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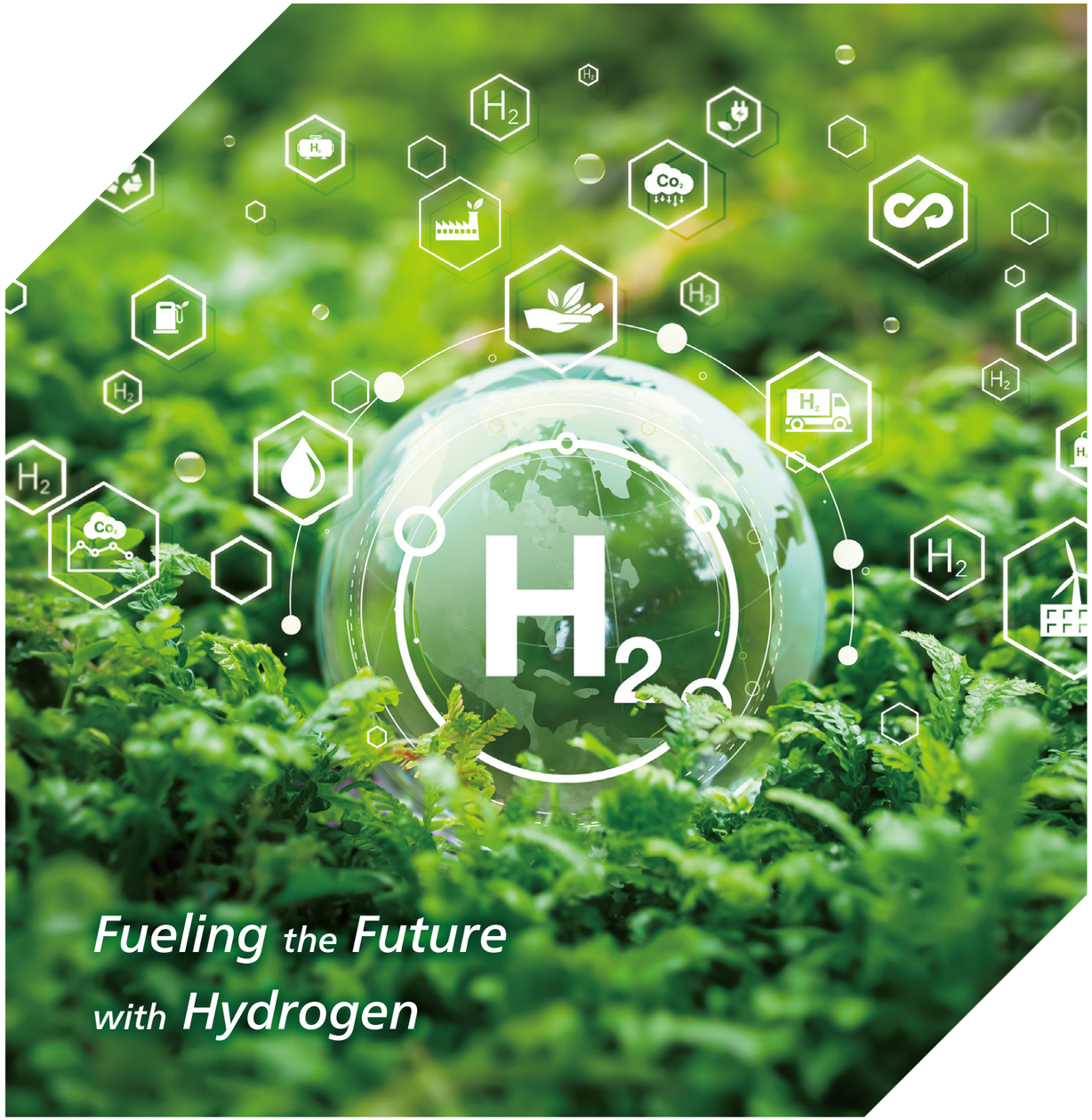

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Our Aspirations

Turning support into strength— racing across the field and onto the world stage!

In November 2025, the Japan women's national rugby sevens team (Sakura Sevens) achieved a historic feat, finishing third at the HSBC SVNS Dubai tournament—Japan's best-ever result. Representing Japan on Sakura Sevens are Ria Anoku and Michiyo Suda of Sumitomo Wiring Systems. Sevens is a form of rugby played with seven players on a full-size pitch, the same as in the 15-a-side game. It is characterized by fast-paced play that makes full use of the open space, with possession changing hands rapidly. Anoku and Suda explain that Japan's strength lies not in relying on individual star players, but in players understanding one another's strengths and competing as a cohesive unit.

In addition to representing Japan, the two also play for the women's rugby team PEARLS, which is sponsored by Sumitomo Wiring Systems, and work in corporate communications at the company. Suda is in her first year with the company. "Since I'll be away from work for extended periods during the national team training camps, I make sure to take notes on everything I'm taught and review them during camp so I don't forget," she explains. Anoku, who has a longer career with the national team, expresses her appreciation for her co-workers: "I feel some hesitation about handing over my duties during my absence, but I'm touched by the warm support I receive. I'm especially thankful to those who offer words of encouragement, as well as to those who come to watch matches in person or follow them online."

Rugby is a physically demanding sport, and both have experienced significant injuries. The rehabilitation process can be lengthy, starting from a point where they are unable to move freely and continuing through to regaining cardiovascular fitness by running. What they share is a shift in perspective: rather than viewing this period as a blank period in their careers, they see it as a time to reassess their physical condition, come back stronger, and develop new strengths. "I believe that if you persevere through difficult times, there will always be a moment when you move closer to your goals. I want to keep challenging myself," says Anoku. "Whatever the situation, I want to approach it with a positive mindset and enjoy the process," says Suda. As they give their all in three roles—as members of the Japan national team, club players, and company employees—their sights are set on the next tournament, the Asian Games, and ultimately the Olympic Games. SD

Michiyo Suda
General Affairs Department
Corporate Group
Sumitomo Wiring Systems

Ria Anoku
General Affairs Department
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Sumitomo Wiring Systems

Fueling the Future with Hydrogen

Hydrogen is attracting growing attention as a key to decarbonization. As a clean energy source, it has the potential to reduce carbon dioxide emissions across a wide range of fields—from power generation and transportation to industrial applications. Realizing its widespread use, however, will require technological innovation at every stage, from production and transport to storage and utilization. We look at how two Sumitomo Group companies are advancing the use of hydrogen.

