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Innovative Development,
Imagination for the Dream,
Identity & Diversity

Feature

Supporting Nuclear Fusion Reactor ITER, a Small Sun on Earth

Tungsten Monoblock

SUMITOMO ELECTRIC GROUP

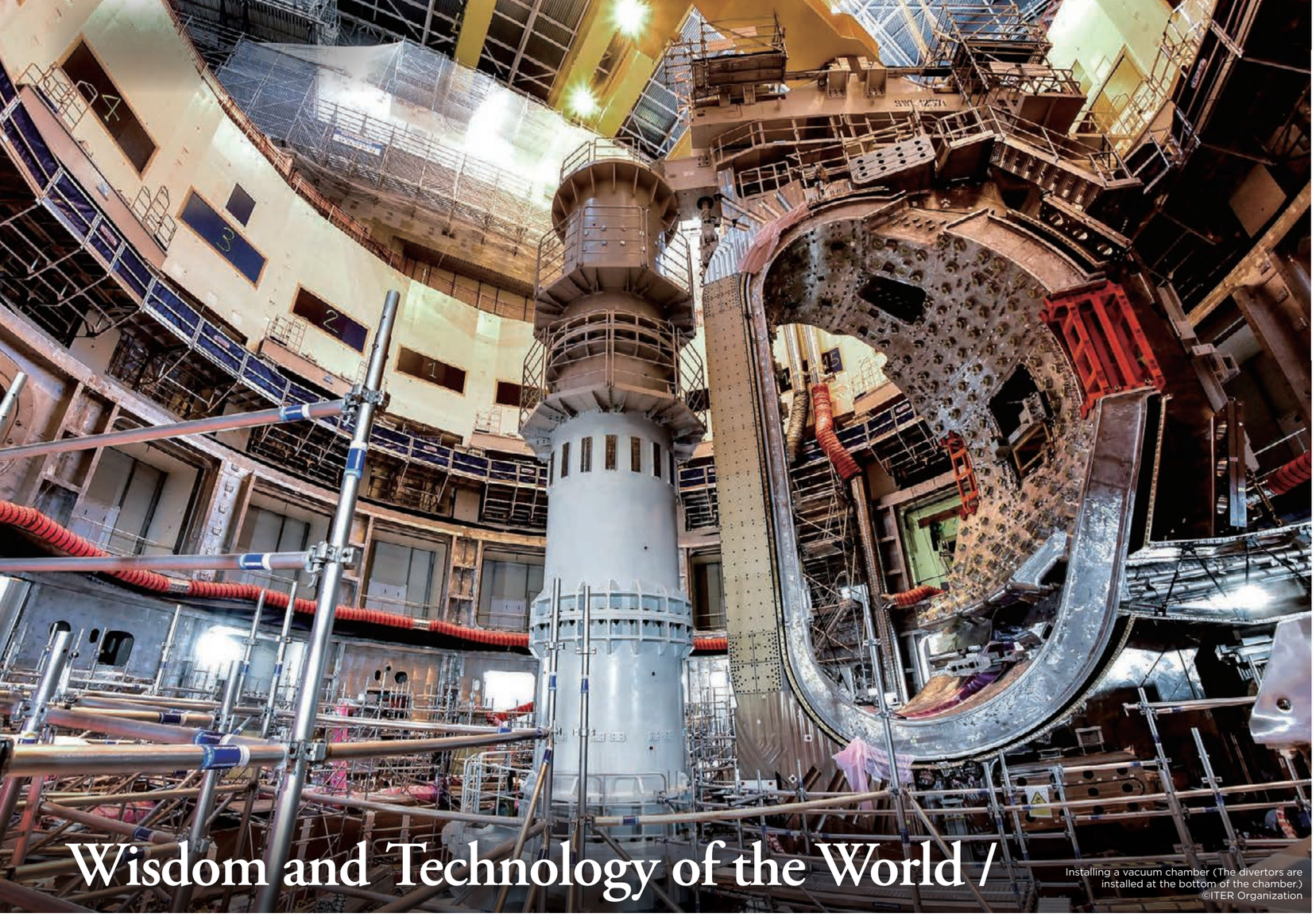
Making a Small Sun on Earth

— Nuclear fusion, safe and sustainable dream energy —

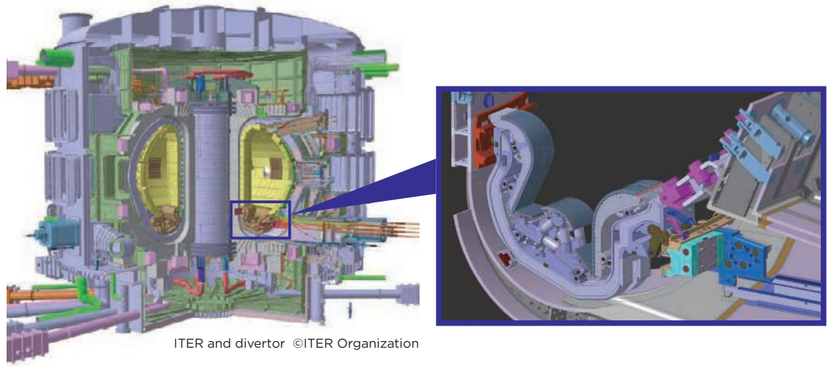
One of the urgent issues we are facing is securing sustainable energy for growing populations and developing industries. The large volume of fossil fuel consumption since the Industrial Revolution is bringing disasters caused by climate change due to global warming. A potential solution to this issue is nuclear fusion, the process by which the Sun produces its heat. If fusion energy can be generated on Earth, then we may achieve an ideal power generation system that features excellent environmental friendliness without CO_2 emissions, high safety, and virtually inexhaustible fuel resources.
To demonstrate the feasibility of fusion energy, an international project called ITER ("the way" in Latin) is progressing with cooperation among 35 countries.

Japan is one of the leaders of this project, as the country's National Institutes for Quantum Science and Technology (QST) and many Japanese companies have been participating in ITER. A.L.M.T. Corporation, a Sumitomo Electric Group company, has supplied tungsten monoblocks, an important component of the divertor, a key device in the nuclear fusion reactor. This feature article focuses on efforts to realize nuclear fusion, a dream energy source.

