パラオ・オモカン島

The Denka Way
Summer 2024 Vol.20

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Denka

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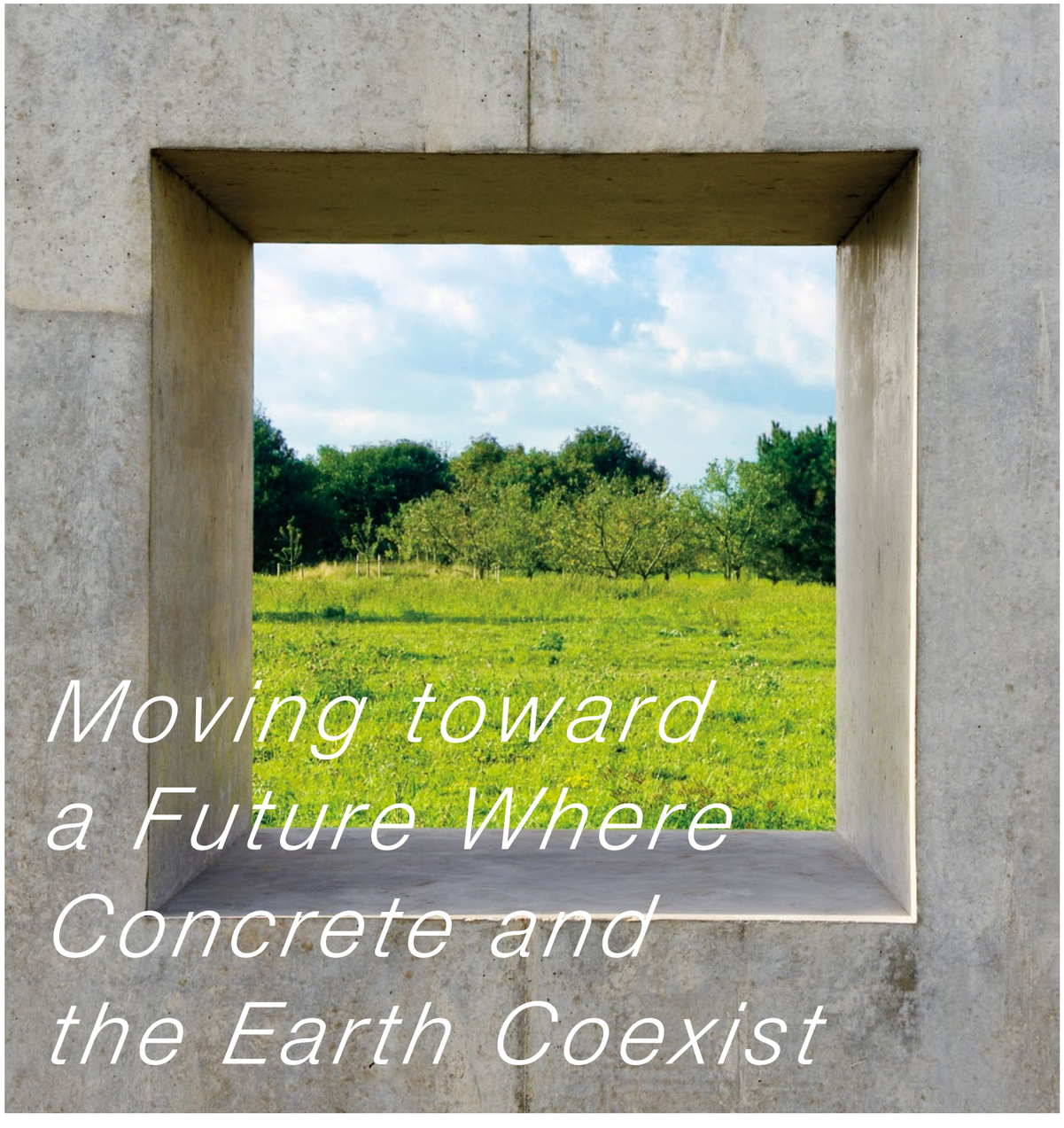


Moving toward a Future Where Concrete and the Earth Coexist

LEAF®, Denka's Special Cement Additive That Contributes to the Realization of a Carbon Neutral Society

Until recently, the manufacturing process of concrete has been unable to avoid emitting a large volume of CO_2. However, manufacturing technologies are being innovated. LEAF®, Denka's special cement additive that reacts with and absorbs CO_2, is a key material of CO_2-SUICOM®, the world's first carbon negative concrete* that has been put to practical use. In this special feature, we introduce the characteristics of LEAF® and the future that will be achieved through its use.