Assembling the test equipment. His gaze is set on the hydrogen-powered future this technology will help bring about.

PART 1

Toward zero loss in liquid hydrogen storage Technology supporting the use of hydrogen

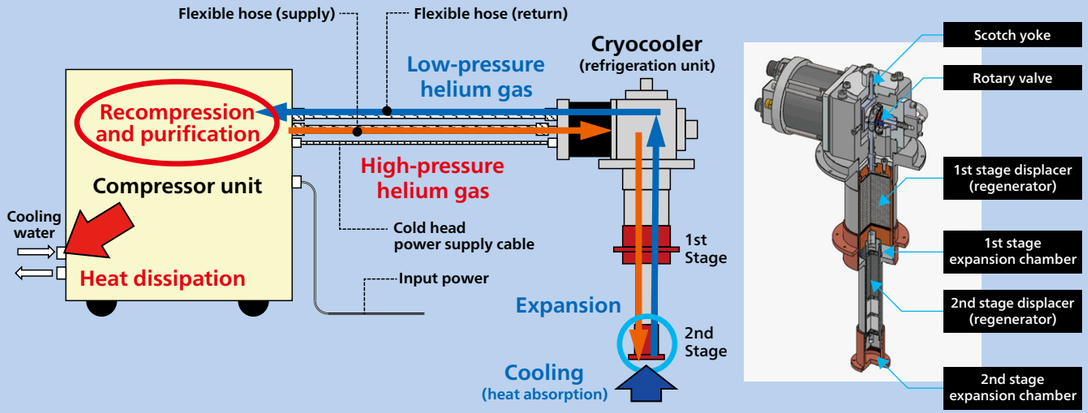
Sumitomo Heavy Industries

Hydrogen is often liquefied for transport and storage. However, because it vaporizes easily, losses due to evaporation have long been a challenge. Sumitomo Heavy Industries focused on this issue, developing a system to recover boil-off gas inside storage tanks and successfully demonstrating its effectiveness. We spoke with the project leaders, Takaaki Morie, General Manager of the Advanced Technology Center at the Innovation and Technology Research Laboratories, Corporate Technology Management Group, and Yutaro Koike of the Cryogenics and Vacuum HQ, Advanced Technologies SBU.

A system using a cryocooler to liquefy and recondense hydrogen. By applying the cryocooler technology cultivated over the years, losses during liquid hydrogen storage are eliminated.

Japan has long recognized the potential of hydrogen and has worked to develop technologies for its use across a wide range of fields. In the wake of the oil shocks of the 1970s, the government launched the Sunshine Project, which set out four priority areas—solar, geothermal, coal, and hydrogen—to reduce dependence on fossil fuels. Hydrogen was included because it is the most abundant element and, unlike fossil fuels, is not subject to the risk of depletion. It can also be produced through the electrolysis of water using renewable energy sources such as solar and wind power, making it a geopolitically stable energy option. Since then, hydrogen has featured prominently in various energy initiatives, with related technologies steadily advancing. Japan was the first in the world to achieve mass production of residential fuel cells and fuel cell vehicles (FCVs), and it has developed strong technological capabilities in areas such as hydrogen transport, power generation, and industrial heat applications.

High-pressure helium is supplied from the compressor and expanded in the cryocooler to generate cooling.



Operating principle of a GM cryocooler. High-pressure helium is supplied from a compressor and expanded in the cryocooler to generate cooling. The diagram shows a two-stage system. A single-stage cryocooler is used for hydrogen liquefaction and recondensation.

Against this backdrop, Japan became the first country in the world to formulate a national hydrogen strategy—the Basic Hydrogen Strategy—in 2017. In 2023, it was revised in light of global developments and technological advances, with plans for further reviews roughly every five years. Because it produces no carbon dioxide (CO_2) when used as a fuel, hydrogen is expected to play a vital role in the transition to a decarbonized society.

Applying proven cryocooler technology to hydrogen systems

Advancing technologies for hydrogen storage and transport is essential for promoting its use in the transition to a decarbonized society.

"Hydrogen is a gas at room temperature, but when cooled to –253°C, about 20K (kelvin), it liquefies, increasing its density to roughly 800 times that of the gas," explains Koike. "In other words, liquefaction allows about 800 times more hydrogen to be stored in the same volume, making it a highly efficient method for storage and transportation. However, because of the extremely low temperatures involved, even a small amount of heat input can cause it to vaporize."

Boil-off gas generated inside storage tanks poses challenges in terms of both safety and cost. If vaporization causes pressure to build up within a tank containing liquid hydrogen, it can lead to damage to the tank. To prevent internal pressure from exceeding safe limits, the gas is sometimes vented to the atmosphere. "In relatively small containers of 100m^3 or less, however, 0.5 to 1% of the total liquid hydrogen is lost each day, which directly translates into an economic loss," Koike adds.

To address this challenge, Sumitomo Heavy Industries' Technology Research Center and the then Precision Equipment Group developed a system that uses a cryocooler to recover boil-off gas. Equipped with a cryocooler capable of operating at 20K—the liquefaction temperature of hydrogen—the system re-liquefies and condenses hydrogen vapor, aiming to reduce losses during storage.

"Conventional cryocoolers operate on the principle that a gas absorbs heat from its surroundings as it expands," explains Morie. "Sumitomo Heavy Industries has extensive experience in developing cryocoolers based on this principle, including the Gifford-McMahon (GM) cryocooler. It generates cooling effects by reciprocating the coolant and expanding helium gas. We were the first in the world to develop a technology capable of maintaining a stable 4K environment without the use of liquid helium, and it is now widely used in essential equipment that underpins modern industries, such as MRI systems and semiconductor manufacturing equipment."

The Yokosuka Innovation Hub, Cs'-Lab+ in Yokosuka City, established in 2025, is the central hub for R&D of the Sumitomo Heavy Industries Group.

To put it simply, a cryocooler is like the indoor unit of an air conditioner, while the compressor that pressurizes helium corresponds to the outdoor unit. Air conditioners use refrigerants rather than helium, but they operate on the same principle—absorbing heat as the gas expands.