Experimental nuclear fusion reactor, ITER, under construction ©ITER Organization



Installing a vacuum chamber (The divertors are installed at the bottom of the chamber.) ©ITER Organization



ITER and divertor ©ITER Organization

ITER site ©QST

Wisdom and Technology of the World / Brought Together in France

— ITER project, a necessity for nuclear fusion —

Nuclear fusion, generating enormous energy with little fuel

Prior to the ITER project, Japan embarked on the development of nuclear fusion in the early 1980s. An experimental nuclear fusion system started operation in 1985. With Europe and the United States, which started development at the same time, Japan has been leading nuclear fusion research in the world. The ITER project was set in motion at the Geneva Summit in 1985, when the idea of the project to demonstrate nuclear fusion for peaceful purposes was proposed by the former Union of Soviet Socialist Republics and the US. The ITER Agreement was officially signed in Paris in 2006 by seven parties: Japan, Europe, USA, Russia, South Korea, China, and India. Currently, a total of 35 countries are participating in the project. The construction of large facilities started in 2007 at Saint-Paul-lès-Durance in southern France. Key components that were produced by the parties have arrived at the ITER construction site, and the assembly of an experimental fusion reactor ITER, which generates 500 MW of fusion energy, is under-way.

First, let's define nuclear fusion. The stars in the universe, including the Sun, shine brightly due to the nuclear fusion process, in which lighter nuclei, such as hydrogen, collide with each other and fuse into heavier nuclei, such as helium. A very small loss of mass from the fused atoms releases tremendous amounts of energy in the process. This energy from the Sun flows to the Earth. A huge project aimed at producing fusion energy through this process on Earth is the ITER project.

High safety, virtually inexhaustible fuel resources, environmental friendliness, and enormous amounts of energy

Although they both use nuclear energy, nuclear fusion is totally different from nuclear fission, which is the principle of nuclear power plants. The fusion fuels are isotopes of hydrogen, which can be readily extracted from sea water, and provide a secure and limitless source of energy. Fusion does not emit CO_2 and has excellent environmental friendliness. One gram of fission fuel used in nuclear power plants generates energy equivalent to 1.6 tons of oil, whereas 1 g of fusion fuel generates energy equivalent to 8 tons of oil. Nuclear fusion has enormous potential to become the first sustainable energy source for humankind.

Divertor, an essential component for maintaining a plasma state

Since positively charged nuclei have mutual repulsive forces, in order to fuse they need to collide at a speed faster than the speed of sound, and even faster than 1,000 km/s. The method to obtain such speed is to heat deuterium and tritium, isotopes of hydrogen, to a temperature exceeding 100 million degrees Celsius. Under such high temperature, positive ions and electrons are liberated from the nuclei and move in a chaotic way. This is a plasma state in which nuclear fusion occurs. The produced energy then heats other nuclei to more than 100 million degrees Celsius, producing a chain reaction, which requires confinement of plasma at high density for sufficient time within a defined volume. In various methods proposed, an ITER tokamak-type fusion reactor produces strong magnetic fields to confine plasma in a donut-shaped vacuum chamber. At the bottom of the chamber, there is a component for directly receiving high heat flow and particle flow generated by the plasma. This is one of the key components, a divertor. The component discharges helium and impurities produced by the reaction and removes high heat load and particle load for the stable confinement of plasma.

Unbreakable tungsten under high heat load

Designated as Japan's domestic agency for the ITER project, QST is in charge of manufacturing and delivering commissioned components and equipment to the ITER site, and also serves as Japan's liaison office for the ITER project. Satoshi Suzuki, Deputy Manager of the Department of ITER Project, Naka Fusion Institute, QST, has been engaged in divertor development for about 30 years.

"The divertor assigned to Japan is called the 'outer vertical target,' which is used under severe conditions, such as heat load and particle load from plasma. Since the surface temperature reaches a maximum of 2,300°C, the material is required to have extremely high durability or unbreakability under high heat load. While examining the use of carbon, the ITER Organization determined to use tungsten in 2013. In a high-heat flux test at QST, out of all the materials of domestic and foreign manufacturers, only the tungsten of A.L.M.T. Corp. did not break," said Suzuki.

What is the genesis of unbreakable tungsten adopted by ITER? The next chapter describes how A.L.M.T. Corp. developed its tungsten.

Satoshi Suzuki, Deputy Manager of the Department of ITER Project, Naka Fusion Institute, QST

Overview of a divertor
(The connected units form a huge ring)
©ITER Organization

Unbreakable Tungsten Monoblock

— Efforts toward the one and only excellent durability —

Nurtured powder metallurgy and hot working techniques

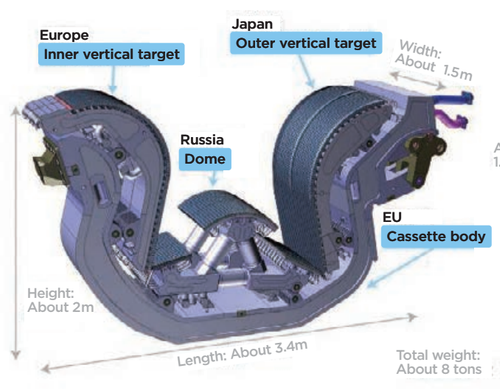
A.L.M.T. Corp. was formed through the merger of Tokyo Tungsten Co., Ltd. and Osaka Diamond Industrial Co., Ltd. in 2000. Since then, as a Sumitomo Group company in the industrial materials segment, it has been focusing on two businesses: the manufacture of high-melting-point metallic materials and of diamond precision tools. Regarding tungsten, its strength is sufficient to handle the entire process from refinement to final products. It has enjoyed a long business relationship with QST, and had a connection with the former Japan Atomic Energy Research Institute. Since 1999, it has researched and developed tungsten for ITER. Tungsten has the highest melting point among all metals and lower thermal expansion coefficient, and excellent shape stability even in ultra-high-temperature environments. The powder metallurgy technique (powder pressing and sintering) and hot working technique nurtured by A.L.M.T. Corp. for a long time exploit the full potential. These techniques have produced unbreakable tungsten, leading to its adoption in divertors.