*Concrete that absorbs more CO_2 than is generated during manufacturing

Reducing CO_2 emissions for concrete is the key to realizing a carbon neutral society. By working with major construction companies, concrete manufacturers, and others, Denka aims to propose technologies from Japan that will be used worldwide.

Development of concrete that absorbs and fixes CO_2

Similar to the steel industry, the cement industry directly generates large amounts of CO_2. The volume of CO_2 generated when producing 1 m^3 of concrete, a primary application of cement, is approximately 290 kg.

To solve this, various countries are taking the challenge of developing concrete that can absorb and fix more CO_2 than is generated during the concrete manufacturing process and achieving social implementation. The volume of CO_2 emissions that can be reduced for concrete by 2030 is expected to be 5 billion tons, and the market for CO_2 absorbing concrete is expected to expand to 45 trillion yen.

Volume of CO_2 generated from 1 m^3 of concrete

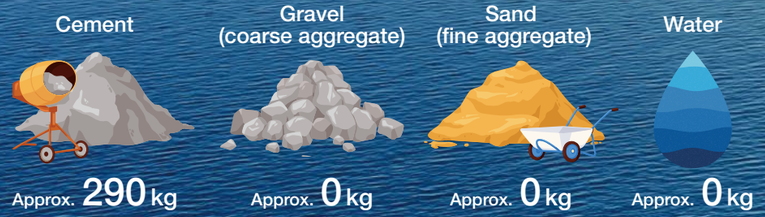
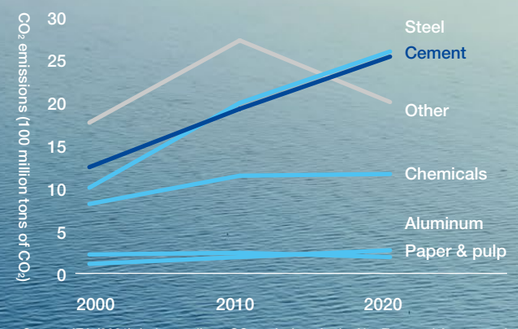
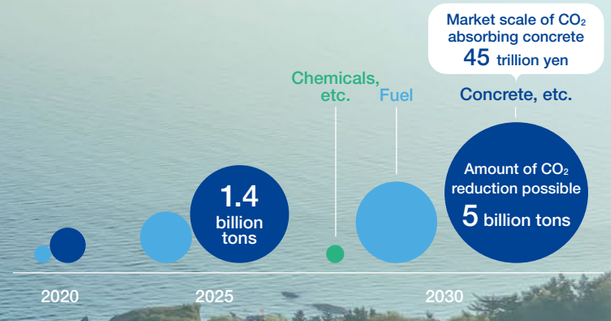


Fig. 1 CO_2 emissions by industry



Source: IEA (2021), Industry direct CO_2 emissions in the Net Zero and Announced Pledges scenarios, 2000–2030, IEA, Paris

Fig. 2 Market forecast for carbon recycling technologies (global scale)



Source: ICEF(2016), Carbon Dioxide Utilization (CO_2U), ICEF ROADMAP 1.0, pp.6-7

Long-life, Environment, Add, Functions

LEAF® absorbs approximately half of its weight in CO_2. It is a wonder material that realizes the high strength and durability of concrete and is used as a key material of CO_2-SUICOM®, the world's first carbon negative concrete that has been put to practical use.

LEAF®

What is LEAF®?