New cryocooler demonstrates safety and cost-effectiveness

The vapor recovery system combines a cryocooler fitted with a heat exchanger at its tip to cool the boil-off gas with a compressor unit that pressurizes helium. Cooling generated as helium gas expands inside the cryocooler is transferred to the heat exchanger, where it cools and condenses the vapor within the storage tank.

During development, it was necessary not only to verify the system's capacity to handle boil-off gas, but also to demonstrate that, despite the electricity consumed by the cryocooler during operation, sufficient economic benefits could be achieved through its recovery.

"That's why we placed particular emphasis on the efficiency of the heat exchanger," says Koike. "If recondensation efficiency is low, the overall energy efficiency of the system declines, making it economically unviable. In the end, we developed a heat exchanger capable of achieving near-100% efficiency."

Because hydrogen is flammable, safety is a critical concern. The area where the cryocooler is installed is likely to be classified as a Class 2 hazardous location, making explosion-proof design essential. In addition, as the system falls under the High-Pressure Gas Safety Act, it had to comply with all relevant standards. When the company submitted an application to the Kanagawa Prefectural Government for approval to conduct in-house testing, it received multiple requests for design revisions, and more than three months passed before approval was granted. "It took time, but it also deepened our understanding of the regulatory requirements and enabled us to design a system with a high level of safety," says Koike with a hint of pride.

These efforts have yielded promising results in demonstration tests. Even under conditions in which heat was applied externally to a sealed container holding approximately 2 liters of liquid hydrogen to promote vaporization, the system completely suppressed pressure buildup for about half a day, maintaining a sufficiently low pressure while maintaining safety. It was also confirmed that pressure rises immediately when the cryocooler is stopped, providing clear evidence of the system's effectiveness.

Promising results have also been achieved in terms of cost-effectiveness. Based on current hydrogen prices in Japan, the payback period for investment in this system is estimated at around one year. Although hydrogen prices are expected to decline in the future, "we believe that continued improvements in cryocooler efficiency will ensure that the system remains economically viable, even taking future hydrogen prices into account," says Koike.

The source of the company's competitive strength lies in its extensive technological expertise in cryogenics. It holds a 95% share of the global market for cryocoolers used in MRI systems and has a strong track record in vacuum pumps for semiconductor manufacturing equipment. A distinctive feature is the ease of use of these systems. "Once the initial setup is complete, even users unfamiliar with the system can easily create cryogenic environments—such as 4K or 20K—with the press of a single button," says Morie.

Going forward, the company will move into the practical implementation phase for hydrogen applications. It is targeting energy and mobility-related companies as well as research and development centers, and aims to begin concrete discussions on equipment deployment as early as fiscal 2026.

Realizing a hydrogen-based energy system requires not only advances in production and utilization, but also in storage and transportation. Morie and Koike emphasize that their cryocooler technology enables hydrogen to be stored safely and efficiently while delivering clear economic benefits, and that they hope to contribute to the development of a global hydrogen economy.

Cryogenic technology developed over more than 60 years since the establishment of the Hiratsuka Laboratory in 1962 is now poised to create new value as core infrastructure for a next-generation energy system. SQ

Hiratsuka Laboratory, opened in 1962, where Sumitomo Heavy Industries began R&D of cryocoolers.

PART 2

Leveraging over 40 years of experience to advance decarbonization with hydrogen

Sumitomo Seika Chemicals

Hydrogen is essential for manufacturing, particularly in the semiconductor industry, and also as an energy resource contributing to the realization of a decarbonized society. As efforts to expand its use accelerate, growing attention is being paid to the technologies that extract hydrogen from natural gas and from by-product gases generated in manufacturing processes. Sumitomo Seika Chemicals has particular strengths in pressure swing adsorption (PSA) technology, which separates and purifies target gases by repeatedly cycling between adsorption and desorption through changes in gas pressure. We spoke with Takayoshi Chiba, General Manager, and Hiroshi Yamazaki, Manager, of the Engineering and Systems Department in the Functional Materials Division about the company's technological advantages and market prospects.

Hydrogen—the most abundant element in the universe. Could it hold the key to a decarbonized future?

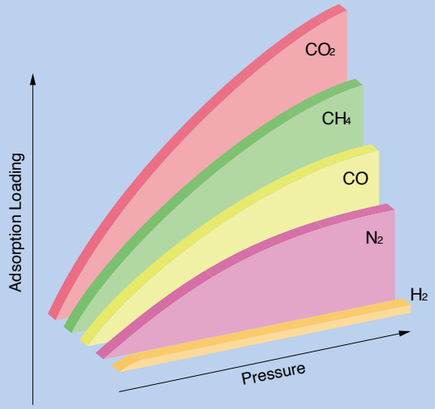
Sumitomo Seika Chemicals was founded in 1944 as a fertilizer manufacturer. As Japanese society developed—from postwar reconstruction to economic growth—the company diversified, globalized, and expanded. Today, its core businesses include superabsorbent polymers, functional chemicals, and gases. Its superabsorbent polymer AQUA KEEP, used in everyday items such as disposable diapers and pet pads as well as in a wide range of industrial applications, commands a high market share in Japan and overseas.

Sumitomo Seika Chemicals began developing PSA hydrogen gas purification systems about 40 years ago.

"We had long been involved in the gas business, including the sale of industrial gas cylinders," says Chiba. "This led us to focus on PSA—a process that separates and purifies target gases by varying pressure—and to begin research in 1976. In 1979, we completed the first PSA nitrogen gas generator. Seeking to put this technology to broader use, we began working with a range of gases, one of which was hydrogen. Back then, there was no such concept as a 'hydrogen economy,' and environmental considerations were not a priority. However, hydrogen was relatively expensive, and there was strong demand from factories and other users, which prompted us to begin developing PSA hydrogen gas generators."

PSA systems can be used with a wide range of gases.

A methanol reforming hydrogen gas generator at Sumitomo Seika Chemicals' Befu Works in Hyogo Prefecture.



Hydrogen gas is obtained by separating it from a gas mixture—comprising carbon dioxide, methane, carbon monoxide, nitrogen, and hydrogen—through repeated cycles of adsorption and desorption under varying pressure.