Let's look at the structure of a divertor. A divertor consists of a cassette body (support structure) manufactured in Europe, an outer vertical target manufactured in Japan, an inner vertical target manufactured in Europe, and a dome manufactured in Russia. The heat-receiving surface of the outer vertical target is made of tungsten material, called a monoblock, with dimensions of around 30 × 30 × 10 mm. About 20 rows of monoblocks with skewered cooling tubes are arranged per cassette body. The total number of monoblocks of the outer vertical targets arranged on a total of 54 cassette bodies installed at the bottom of a vacuum chamber is about 200,000. If only one surface is melted due to the heat load, the cooling pipe might break. This means that only the high durability of all of the monoblocks exposed to plasma for a long time can sustain a nuclear fusion reaction for a long time. A.L.M.T. Corp. has applied its strength of powder metallurgy technology to develop excellent thermal-shock-resistant tungsten material, or unbreakable tungsten.

Suppressing grain growth under high temperature

Takeshi Iikura, who is the manager of the ITER Engineering Group, Engineering Dept. and has been engaged in the production engineering of tungsten monoblocks in the Working Engineering Group, Thermal Management Div. (Sakata Works), has participated in the ITER project since his second year at the Company in 2013. At that time, he developed tungsten plates for monoblocks in the Material Engineering Group at the Toyama Works. The year 2013 was also the year when tungsten was determined to be adopted in divertors.

"To manufacture tungsten plates, tungsten powder is processed into a pressed body, sintering is performed, and then the obtained sintered body is subjected to plastic deformation. When a tungsten material after plastic deformation is exposed to a plasma temperature of above 2,000°C for a long time, new grains may be produced and grow (recrystallization), resulting in swells or cracks. To improve durability against heat load, it was considered effective to minimize the recrystallization grain growth. We aimed to maintain fine recrystallization grains," said Iikura.



Divertor devices manufactured by each party
©ITER Organization

Outer vertical target manufactured by Japan
©ITER Organization

Installing monoblocks in the outer vertical target
©QST

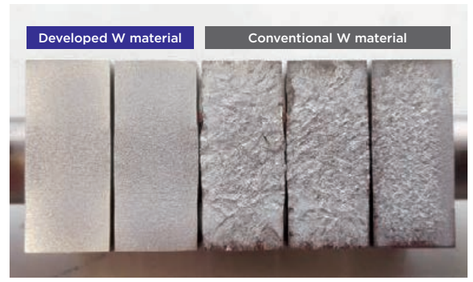
The key point was plastic deformation, in other words, the rolling process. The rolling process is to heat and pressurize material for deformation. Optimum conditions and parameters of heat and pressure were determined to maintain fine recrystallization grains after one year or more of trial manufacture, resulting in a new tungsten manufacturing method.

"We manufactured tungsten monoblocks for heat flux tests using the newly developed plates, and conducted heat flux tests using the equipment owned by QST. The tungsten monoblocks were exposed to an electron beam equivalent to about 2,300°C for 10 seconds, and cooled for 10 seconds. This cycle was repeated 1,000 times (over three times the number of cycles of the ITER design requirements). The monoblock fabricated from the conventional tungsten exhibited swells on the heat load surface, while no swells were observed in the newly developed products. By maintaining fine recrystallization grains, the monoblocks exhibited performance suitable for a divertor," said Iikura.

Globally evaluated unbreakable tungsten

Then Iikura and the other members evaluated prototypes for outer vertical targets using developed tungsten monoblocks. The evaluation comprised high-heat flux tests at the Efremov Scientific Research Institute in Russia, in the presence of staff of the ITER Organization and QST. The tests were conducted based on numbers of cycles far exceeding the ITER requirements, and no cracks were observed in any of the monoblocks, demonstrating superb durability. The material achieved the first international recognition as unbreakable tungsten and was certified as the tungsten material for divertors by the ITER Organization and QST. At this moment, only A.L.M.T. Corp. can supply unbreakable tungsten. The excellent working technique nurtured by A.L.M.T. Corp. is also used for the machining of the very complex shapes of the outer vertical target, which requires high precision in the order of 10 μm. Iikura, who is engaged in the production engineering of monoblocks at the Sakata Works, visited the ITER construction site in France in 2018.

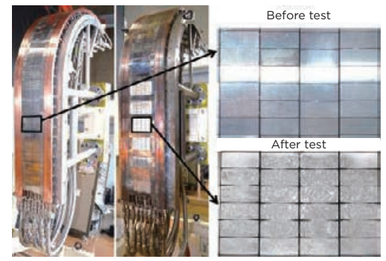
"The ITER project is an international megaproject that involves many countries. It is certainly ambitious and could yield a potential solution to energy and environmental problems. I am happy and proud to be one of the engineers in charge, and am eager to solve any issues that arise," said Iikura.



Tungsten monoblocks after high heat flux tests ©QST

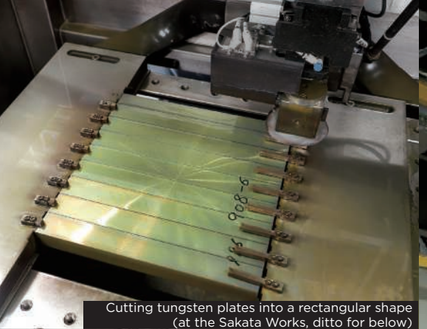
High heat flux test equipment (JEBIS) ©QST