LEAF® is an admixture for cement and concrete developed by Denka that reacts to CO_2, but does not react with water. It contributes to the high durability of concrete and reduction of the burden on the environment by absorbing and fixing CO_2.

Benefits of LEAF® for concrete

Stronger
Fills voids in concrete, increasing its density

Longer life
Enhanced resistance to chemical erosion and penetration of degradation-causing agents

Low pH
Gentle on plants and environmentally friendly due to low alkalinity

Proof of technical capabilities!
More than 80 domestic patent applications related to LEAF® have been submitted!

Development by reversing way of thinking

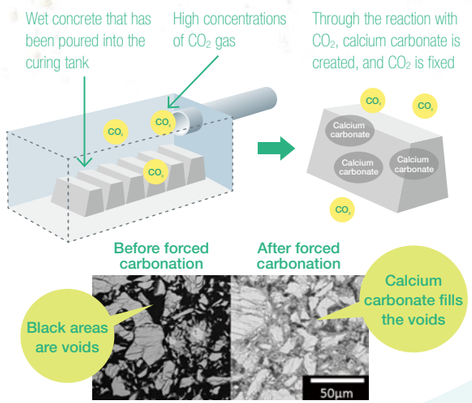
γ-C_2S, the main component of LEAF®, is a powdered substance made from calcium hydroxide and silica. Efforts have been made to control the generation of γ-C_2S for conventional cement manufacturing as it does not react with water. Denka focused on γ-C_2S, which had been considered troublesome, and its property of hardening when it reacts with CO_2. Denka proceeded with development as it believed that the carbonation reaction of γ-C_2S would absorb and fix CO_2 and be able to enhance the strength and durability of concrete.

Using concrete from 5000 years ago as a hint!
More than 5,000 years ago, a material similar to modern concrete was used for flooring at the Dadiwan site in China. Analysis of its composition revealed that it had high strength and properties similar to marble due to a long-term chemical reaction with CO_2, which inspired us to begin development.

Core technology: forced carbonation

During the manufacturing process of concrete mixed with LEAF®, high concentrations of CO_2 gas are pushed into the curing tank to force carbonation and fix CO_2 in the concrete. Theoretically, the amount of CO_2 absorbed is expected to be 500 kg for 1,000 kg of LEAF®. In addition, the strength of the concrete is enhanced due to calcium carbonate and other substances produced through carbonation filling the voids.

Concrete strengthened with calcium carbonate!



Reduction of CO_2 emitted during manufacturing

LEAF® uses hydrated lime, which is a by-product from manufacturing processes at plants for other products, as a raw material. As a result, CO_2 emissions during the production of LEAF® can be reduced.

CO_2-SUICOM®

Environmentally friendly concret jointly developed by four companies

CO_2-SUICOM®, which was jointly developed by Kajima, The Chugoku Electric Power Co., Landes, and Denka, is a type of concrete that can absorb and fix more CO_2 than is generated during the manufacturing process.

Characteristics of CO_2-SUICOM®

A product that uses LEAF®!

Results of application

It has been used for boundary blocks between sidewalks and roads, concrete frameworks, paving blocks, precast ceiling panels, etc.

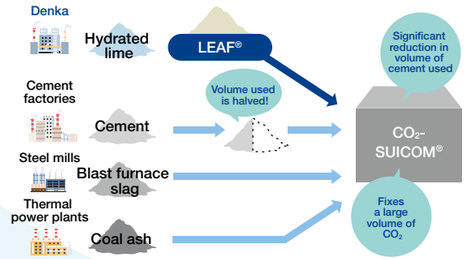
As it is more expensive than regular concrete, reducing manufacturing costs and increasing supply are key for its widespread use.


Boundary blocks between sidewalks and roads


Paving blocks

Cement volume reduction + LEAF® + carbonation curing = carbon negative

Carbon negativity is achieved by reducing the volume of cement through replacement of a portion of the cement with by-products, such as blast furnace slag (steel by-product) or fly ash (coal ash from thermal power generation), and by carrying out carbonation curing through mixture with LEAF®.