When generating nitrogen, air is used as the feed gas. Air consists of roughly 80% nitrogen, 20% oxygen, and trace amounts of carbon dioxide (CO_2). When compressed air is introduced into the lower part of the adsorber vessel, oxygen and other components are adsorbed and removed, allowing nitrogen gas to be recovered from the upper part. Because the adsorbed oxygen and other components are desorbed at atmospheric pressure, the system can be used repeatedly.

Following its success with nitrogen gas generators, the company also developed oxygen gas generators. Subsequently, it developed hydrogen gas purification systems, as well as argon and carbon dioxide gas recovery and purification systems. Although the adsorbents used and the system configurations vary depending on the gas, and while there is a distinction between gas "generation" and "purification," the basic principle of PSA—repeatedly cycling adsorption and desorption by varying pressure to obtain the desired gas—remains unchanged. The company's ability to handle such a wide range of gases is underpinned by more than 40 years of experience, and the accumulation of expertise is one of the company's key strengths.

Cost-effective on-site hydrogen production for industrial operations

The feedstocks typically used in hydrogen gas purification systems include methanol, natural gas, and by-product gases from coke ovens. All are used to extract high-purity hydrogen from feed gases. Systems using methanol or natural gas are installed to supply hydrogen required for operations, while those using by-product gases enable the effective utilization of by-products of business activities.

"Many industries require hydrogen. It is essential for hydrogenation processes, in which hydrogen is added to substances in chemical manufacturing, for desulfurization in petroleum refining, and for the heat treatment of metals," says Chiba. "In particular, even trace impurities can affect the quality of semiconductors and optical fibers, so manufacturing facilities require a constant supply of high-purity hydrogen. While hydrogen can be procured from specialized suppliers, installing a hydrogen gas purification system on-site makes it possible to produce hydrogen in-house. This is more cost-effective than external procurement, and it ensures a stable supply unaffected by adverse weather, natural disasters, or transportation disruptions—an advantage unique to on-site production."

Although the basic configuration of PSA hydrogen gas purification systems is standardized, Sumitomo Seika Chemicals optimizes each system for specific applications. Hydrogen, the simplest element, readily bonds with other elements and is prone to redox reactions. The entire process must be carefully adjusted, taking into account not only the installation location and scale of the system, but also the composition of the feed gas and the required purity level of the refined gas. Hydrogen demands more precise engineering than other gases.

"We examine every aspect, including selection of adsorbents, balance between gas flow rate and velocity, and timing of pressure switching," explains Chiba. While the principles are straightforward, engineering is a matter of accumulated know-how. Hydrogen gas is so difficult to handle that some companies have withdrawn from the field."

Advancing technology toward a decarbonized society

Extracting hydrogen from by-product gases presents a different set of challenges.

"At steel mills, coke ovens used to heat coal generate large volumes of gas. However, because this gas is contaminated with impurities from the raw materials, it is typically used only as a fuel. By incorporating a pre-filter into the process alongside the adsorption adsorber vessels, we can remove impurities specific to coal-derived gas. This has enabled us to extract high-purity hydrogen gas usable for applications beyond combustion, such as power generation," says Yamazaki.

Furthermore, while methanol and natural gas have relatively consistent compositions—allowing past data to be used for setting parameters such as flow rates—by-product gases vary widely in composition and volume. Therefore, installing a hydrogen gas purification system requires detailed analysis of the gas at the outset. Also, when such systems are introduced into existing plants, there are significant constraints on installation conditions, making more finely tuned engineering necessary. Although this is not straightforward, effective utilization of by-product gases is important in decarbonization, and tackling it is crucial.

"To begin with, hydrogen supply lags demand, and its relatively high cost compared to other energy sources is another factor slowing adoption," says Chiba. "There is still considerable scope to improve our PSA systems. Developing technology for higher gas recovery rates will also be a challenge. Through promoting the use of by-product gases, we hope to contribute to the realization of a decarbonized society." Yamazaki adds, "Improving recovery rates will require not only enhancements to equipment and systems, but also further work on adsorbent performance and refinement of our technologies to efficiently remove non-target components of gases about which our knowledge is still limited. We need to do all this in a comprehensive manner."

Looking ahead, the widespread adoption of methanation is viewed as a key development. Methanation is a technology that synthesizes methane from hydrogen and carbon dioxide. If this synthetic methane is distributed in the same way as today's city gas, and the CO_2 generated is reused in methane synthesis, no additional CO_2 emissions are produced, making the process carbon neutral. The Japanese government aims to begin utilizing methanation by 2030 and has set a target of replacing 90% of city gas (25 million tons annually) with synthetic methane by 2050.

To realize carbon neutrality through methanation, the hydrogen used as a feedstock should be green hydrogen, that is, hydrogen obtained by electrolysis of water using renewables such as solar and wind power. However, green hydrogen is currently costly to produce, and its widespread adoption is not expected to occur for some time. Until low-cost green hydrogen becomes available, methods such as extracting hydrogen from industrial by-product gases are considered cost-effective, and PSA can be utilized for this purpose. Promoting the use of by-product gases will also help reduce greenhouse gas emissions. To achieve this, purification technologies that remove unwanted gas and enhance hydrogen purity are indispensable. Further advances in Sumitomo Seika Chemicals' PSA hydrogen purification systems will be key. SQ

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1. In PSA, various adsorbents, including synthetic zeolites, are used depending on the target gas.
2. Sumitomo Seika Chemicals, which began as a manufacturer of fertilizers and functional chemicals, has since distinguished itself in the gas business. Its strength lies in its ability to tailor systems to customer needs, from compact units to large-scale installations.

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3. Packaged methanol reforming high-purity hydrogen gas generator (100Nm^3/h, 99.999% purity), used by customers requiring high-purity hydrogen, such as in semiconductor manufacturing .
4. H_2-PSA PSA hydrogen gas purification system. Hydrogen gas is recovered by decomposing methanol or natural gases.

Let's talk!

Building connections through company sports clubs

Illustration: Naoyuki Hayashi

Sumitomo Group companies, which place a strong emphasis on employee well-being, actively support sports-based club activities. In recent years, these activities have attracted attention not only for fostering camaraderie within the workplace, but also for strengthening employee engagement. In this feature, employees from three Group companies share their experiences.