A test scene using JEBIS ©QST

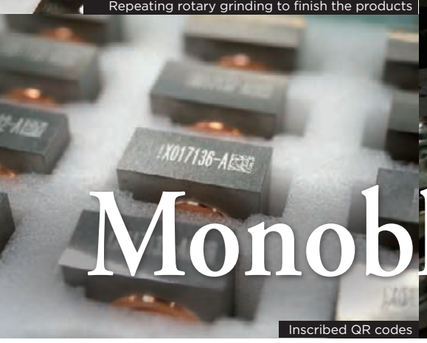


Test results at Efremov Institute in Russia
©QST

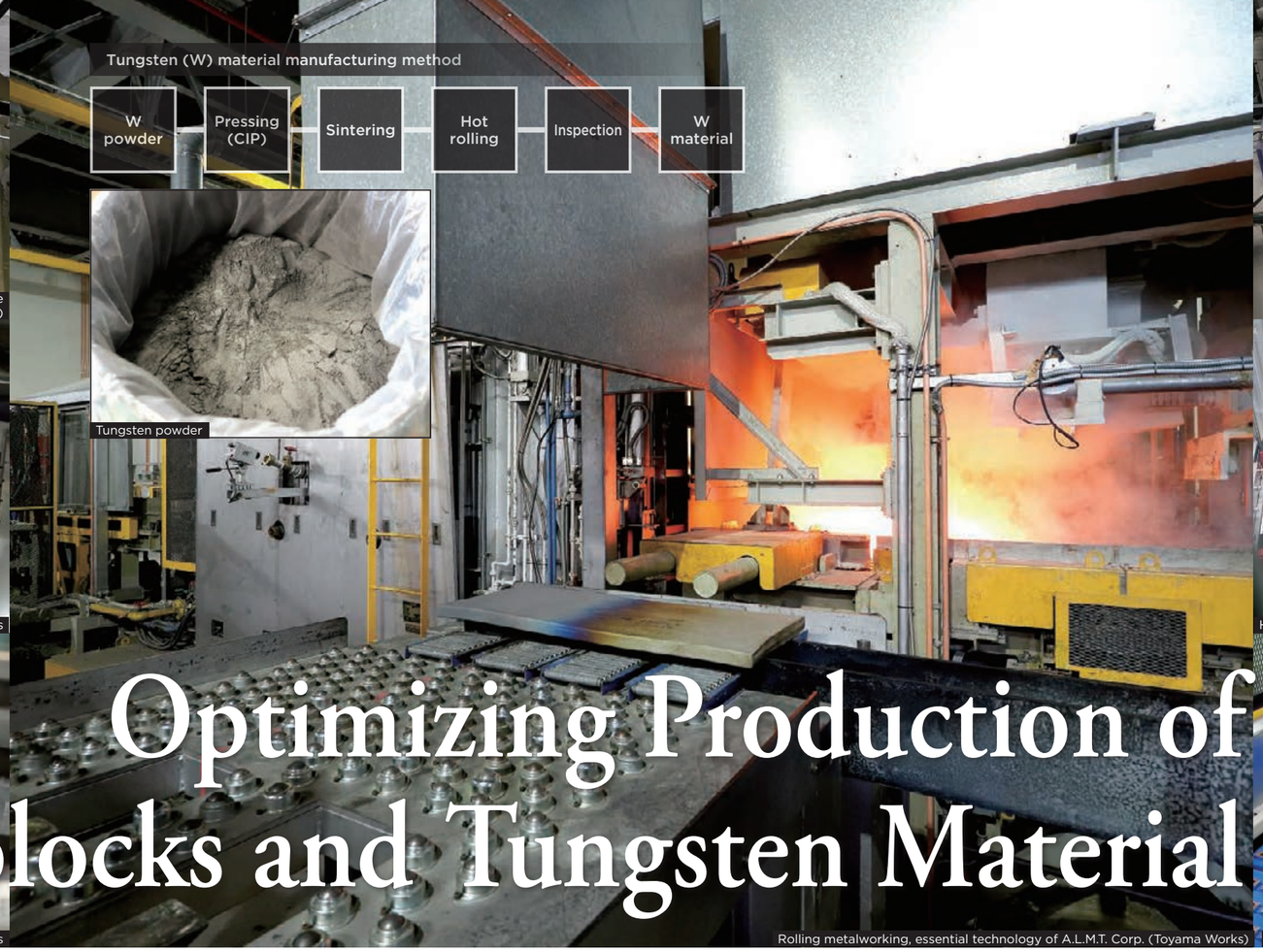
Takeshi Iikura, Manager of the ITER Engineering Group, Engineering Dept., Thermal Management Div., A.L.M.T. Corp.


Cutting tungsten plates into a rectangular shape (at the Sakata Works, ditto for below)


Repeating rotary grinding to finish the products



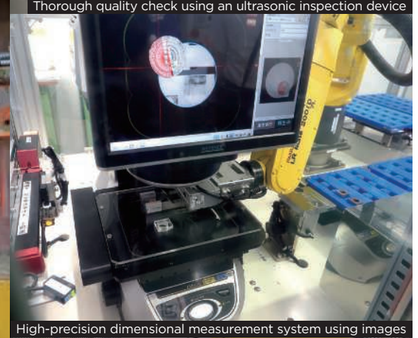
Inscribed QR codes

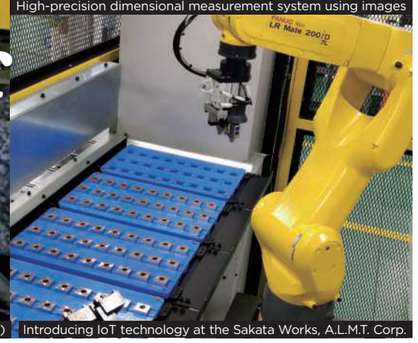


Rolling metalworking, essential technology of A.L.M.T. Corp. (Toyama Works)

Tungsten powder


Thorough quality check using an ultrasonic inspection device


High-precision dimensional measurement system using images



Introducing IoT technology at the Sakata Works, A.L.M.T. Corp.

Optimizing Production of Monoblocks and Tungsten Material

— Accelerating the buildup of the supply system for the world —

Units developed through coordination with other companies

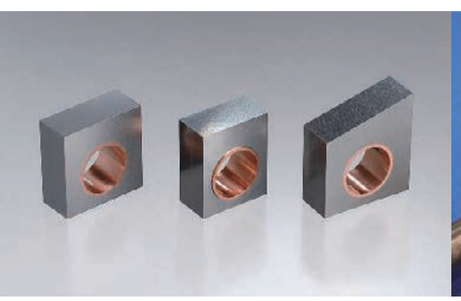
At the first bidding by QST, A.L.M.T. Corp. won a contract to supply 12,000 monoblocks in 2019, received an order of 120,000 monoblocks under an optional contract in 2021, and plans to manufacture 200,000 units in the end. Evidently, its dominant presence results from its achievement of producing unbreakable tungsten. Another important role of monoblocks is to remove heat using the high thermal conductivity of tungsten. A unit of the heat receiving surface of a divertor consists of a monoblock with a skewered cooling tube. Satoshi Suzuki pointed out that there were many hurdles to completing the monoblock, and we have made progress in clearing them.