Created based on diagram created by Kajima Corporation

Received JCIA Technology Award Environmental Technology Prize!

In May 2023, Denka was awarded the JCIA Technology Award Environmental Technology Prize by the Japan Chemical Industry Association for "Development and commercialization of LEAF®, the special cement additive that contributes to the realization of concrete that absorbs and fixes CO_2."


At the award ceremony

Intercompany Collaboration toward the Development of Next-Generation Concrete

In cooperation with Kajima Corporation and Takenaka Corporation, Denka strives to develop and spread the use of carbon-negative concrete as a leading company of CUCO®, a consortium of 55 corporations, universities, and research institutions.

CUCO®, which stands for Carbon Utilized COncrete, is a consortium that implements projects under the framework of the Green Innovation Fund Project*1 of NEDO*2. With the aim of realizing a carbon neutral society by 2025, CUCO® will strive to develop concrete that utilizes carbon by 2030. Specifically, we will promote technical development for leveraging CO_2 in concrete manufacturing, develop manufacturing systems for reducing costs, and establish methods that control the quality of established technologies and evaluate the amount of fixed CO_2.

Website for the CUCO® project
https://www.cuco-2030.jp/english/

*1 A 10-year initiative to support companies' research and development, demonstration, and social implementation for the achievement of carbon neutrality by 2050
*2 New Energy and Industrial Technology Development Organization

Expectations for Denka and LEAF® explained by leading company members

Kajima Corporation

Tetsushi Kanda
Deputy Director
Kajima Technical Research Institute

As a leading company of the CUCO® project, Kajima Corporation handles the overall development of carbon-negative concrete, including CUCO®-SUICOM*3. We take a managerial position, leading precast concrete manufacturers, other major construction companies, and material manufacturers, with the goal of achieving a 5% share of the entire concrete market in 2030.

We are going to construct the CUCO®-SUICOM Dome, an eco-friendly concrete dome, for the Expo 2025 Osaka Kansai. It is the first project to apply CUCO®-SUICOM in in-situ concrete construction*4 and reinforced concrete structures and involves major technical steps.

To spread the use of CUCO®-SUICOM, it is essential to ensure a stable supply and reduce costs through the increased production of LEAF®. We would like Denka to cooperate with us in these two areas, while also expecting technical achievement, including quantifying the amount of fixed CO_2. In the future, we will strive to not only reduce CO_2 but also store and effectively use it with concrete, thereby mitigating global warming and making societal contributions through business.

*3 A type of carbon negative concrete that has enabled further reduction of CO_2 emissions based on CO_2-SUICOM®
*4 A construction method for building structures by using ready-mixed concrete onsite

CUCO®-SUICOM Dome
Reducing CO_2 emissions by a total of 70% compared to conventional concrete!

Exterior image of CUCO®-SUICOM Dome
(Photo credit: Kajima Corporation)

Blasting CUCO®-SUICOM
(Photo credit: Kajima Corporation)

Takenaka Corporation

Masaro Kojima
Senior Chief Researcher
Construction Technology Research Department
Research & Development Institute

Takenaka Corporation is responsible for developing carbon negative concrete through the improvement of CCU materials*5 and ECM concrete*6, as well as technical development for leveraging the concrete in precast components*7 and in-situ concrete construction. In the Expo 2025 Osaka Kansai, we applied the CUCO® Precast Components for Construction as a foundational material for the Event Hall Building of the Future Life Zone. The components were developed through the integration of three technologies: ECM cement that reduces CO_2, CCU materials that have fixed CO_2, and LEAF® that absorbs CO_2. LEAF® is a key material in the CUCO® project. We expect Denka to develop and roll out new LEAF® with competitive pricing through the accumulation of its high level of technical capabilities.

We will engage in technical development and social implementation with the aspiration of replacing all concrete with our products to achieve carbon neutrality by 2050. To promote social implementation, a system for creating value through reducing, fixing, and absorbing CO_2 is essential. We will also continue to pay attention to the system organized by the country.

