that time, stated, "The year 1961 when we launched new products and equipment marked a milestone in our history." The success of this unique construction project that attracted the attention of the global community was one of the epoch-making events.

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



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