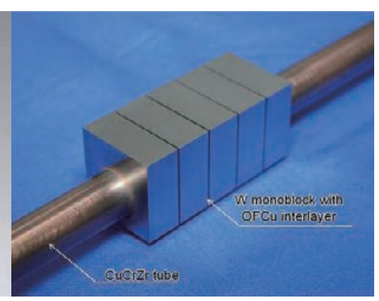
"We made a hole at the center of a monoblock to skewer a cooling pipe and attached a layer of pure copper around the hole to form a cushion. Due to the different thermal expansion coefficients of tungsten and copper, we failed to bond them. I encouraged A.L.M.T Corp. to cooperate with a competitor that has an excellent bonding technique, and we finally overcame the highest hurdle," said Suzuki.

Group Leader Koichiro Ezato of the Plasma Facing Component Technology Group, Department of ITER Project, has been engaged in the development of divertors with Suzuki. He has conducted research on divertors since his graduate school days, and has great passion to achieve self-sufficiency in energy through nuclear fusion in the future.

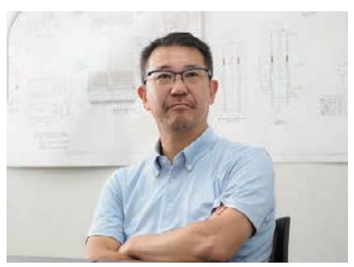
"The divertor is an essential component for making nuclear fusion energy a reality. Since it is always exposed to high temperature, cooling the device is very important. Therefore, the development of cooling tubes was a significant theme. However, we did not know a manufacturer that could produce copper alloy with high reliability, for example, with no water leakage under the high and widely fluctuating temperatures of ITER conditions. Finally, we found a company that possessed a required manufacturing technique. I felt confident of success when the cooling pipes were completed," said Ezato.

The fusion of techniques from A.L.M.T. Corp. and other companies in Japan enabled us to complete the unit for a divertor.


Tungsten monoblocks



Tungsten monoblock with a cooling tube ©QST


Koichiro Ezato, Leader of the Plasma Facing Component Technology Group, Department of ITER Project, Fusion Energy Directorate, QST

Introducing automation and IoT to secure high quality

Iikura was then transferred from the Toyama Works to the Sakata Works in Yamagata Prefecture. By that time, they had delivered monoblocks to QST as samples; however, after receiving the contract to supply 12,000 units in 2019, they had to establish a new mass-production system. Until then, they had been producing each monoblock by hand. Iikura thus started establishing a new automated production line.

"Needless to say, tungsten monoblocks installed in nuclear fusion reactors are without precedent. I aimed to achieve absolutely high precision and traceability. Since problems are inherent in manufacturing, I inscribed QR codes on monoblocks to clarify the production history in the production system by using IoT and QR codes assigned to monoblocks," said Iikura.

At the beginning, however, the system did not work well. The yield rate was very low and defects were frequently detected. Automation does not always lead to stable quality. The machining requires high precision in the order of 10 μm, but it nevertheless produced errors due to heat and contact with each monoblock. Precision requirements were not to be compared with conventional ones. To solve the problems, Iikura and other members improved the precision of the jigs used for machining, and even developed new jigs. Their efforts bore fruit and stabilized the quality, bringing the production on track. After QST ordered monoblocks for actual equipment in 2021, new production lines started full-scale mass production from 2022. He always keeps in mind how to address unforeseeable problems. His pursuit of keeping high quality through stable operation of facilities will never end.

For adoption of our tungsten in Europe's inner vertical targets

Tungsten plates, a material of monoblocks, are manufactured at the Toyama Works. Takanori Kadokura, Deputy Manager of the Engineering Department, is engaged in production engineering. Kadokura has worked in the development of tungsten and molybdenum at the research and development division for 20 years since his first year at the company. He participated in the ITER project in 2018. He also took charge of developing unbreakable tungsten with Iikura. One of his missions now is securing stable quality in tungsten plate production like the monoblock production.

"Tungsten plates are manufactured through the processes of pressing tungsten powder and rolling a sintered body, and optimum balance of these processes produces the unbreakable feature. I focused on raising awareness and improving the motivation of workers. To achieve higher quality, I have united the Works," said Kadokura.

Kadokura has another mission. A.L.M.T. Corp. has now supplied tungsten monoblocks for outer vertical targets. Kadokura's other mission is to advertise the tungsten monoblocks to European manufacturers that undertake inner vertical targets for order-taking.