*5 Aggregate made from scrap generated after building demolition that absorbs CO_2
*6 Concrete with reduced CO_2 that is made by replacing some cement with ground granulated blast furnace slag or other industrial by-products
*7 Concrete parts that have already been manufactured at factories, etc.

Event Hall Building in the Future Life Zone
Reducing CO_2 emissions by over 80% compared to conventional concrete!

The Event Hall Building's foundational components that have applied the CUCO® Precast Components for Construction (Photo credit: Takenaka Corporation)

From a member of the development team

Seizing the opportunity to realize social implementation

Taiichiro Mori
Omi Sustainability Promotion Dept.
Omi Plant

LEAF®, which is capable of fixing CO_2, was developed before the Paris Agreement was adopted in 2015. When I began focusing on this theme in 2016, it was already highly evaluated as a product that would contribute to reducing CO_2 emissions throughout the world. However, the barrier of placing top priority on economic performance was preventing commercialization. Thanks to Japan's Carbon Neutrality Declaration in 2020, market environments are significantly changing. Seizing this opportunity, we would like to achieve social implementation in collaboration with domestic and overseas partners.

In development, we are demonstrating on-site capabilities that integrate user needs with our abundant technologies for designing and processing powder materials, which have been cultivated through Denka's other products, such as CSA, an expansive additive, and Natmic, an accelerator. Additionally, we successfully utilized γ-C_2S, which had not been the subject of research as the industry avoided it due to it not reacting with water. I believe this success reflects the innovative thinking ingrained in Denka's Special Cement Additives Dept.

The superior durability of carbonated concrete is evidenced by the fact that ancient Roman concrete has survived soundly for thousands of years. Our method of fixing CO_2 in a short period of time by utilizing LEAF® and forcing carbonization is excellent not only because it reduces CO_2 emissions but also because it enhances the durability required of concrete. Furthermore, this product has potential for CO_2 utilization in applications other than concrete.

Resource-derived energy is limited, and a transition to a circular economy is advocated. CO_2 is invisible, but it can also be used as a resource. Japan must demonstrate competitiveness in this realm, as the country has historically practiced the spirit of *mottainai*. With the purpose of "Making the world a better place as specialists in chemistry," I would like to envision a sustainable future for concrete, which will continue to be essential in social infrastructure.

From a member of the manufacturing team

Increasing production volume and achieving stable production

Yuji Hiroshima
Cement & Special Additives Section
Manufacturing Department No.1
Omuta Plant

To manufacture LEAF®, our top priority was safety. We implemented measures for various anticipated issues before starting operations.

For instance, since the product utilizes a by-product from acetylene manufacturing processes as a raw material, we were concerned about potential impacts of moisture content fluctuations on physical properties. Additionally, we had to consider the risk of highly alkaline water due to heat generated during the process of pulverizing and mixing materials.

To address these issues, we not only collaborated with the development team, but also incorporated improvement ideas suggested by on-site workers, thereby establishing a manufacturing system. Thanks to the high-temperature sintering technology Denka has accumulated, we have successfully identified optimal manufacturing conditions for LEAF®, such as sintering temperatures and input amounts, based on laboratory testing data. This achievement has led to stable operations.

There is a demand for limiting CO_2 emissions throughout society. Unlike cement, which hardens by reacting with water, LEAF® is a carbon negative product that hardens and achieves strength by absorbing CO_2. Additionally, by leveraging by-products from plants as raw materials, it also reduces CO_2 emissions associated with raw materials. LEAF® is an exceptional product that theoretically absorbs half of its weight in CO_2 during construction.

Currently, LEAF® is used in boundary blocks and paving blocks for sidewalks. I believe its value can be demonstrated in various fields in the future.

By increasing social awareness of LEAF®'s utility and scaling up the production volume, we aim to achieve further stable production.

A New Business Idea Contest

Where an Employee's Idea Could Become Denka's New Star

Denka Innovation Da y!