(From left)
Takaaki Numano, Commercial Production Dept. 3rd, Mitsui Sumitomo Insurance
Yosuke Kuze, Marine Department, Sumitomo Warehouse
Hisashi Murakami, Omiya Branch, SMBC Nikko Securities

Club activities for all skill levels

Numano: I'm a member of the tennis club. I used to play competitively, but now I serve as manager of the company team.
Murakami: I'm part of the company baseball team—we play rubber-ball baseball. I used to play but now I'm the manager.
Kuze: I'm in the running club and still actively running. I joined about four or five years ago after my supervisor at the time encouraged me to give it a try, but I was a complete beginner. What prompted you both to join?
Numano: I've been playing tennis since my student days. I joined the tennis club soon after joining the company, and until recently I competed in league matches as a member of the company team. I've experienced both promotion and relegation in the league.
Murakami: I also played baseball in college, so I joined the team soon after joining the company—about 30 years ago. Around 10 years ago, I formed a new team and took on the role of manager. Our club focuses mainly on matches and doesn't really hold practice sessions, so I'm curious—what kind of activities do your clubs do?
Numano: We have about 200 members nationwide, including in Tokyo and Osaka. The club includes players of all levels—from beginners to those competing in the Tennis Japan League—and everyone enjoys tennis at their own pace. We usually practice individually, but once a month we hold a session at the company's tennis courts, where a wide range of members—from families to former members—come together to enjoy playing.
Kuze: We have about 25 members. About once every two months, we get together after work to run around the Imperial Palace, and we also take part in running events two or three times a year. At an ekiden event held at Nissan Stadium, this past January, 17 of us took part, divided into six teams, passing the sash from one runner to the next. Participation in both the runs and events is optional, and everyone takes part at their own pace.
Murakami: Within the SMBC Nikko Securities Group, there's a rubber-ball baseball league called the "Nikko League," which was established in 1996. There are currently six teams in the league, including ours. Every year, we play five league games, and the top two teams go on to compete in the final at a major stadium such as Meiji Jingu Baseball Stadium. It's something everyone keenly looks forward to, and it creates a lot of excitement.

Club activities foster diverse forms of communication

Kuze: Mr. Numano, as the manager of the company team, I imagine you have to be quite demanding when it comes to competition, don't you?
Numano: Yes, winning in the league is a major goal. At the same time, one of the great things about the club is that tennis gives us the chance to connect with people across departments and roles. Being able to chat and get to know people on the court—and then finding it easier to consult colleagues in other departments in our day-to-day work—is something I greatly value.
Kuze: I feel the same way. Through club activities, we often find ourselves chatting and getting energized with colleagues from other departments we don't usually interact with at work, which really helps build a sense of team unity. One of the greatest appeals is the chance to connect with people across departments, roles, and generations. For example, when I took part in the Aino Machi Hanyu Sawayaka Marathon in Hanyu City, Saitama Prefecture, I was able to connect with colleagues based there through running.
Murakami: I agree. Our team brings together members in their 20s through to their 60s, with a wide range of experience and backgrounds, and you can feel the distance between people gradually narrowing as we play together and build teamwork. When I was younger, I once asked someone from an opposing team for help with a work matter, and I still remember their kindhearted response.
Numano: In addition to matches and practice, our club has also begun getting involved in community-focused activities through tennis. In collaboration with local governments and sports clubs, we've visited local junior high schools as coaches to provide tennis instruction. Having our own facilities, and a supportive environment, we'd like to give back to the community by sharing the experience and skills we've gained through tennis.
Kuze: In terms of community involvement, in Osaka our company takes part each year in a clean-up initiative called the "Osaka Marathon Clean-Up Campaign," organized by Osaka City in the lead-up to the marathon. I'm based in Tokyo, so I'm unable to participate myself, but I hope these kinds of activities—bringing together running, community, engagement, and connection—will continue to grow.
Murakami: Former members who have retired also take part in our team, so the club serves as a place where they can stay connected with current employees. Even if someone leaves the company—for example, to change jobs—they can maintain those ties through baseball, and in some cases that leads to people returning to the SMBC Nikko Securities Group. In today's world of increasing workforce mobility, club activities may well be a valuable way of keeping people connected. SD

Looking to the future

Numano: I'd like to take the lead in expanding our community outreach through tennis and further strengthen the role of the team. As manager, I also hope to apply in my work what I've learned about team building and player management through our push for league promotion.

Kuze: What's great about our club is that everyone can enjoy running in their own way. While keeping that atmosphere intact, I'm personally aiming to train hard and break 90 minutes in the half marathon!

Murakami: We've fostered good communication within the team through baseball, and I'd like to develop that even further. Looking ahead, I hope we'll be able to build connections with other teams from other Sumitomo Group companies through baseball as well.

*The discussion took place in early February 2026.

Illustrator Miki Tanaka

Visits Sumitomo Group

Theme

Chiba Factory
Sumitomo Construction Machinery

Sumitomo Construction Machinery manufactures hydraulic excavators and other machinery used around the world. These machines are the unsung heroes that support the foundations of society—essential not only for construction work, but also for disaster recovery and resource recycling through demolition. At the Chiba Factory, the company's main domestic production base in Inage Ward, Chiba City, an average of 40 units of construction machinery across a range of models are produced each day. Here, highly skilled employees with refined technical expertise carry out the four key processes—welding, machining, painting, and assembly—with remarkable efficiency. I visited this production site where high-mix, low-volume manufacturing is carefully leveled and balanced with rigorous quality assurance.

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1. Production line at the Chiba Factory, Sumitomo Construction Machinery's main domestic production base. About 40 units of construction machinery are produced here each day.
2. The Chiba Factory stands alongside Sumitomo Heavy Industries' Chiba Works. In 2025, Sumitomo Construction Machinery celebrated the 50th anniversary of hydraulic excavator production, which began in 1975.