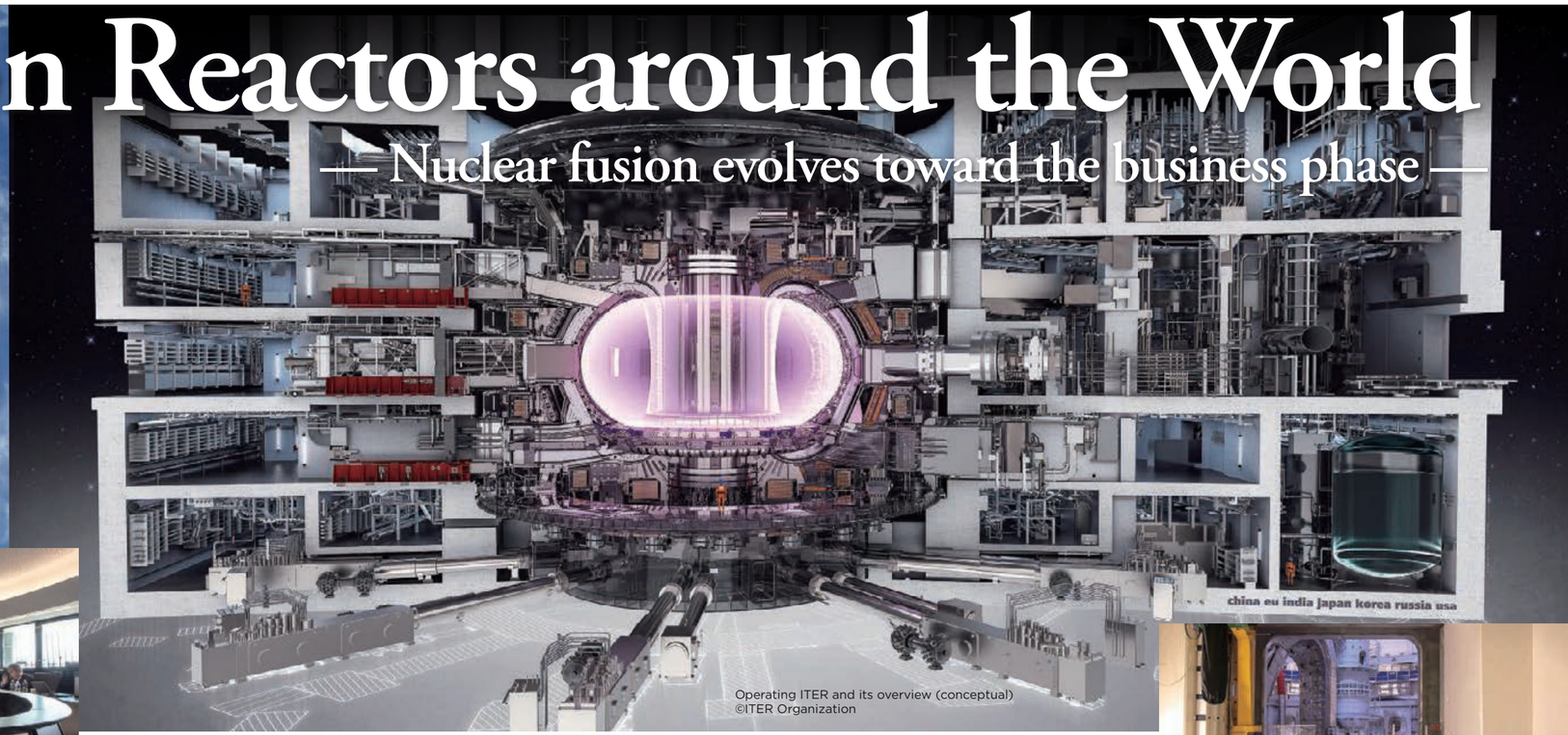
"I contacted three European manufacturers. One of them completed prototype evaluations, and our material successfully passed the acceptance criteria. Our tungsten monoblocks were also certified by Fusion for Energy, a joint undertaking that is responsible for the EU's contribution to the ITER project. Their adoption process differs from our domestic process in many respects, so I have promoted activities of asking companies to evaluate our tungsten monoblocks. Furthermore, I am investigating the demand for monoblocks for divertors used for nuclear fusion reactors developed by other research institutes in Europe, aside from the ITER project, to expand the business," said Kadokura.

Takanori Kadokura, Deputy Manager of the Engineering Dept., Thermal Management Div., A.L.M.T. Corp.

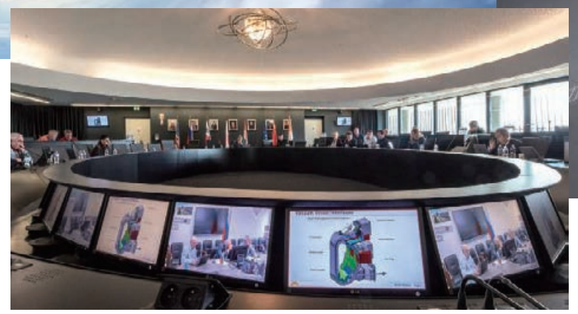
Using the ITER Project as a Step to Nuclear Fusion Reactors around the World

— Nuclear fusion evolves toward the business phase —

A Small Sun on Earth (conceptual) ©ITER Organization



Operating ITER and its overview (conceptual)
©ITER Organization



Pooling the wisdom of the world in the ITER project ©ITER Organization

Never give up once you decide to do it

Kadokura's efforts to advertise tungsten monoblocks to European manufacturers are beginning to steadily produce favorable results. Currently, European manufacturers must procure tungsten monoblocks only from A.L.M.T. Corp. and a Chinese company, which together have started delivering about 65,000 units since October 2022. About half of them are to be delivered by A.L.M.T. Corp. To satisfy the demand in Europe, new facilities have been introduced to the production site of the Sakata Works. Shinpei Yamamoto works for the Thermal Management Sales Department as a leader of domestic and foreign sales activities. Yamamoto took on the assignment of sales for the in-house ITER project in 2019. Since then, he has been busily engaged in the development of tungsten monoblocks mainly as a liaison with QST.

"I took over the role just before the bidding of tungsten monoblocks for actual ITER equipment. When I heard that I would play a part in an international megaproject, I had mixed feelings of pleasure and pressure. My role is to secure the delivery of products that satisfy the requirements of the ITER Organization and QST, and to help find a perfect solution acting as a bridge between the ITER Organization, QST, and the Works on every occasion. Tungsten monoblocks are entirely original products that have no standard specifications. There are many hurdles, such as unfeasible specification changes and requirements, and I will earnestly address and overcome all of them with our members," said Yamamoto.

After the ITER Organization determined to adopt tungsten in divertors in 2013, Yoshitake Fukaya, a director and the manager of the Thermal Management Division, has been engaged in the project. He managed the material development to achieve unbreakable tungsten using the fine recrystallization grain control method as a manager of the Engineering Department at the Toyama Works. After 2016, he ran the business end as a manager of the Sales Engineering Department. Now he is coordinating the overall in-house ITER project from engineering to sales.

"Honestly, I was delighted with the decision on mass production. I thought that the order of 120,000 tungsten monoblocks under an optional contract was proof of trust in us. Looking back over those 10 years, we faced many difficulties. However, all project members share the company's DNA: there is no way forward if you think you cannot do it, and you must never give up once you decide to do it," said Fukaya.

Shinpei Yamamoto, Manager of the 2nd Sales Group, Thermal Management Sales Dept., A.L.M.T. Corp.

Yoshitake Fukaya, Director and Manager of the Thermal Management Div., A.L.M.T. Corp.

Expanding international nuclear fusion market

Nuclear fusion is moving into the business phase and moves by countries around the world are accelerating. Yamamoto at the business end says that he is strongly conscious of the moves.

"National and private research institutes have mainly conducted research and development of nuclear fusion until now. But the situation is rapidly changing. Start-ups around the world are gaining momentum. I am gathering and processing every piece of information on them to expand our business. Our tungsten is adopted in divertors because of its high durability. This feature can be applied to materials for not only nuclear fusion reactors but also other components of reactors in other industries. I will further cultivate new needs," said Yamamoto.