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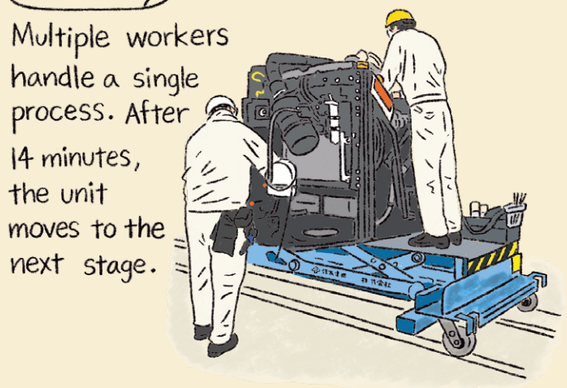
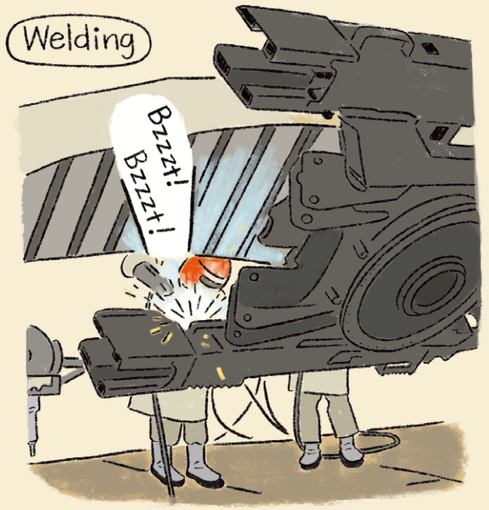




As we passed through a residential area and entered the industrial zone, the Chiba Factory of Sumitomo Construction Machinery, a member of the Sumitomo Heavy Industries Group, came into view. Just inside the main gate is the LS-25000ALJ hydraulic excavator, the first model the company developed and sold in 1969. Having worked tirelessly in the field, it now stands proudly on display.

"Sumitomo Construction Machinery produces between 8,000 and 9,000 hydraulic excavators and asphalt pavers each year," explains Mr. Keisuke Sakamoto, Manager of the Chiba Manufacturing Section and the Manufacturing Planning Section of the Manufacturing Department. "The Chiba Factory is currently the only domestic production site—our mother factory—that manufactures the full range of hydraulic excavators, from small to large models. Around June 2025, we began ramping up operations at our Yokosuka Factory in Kanagawa Prefecture, with plans to transfer production of large excavators in the 35- to 80-ton class there. By 2028, our production system will consist of two sites in Japan, along with plants in China and Indonesia."

Wearing a helmet, workwear, and a protective mask, I toured the factory, guided by Mr. Sakamoto. At the Chiba Factory, excavators ranging from 7.5-ton to the 80-ton class are produced, with models of different sizes moving along the same production line. In the case of automakers, production efficiency is typically improved through leveling and automation using robots to enable the mass production of identical models. However, this approach does not work at the Chiba Factory, which produces a wide variety of models in small quantities.

"At our factory, we have a rule that each production process is carried out within a 14-minute cycle. This cycle was established by breaking down the workflow in order to achieve a daily output of around 40 units. Depending on the model and size of the machine, however, the time required for the same process can vary, and work on larger machines does not always fit within the 14-minute window. We therefore schedule smaller models after larger ones, designing our production plans to level the overall working time across the entire line, including the preceding and subsequent processes," says Mr. Sakamoto.

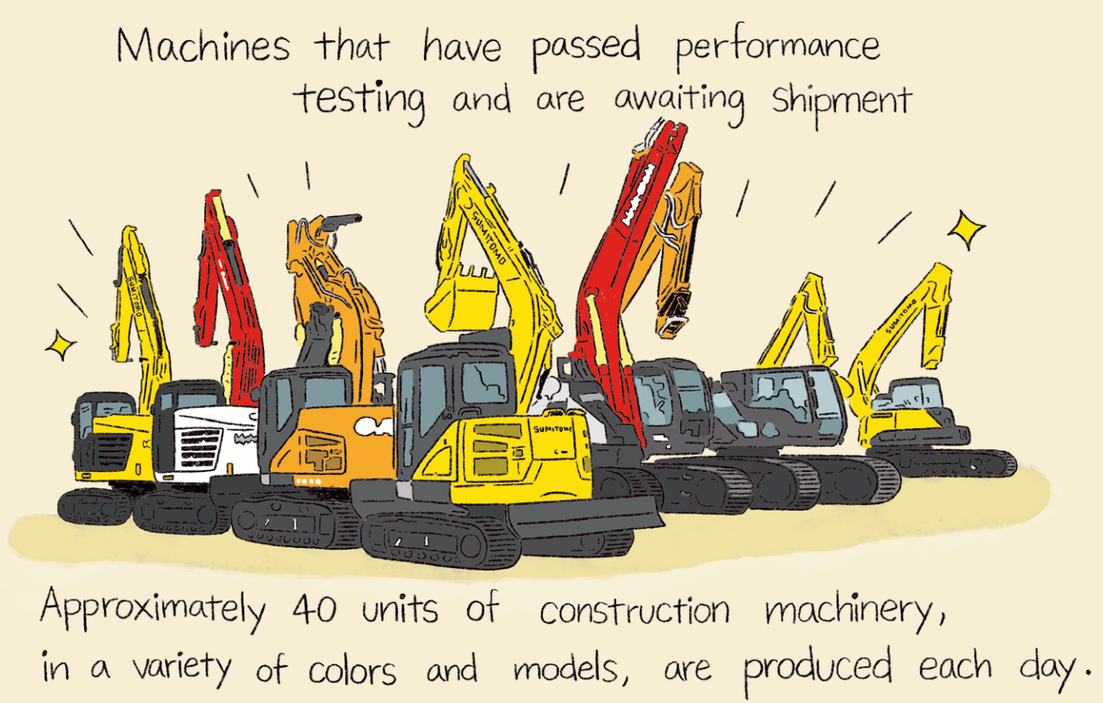
The production process is broadly divided into four stages: welding, machining, painting, and assembly. Each plays an essential role, but welding is considered particularly critical. If the quality of welding is inadequate, it could

lead to accidents at work sites where heavy earth and debris are excavated and loaded, or where buildings are demolished. "Not everyone working here is a veteran. Our workforce is diverse, including new hires, mid-career hires, and foreign technical intern trainees, regardless of gender," says Mr. Sakamoto.

To produce such a large number of machines while maintaining high quality, all employees must acquire a high level of technical skill. To this end, the Chiba Factory has established a three-pronged skills development system for each stage of the production process—comprising the "Welding Dojo," "Machining School," and "Assembly Academy." "New workers learn the fundamentals through training before being assigned to the shop floor. It takes at least three months to master a single process, and experienced employees provide hands-on support to ensure that new workers improve their skills while maintaining production quality," explains Mr. Sakamoto.

Production at the Chiba Factory does not rely solely on human senses and skills. For example, even when bolt tightening in the assembly process appears to have been performed correctly, foreign matter lodged in the threads can result in insufficient clamping force, potentially leading to serious accidents later on. To address this risk, areas where detachment would be particularly dangerous—such as the joints between the upper and lower structures and mounting points for rear counterweights—are designated as "critical tightening" points. A system has been introduced to automatically evaluate these points based on three parameters: torque (the force that twists an object around an axis), the rotation angle after tightening begins, and the time required for tightening. Records are retained for each unit, enabling traceability in the event of a problem.

Outside the building, functional checks are carried out on excavators whose assembly has been completed. The sight of these brand-new machines—swinging their massive arms up and down, rotating their cabs, and moving on their brand-new crawler tracks—is truly impressive. "Excavators that have passed the functional checks are lined up in a large open area. Machines in a variety of colors—including Sumitomo Construction Machinery's signature yellow, bright orange models for Europe, and red Link-Belt machines primarily sold in North America—quietly await shipment," says Mr. Sakamoto. For machines destined mainly for overseas markets, the buckets at the end of the arm are typically attached at the destination, not installed at the factory, to meet customer requirements. Watching the machines take shape one after another, I appreciated anew the role they play at construction sites. SD



Crossing **Borders**

Creating Value in a Connected World

Mario Nakayama

Assistant Manager
Aerospace Thermal Management Engineering Department
Sumitomo Precision Products

From Croatia. Came to Japan in 2011. Completed a Ph.D. in Aeronautics and Astronautics at the Graduate School of Engineering, Kyoto University. Worked as a postdoctoral researcher on thermal control using topology optimization. Following a joint research project with Sumitomo Precision Products, joined the company in 2019 and was assigned to his current division.

Advancing the implementation of cutting-edge thermal control technology in a flexible research environment

Mario Nakayama is an engineer from Croatia. At Sumitomo Precision Products, he is currently working on improving the performance and reducing the size of heat exchangers for aircraft engines using topology optimization.

He has been interested in space since childhood and came to Japan to study aerospace engineering at the Graduate School of Engineering, Kyoto University. While working as a postdoctoral researcher, he learned that Sumitomo Precision Products was launching a project to put topology optimization into practical use and he decided to join the company. "There were other job opportunities, but they were all project-based. What attracted me to Sumitomo Precision Products was its long history in the aerospace business and its environment that allows research to continue over the long term," he says, explaining his decision.

As a leading manufacturer of heat exchangers, Sumitomo Precision Products has long supplied thermal control systems—primarily heat exchangers for aircraft engines—based on its proprietary design technologies. Nakayama, who is helping to introduce new technologies to improve efficiency, is a valuable member of the team.

"I basically conduct my research independently within the company. However, when it comes to research methods and manufacturing technologies, it's reassuring to know there are many specialists I can consult. Unlike when I was at Graduate School, I'm able to have discussions with practical applications in mind, and there is a great deal to learn."

He also describes the research environment as highly flexible. "Of course, results are expected, but to a certain extent I can set my own research milestones." As a specialist in heat exchangers, Nakayama is fully committed to his research and aims to contribute to advancing Japan's technological capabilities.

Sumitomo Precision Products has long conducted joint research with the Japan Aerospace Exploration Agency (JAXA), and Nakayama says, "I'd like to work on space-related projects too." SD

Ideas also emerge through discussions with colleagues.

My favorite book

"Ghost in the Shell" By Masamune Shirow

"Ghost in the Shell" (1989), a manga by Masamune Shirow. Japanese manga and anime are popular in his home country of Croatia, and Nakayama says he became hooked on "Ghost in the Shell" after watching its anime adaptation when in high school. Set in the near future, the story follows a public security unit led by a cyborg protagonist as they tackle increasingly sophisticated cybercrime. "Even now, I watch this anime about once a year, and each time it makes me reflect on the impact of technological advances on society, as well as what it means for me to develop technology. I like the fact that it's not easy to understand—that's part of what makes it so interesting."

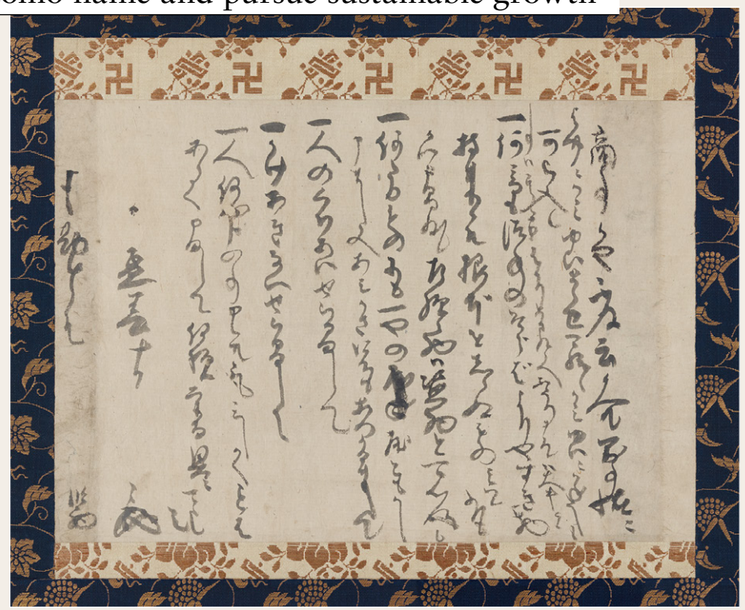
Sumitomo's

Modern Development

The present-day Sumitomo Group developed through the endeavors of several companies whose flourishing businesses not only made them leaders in their industries but were also instrumental in Japan's modernization. Let's take a look at some of them.

Part 47

Based on a tacit understanding with the head of the Sumitomo family, the Group worked together to protect the Sumitomo name and pursue sustainable growth



Monjuin Shiigaki, known as the Founder's Precepts, is a letter written by Masatomo, the founder of the Sumitomo family, toward the end of his life. It offers guidance on how a merchant should conduct business. (Courtesy of Sumitomo Historical Archives).