Unbreakable tungsten monoblocks produced by A.L.M.T. Corp. are highly regarded. However, it won't be until around 2030 when they are installed in nuclear fusion reactors, and by then the environment and technology around nuclear fusion might be different.

"The demonstration fusion reactor for demonstration power generation, which is planned to be constructed around 2035, will require higher durability against heat load than ever before. Under such an environment, will current tungsten monoblocks maintain this unbreakable feature? With our eyes focused on the future, we have started developing new tungsten plates with higher hardness and durability than current tungsten plates. We must have other products as a selling point other than pure tungsten plates when taking on the world," said Kadokura.

Nuclear fusion power generation casts a bright light on the future

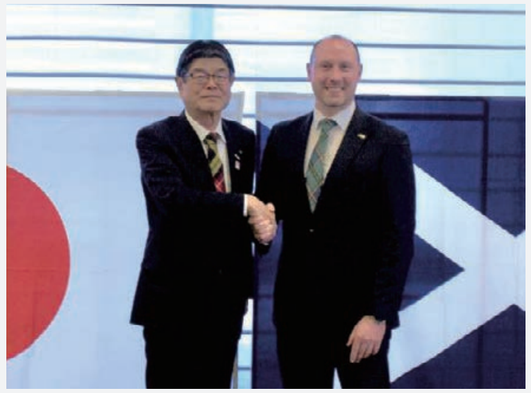
In this article, we learned that members of A.L.M.T. Corp. and QST share the lofty ideals of "for the future world," contribution to society, and pride in their jobs. Their yearning for the day when nuclear fusion power generation becomes a reality, no matter how far into the future, is infused with a great depth of meaning.

Finally, let's see the roadmap of the ITER project. The first milestone is the first plasma, scheduled for 2025, when the nuclear fusion reactor will initially be operated. Then the plasma control tests are planned to be completed around 2035. In the next phase, reaction control, engineering tests, and demonstrations using a demonstration fusion reactor for commercialization will be conducted, and then the reactor will be ready for commercialization around 2050. The roadmap is just a plan. It can be delayed due to problems or moved up due to technological advances. As mentioned above, the nuclear fusion business centering on start-ups is booming across the world. Nuclear fusion power generation, a sustainable energy source, must cast a bright light on the future society of humankind. To realize a Small Sun on Earth, A.L.M.T. Corp. and the Sumitomo Electric Group will continue to take on challenges.

ITER attracts visitors from around the world, raising expectations for the future of humankind
©ITER Organization

QST, liaison in Japan, promoting the ITER project
Satoshi Suzuki (left) and Koichiro Ezato (right)

Holding a Joint Press Conference with the Government of Scotland, UK



Osamu Inoue, President & COO of Sumitomo Electric (left)
Neil Gray, Scottish Cabinet Secretary for Wellbeing Economy, Fair Work and Energy (right)

Rendering

The introduction of renewable energy and interconnected national and regional lines are being promoted worldwide to achieve a decarbonized society. In the European market, where such trends are active, demand for power cables is growing. In particular, the UK is expected to be one of the largest markets for power cables, as the country is planning a number of offshore wind power projects to achieve the Scottish government's Net-Zero 2045 and the UK's Net-Zero 2050.

To capture the increasing demand for high-end cables in the region, the Company has decided to establish a power cable manufacturing and sales company in the Scottish Highlands, and held a joint press conference on April 27, 2023.

Osamu Inoue,
President & COO of Sumitomo Electric.

We are delighted to work with the Cabinet Secretary to build a state-of-the-art submarine cable factory in Scotland. Sumitomo Electric is a technology leader in the industry with a 100-year history of submarine cable production, a solid track record, and high quality standards. Sumitomo Electric has technologies necessary for the development of a green society and will work with the Scottish and UK governments and other stakeholders on future offshore wind power and interconnector projects in the region.

Neil Gray,
Scottish Cabinet Secretary for Wellbeing Economy, Fair Work and Energy

I am absolutely delighted that Sumitomo Electric will be coming to Scotland. This significant announcement demonstrates the strength of confidence investors have in our vision for a net-zero economy. Sumitomo Electric has a proven track record in renewables technology that will be invaluable to supporting Scotland's rapidly expanding offshore wind sector, with ambitions for more than 27 GW of generating capacity to be delivered through ScotWind. The Scottish Government, Scottish Development International, and Highlands and Islands Enterprise will continue to work closely with Sumitomo Electric to foster this important partnership and unlock the opportunities the global renewables revolution presents.

Meeting with UK Prime Minister Sunak

A meeting between UK Prime Minister Rishi Sunak and Masayoshi Matsumoto, Chairman & CEO, and Osamu Inoue, President & COO of the Sumitomo Electric Group was held on May 18, 2023 during his visit to Tokyo.

Both parties reconfirmed that the factory will make a significant contribution to the establishment of local supply chain and technologies in the UK, related to renewable energies, and all stakeholders have expressed enthusiasm and commitment to make Sumitomo Electric's investment a resounding success. The new factory, once built, will also play an important role around improvement of UK's energy security by having a domestic production capability of key power transmission infrastructure.

The following is an extract from the press release by the UK government.

"Sumitomo Electric Industries has announced its decision to build a strategically important high-voltage-cable manufacturing plant in the Scottish Highlands, bringing more than £200 m in investment and creating 150 highly skilled green jobs. This investment will help the UK build resilient supply chains for critical infrastructure such as offshore wind projects, and support UK developers to enhance their contribution to UK growth."

With the cooperation of the UK government, we are committed to making the utmost contribution to the UK's energy security and ambition to achieve Net-Zero 2050 with the high quality standards and power cable technology we have nurtured.

From left, Osamu Inoue, President & COO of Sumitomo Electric, Prime Minister Sunak, and Masayoshi Matsumoto, Chairman & CEO of Sumitomo Electric

id

TOPICS

Topics from the future-shaping Sumitomo Electric Group

His Majesty King Charles III of the UK Visits the Port of Nigg in Scotland

Masayoshi Matsumoto, Chairman and CEO of Sumitomo Electric, was honored to meet His Majesty.