After the dissolution of Sumitomo Head Office in 1945, the various Sumitomo companies voluntarily changed their names and ceased using "Sumitomo" in their corporate names. As a result, some were mistaken for newly established postwar companies, leading to a renewed appreciation of the value of the Sumitomo name.

In September 1949, the General Headquarters of the Allied Powers (GHQ) formally prohibited Sumitomo, Mitsui, and Mitsubishi from using their zaibatsu emblems. Concerned that the trademarks might be used by others, the Sumitomo companies joined with Mitsui and Mitsubishi to launch a campaign in opposition in January 1950 in order to protect their trademarks and trade names. Subsequently, when the Treaty of San Francisco came into force in April 1952, the ban on the use of the emblems was automatically lifted.

However, as the various Sumitomo companies began preparing to restore the Sumitomo name in their trade names, it was conveyed that the 16th head of the family, Sumitomo Kichizaemon Tomonari, wished that the name not be used. In the year prior to the signing of the Treaty of San Francisco, 12 Sumitomo companies, at the initiative of Sumitomo Chemical President Masaharu Doi, established a presidents' council known as the Hakusui-kai. In May 1952, a meeting was arranged through the good offices of former Director-General Shunnosuke Furuta, bringing together Tomonari and the 12 members of the Hakusui-kai to discuss the use of the Sumitomo name.

Speaking on behalf of the Hakusui-kai, Doi stated: "We joined Sumitomo out of admiration for the high moral character of the head of the Sumitomo family and a desire to benefit from his guidance. (...) Even if our business structures change and we are no longer part of the House of Sumitomo, we will do our utmost to build strong businesses by carrying forward the Sumitomo philosophy that has been cultivated over the years." He thus expressed the member companies' intention to continue using the Sumitomo name and sought approval. At that time, Tomonari is said to have remained silent.

Tomonari, who inherited the family leadership at the age of 17 in 1926 and became president of Sumitomo Head Office at 28, voluntarily stepped down when Sumitomo Head Office was dissolved. However, under GHQ directives, four members of the Sumitomo family were purged from public office; their residences were requisitioned, and they were required to pay the highest property tax levied in the country, resulting in the loss of their homes. A waka poem expressing Tomonari's state of mind at the time has been preserved.

At the harsh voices raised against me, I faltered for a moment, then regained my composure.

Tomonari likely felt that he did not wish to further tarnish the Sumitomo name, which had been treated as that of a war criminal and subjected to public criticism. He remained silent, neither giving nor withholding his consent. Shunnosuke Furuta, who enjoyed Tomonari's deep trust, interpreted this as the head of the family's approval, and the gathering then moved on to a more informal setting over drinks.

There is still no formal agreement between the Sumitomo family and Sumitomo companies regarding the use of the Sumitomo name. A tacit understanding—a gentlemen's agreement—was reached to conduct business in accordance with Sumitomo's business philosophy. Such a tacit understanding, founded on mutual trust, carries more weight than a written contract. In 1954, the Sumitomo Trademark Committee was established, and at the same time, the Sumitomo Trademark Basic Agreement was signed by the presidents of the 14 companies of the Hakusui-kai. Even today, one of the Hakusui-kai's key roles is to safeguard and pass on the Sumitomo Group's trade names and trademarks.

What kind of corporate group is the Sumitomo Group? The answer can be found in words recorded by the Confucian scholar Goi Ranshu, who interpreted the Monjuin Shiigaki—a letter written by Masatomo, the first head of the Sumitomo family, and the source of the Sumitomo business philosophy: "The secret of prosperity and longevity lies in disciplined work, through which wealth is accumulated and then used for the benefit of society and others. The Sumitomo family has put this into practice ever since the days of its founder, Masatomo." SD

Changes in Hakusui-kai member companies

As of April 2026

Sumitomo Group companies Company names in parentheses are those at the end of the war.	1951	1952	1958	1964	1977	1986	2008	2012	2014	2016	2025
Sumitomo Chemical* (Sumitomo Chemical Industry)	■	■	■	■	■	■	■	■	■	■	■
Sumitomo Heavy Industries* (Sumitomo Machinery Industries)	■	■	■	■	■	■	■	■	■	■	■
Sumitomo Mitsui Banking Corporation* (Sumitomo Bank)	■	■	■	■	■	■	■	■	■	■	■
Sumitomo Metal Industries*	■	■	■	■	■	■	■	■	■		
Sumitomo Metal Mining* (Sumitomo Mining)	■	■	■	■	■	■	■	■	■	■	■
Sumitomo Corporation* (Sumitomo Real Estate Building)	■	■	■	■	■	■	■	■	■	■	■
Sumitomo Mitsui Trust Bank* (Sumitomo Trust)	■	■	■	■	■	■	■	■	■	■	■
Sumitomo Life Insurance*	■	■	■	■	■	■	■	■	■	■	■
Sumitomo Coal Mining* (Sumitomo Mining)	■	■	■	■	■	■	■				
Sumitomo Warehouse*	■	■	■	■	■	■	■	■	■	■	■
Sumitomo Electric Industries*	■	■	■	■	■	■	■	■	■	■	■
Mitsui Sumitomo Insurance (Osaka Sumitomo Insurance)		■	■	■	■	■	■	■	■	■	■
Nippon Sheet Glass		■	■	■	■	■	■	■	■	■	■
NEC* (Sumitomo Communication Industries)	■	■	■	■	■	■	■	■	■	■	■
Sumitomo Realty & Development			■	■	■	■	■	■	■	■	■
Sumitomo Osaka Cement				■	■	■	■	■	■	■	■
Sumitomo Aluminum Smelting					■	■					
Sumitomo Light Metal Industries					■	■	■	■	■		
Sumitomo Mitsui Construction					■	■	■	■	■	■	■
Sumitomo Bakelite (Sumitomo Synthetic Resin Industries)					■	■	■	■	■	■	■
Sumitomo Forestry (Sumitomo Head Office Forestry Department)					■	■	■	■	■	■	■
Sumitomo Rubber Industries										■	■
Sumitomo Pharma										■	■
Total	12	14	15	16	21	20	19	19	17	19	18

*Pre-war affiliated companies

*Editorial supervision by Sumitomo Historical Archives