On August 8, 2023, His Majesty King Charles III of the United Kingdom visited Scotland and toured the area of the Port of Nigg in the Highlands where Sumitomo Electric Industries, Ltd. is planning to construct a power cable factory.

After His Majesty was briefed by local officials on the Port of Nigg, a Green Freeport designed to boost innovation and inclusive growth, Masayoshi Matsumoto, Chairman and CEO of Sumitomo Electric, was honored to meet His Majesty and explain the outline of the factory and the employment opportunities to be created in the area.

His Majesty addressed the attendees and extended his wishes for their success in establishing a state-of-the-art power cable manufacturing factory in the UK.

First Minister Humza Yousaf and Cabinet Secretary Neil Gray met with Chairman Matsumoto in Scotland

Chairman Masayoshi Matsumoto of Sumitomo Electric met with Humza Yousaf, First Minister of Scotland, and Neil Gray, Cabinet Secretary for Wellbeing Economy, Fair Work and Energy in Scotland on August 7, 2023.

At the meeting, both parties agreed that Sumitomo Electric's new factory will play an important role in Scotland's energy transition and the creation of a net-zero society, and the Scottish Government will continue to provide support for this project. Both also reaffirmed that this project will contribute to the establishment of an offshore wind power supply chain and technology development in Scotland, leading to the effective use of renewable energy and the development of a green society.

From left, First Minister Humza Yousaf, Chairman Matsumoto, and Cabinet Secretary Neil Gray

Meeting with UK Minister Andrew Bowie

Andrew Bowie, UK Minister for Nuclear and Networks at the Department for Energy Security and Net Zero (left)
Osamu Inoue, President & COO of Sumitomo Electric (right)

Andrew Bowie MP, Parliamentary Under Secretary of State (Minister for Nuclear and Networks) of the Department for Energy Security and Net Zero, and Osamu Inoue, President & COO of Sumitomo Electric, met on August 8th, 2023 at the British Embassy.

Inoue explained to Minister Bowie the progress in the establishment of a power cable factory in Scotland. Then, they exchanged views on the power grid of the UK, which is striving to increase the proportion of renewable energy sources, including wind power generation. Minister Bowie expressed his expectations for the partnership between the Sumitomo Electric Group and the UK and Scotland. They had a great time having a fruitful and positive discussion towards realization of a net-zero society. Inoue asked Minister Bowie to meet again in the UK and invited him to the groundbreaking ceremony of the new factory.

Holding the Sumitomo Electric Athletics Festa 2023

— Community-oriented social contribution activities —

Winners of the junior high school relay race and Kirara Shiraishi (Cerespo), with President Inoue

Athletics class/Maruyama

Athletics class/Izumiya (right) and Itou (left)

Para-athletics event

With participants in the Japan Record Challenge Track Meet

On Sunday, October 15, we held the Sumitomo Electric Athletics Festa 2023 at the Sumitomo Sogo Ground in Itami City, Hyogo. The day turned out to be a crisp autumn day, and the event proved a great success.

We held athletics classes for elementary and junior high school students in Itami City with members of our track and field team as guest coaches. The Sprint 50 Challenge* in Itami 2023 was also held, where randomly selected students from across the country competed against athletes representing Japan in a dream match. In para-athletics, we held men's and women's high-speed 100 meter sprints with para-athletes and a racing wheelchair experience event.

In the Sumitomo Electric Athletics Festa, the Kansai Industrial Track and Field Federation has hosted the Japan Record Challenge Track Meet and the Sumitomo Electric Cup since the first event in 2012. The powerful performances of top-class athletes striving to break Japanese records have brought much excitement to the events.

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Based on the Sumitomo Electric Group Basic Policies on Social Contributions, we are committed to community-based social contribution activities, aiming to live in harmony with local communities. As part of our commitment, we promote local sports activities through the organization of athletic lessons and competitions with the Sumitomo Electric Track and Field Team playing the main role.

We strive to be trusted and loved by local people through the athletic lessons given to local kindergarten, elementary school, and junior high school students. The Sumitomo Electric Athletics Festa is an event that can be joined freely by local people.

Athletics class/Koike (right) and Mikase (left)

*Sprint 50 Challenge and its logotypes are trademarks or registered trademarks of Amuse Inc.

id

TOPICS

Topics from the future-shaping Sumitomo Electric Group

A Place Related to Sumitomo's History

— Osaka —

Osaka Prefectural Nakanoshima Library

Sumitomo's close relationship with Osaka dates back to the early Edo Period (1603–1868), when Tomomochi Sumitomo, the second head of the family, opened a copper refinery in Osaka to start a copper refining and smithing business. Ever since then, Sumitomo has developed its business, particularly in Osaka.

This article sheds light on Nakanoshima Library (Kita-ku, Osaka City), affiliated with the Sumitomo Group.

Plaque bearing messages from the benefactor in the central hall

Nakanoshima Library

Courtesy: ShoPro, Haseko, and TRC cooperative venture

Completed in 1904, Osaka Prefectural Nakanoshima Library is celebrated as a fine example of neoclassical architecture in the Greco-Roman temple style. The benefactor for Nakanoshima Library was Kichizaemon Tomoito Sumitomo, the 15th head of the Sumitomo family, who chose to donate the library rather than simply donate the funds for its construction. He donated not only 50,000 yen to fund the purchase of books but also imported encyclopedias and the Sumitomo Collection, comprising around 20,000 Western books on the natural sciences. This munificence reflected Tomoito's wish to see the people of Osaka broaden their horizons.

The copper plaque displayed on the wall of the central hall bears the words of Tomoito:

"Osaka, the largest city in Kansai, is home to one million people. In this city richly endowed with financial resources and goods, several educational institutions have been established and are engaged in friendly rivalry. However, Osaka lacked a library and the prefectural government wished to remedy this deficiency. I wished to contribute by donating a library as well as some books and an endowment."

The construction of Nakanoshima Library took three years, making it a rather lengthy project for its scale, and the construction cost greatly exceeded the initial budget. Fulfilling Tomoito's cherished desire, over 100 years since its completion, Nakanoshima Library still stands in all its dignity, having survived the vicissitudes of war.

id vol.22

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

https://sumitomoelectric.com/id

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