Denka held Denka Innovation Day, a new business idea contest for its employees, with the goal of creating new businesses aligned with the themes of "specialty, megatrends, and sustainability" as outlined in its Mission 2030 management plan.
The event's first iteration received 74 entries, and on February 15, the six projects that advanced to the final round presented their ideas.
Approximately 500 people, including online viewers, watched the presentations.
Prizes were awarded to the top three presenters, and the winning idea will be considered for commercialization.
Through this initiative, Denka continues to explore the possibilities of chemistry to create new value.






The six teams that advanced to the final round:
From left: Emura, Clinical Reagent Manufacturing Dept., Gosen Site / Lin, Advanced Diagnostics Business Development Dept., Life Innovation / Muramatsu,New Business Exploration Dept., Life Innovation / Kawamura, Takekawa, Fujisawa, Tohoku Sales Office, Elastomers & Infrastructure Solutions / Aida, Engineering Group, Sheet Section, Production Dept. No.2, Isesaki Plant; Asanuma, New Business Creation Dept., New Business Development / Jin, Denka Chemicals G.m.b.H.

Overview of the first Denka Inno vation Day judging

First round (74 entries)
Document review. To ensure a broader perspective, 18 young employees were selected by board members to conduct the screening process.

Second round (20 entries)
Presentation format. A total of eleven judges, including the General Manager of the Corporate Planning Dept., the General Manager of the New Business Creation Dept., representatives from other departments, and external members, conducted the review process.

Final round (6 entries)
The chairman, president, and other board members, along with two external judges, conducted the review. The presentations were also streamed online.

Winner receives one million yen in prize money and a chance for commercialization

An opportunity to cultivate Denka's challenger mindset

Denka Innovation Day was started not only to foster the creation of new businesses but also to cultivate a corporate culture where employees can feel excited about the future and enthusiastic about taking on challenges, one of the core values advocated in Mission 2030.

A total of 74 entries were received from various departments and locations. These entries were evaluated from multiple perspectives, including whether they were meaningful for Denka, their feasibility, and applicants' intentions for commercialization. A scoring system was used, ensuring fair and efficient evaluations with clearly defined criteria.

The experience of brainstorming a new business from scratch serves as an opportunity for participants and other employees to reconsider the potential within Denka. For this contest, experts were invited to provide feedback to refine participants' ideas into more concrete proposals. As a result, participants gained insights into the necessary processes and perspectives for commercialization. Feedback sessions were also offered to non-winning presenters by request. Many within the company noted that their perspectives on creating new business ideas had expanded. The contest brought many ideas closer to commercialization, not just the winning one.

Denka Innovation Day attracted a lot of attention from employees. Approximately 200 attended the explanatory session held before the contest, and many also tuned in online to watch the final presentations. Many employees were interested in the new ideas and curious about taking on new challenges, making it a fruitful initiative towards achieving Mission 2030.

Building on the insights gained from the first event, the next contest will be held with improvements to allow even more employees to take on the challenge.

Comments from external judges

Satoshi Konno
Executive Partner, Innovation Engine, Inc.

High hopes for more bold ideas in the future

I have participated in numerous presentations as an external judge, but this one was particularly interesting. Please continue to pursue such innovative initiatives in the future. It's also rare for the management team to participate in presentations like this. I hope employees will appreciate management's intentions and strive for further growth.

Yuki Hanyu
CEO
IntegriCulture Inc.

Many intriguing ideas made it hard to choose a winner

I thoroughly enjoyed seeing all the ideas. It was quite challenging to evaluate highly feasible incremental process innovations alongside ambitious moonshot proposals for a better future. As this was only the first event, I am looking forward to improvements and even more intriguing proposals in the future.

The 2nd Denka Innovation Day!

This event will be held again in FY2024. We welcome submissions of not only new ideas, but also ideas that narrowly missed selection in the first contest. Please enthusiastically submit your proposals! We plan to hold an explanatory session in the near future.

A Mindset to Encourage Challe nges

As Told by the Denka Innovation Day Top 3

The three winners of Denka Innovation Day explain why they entered the contest and what they have learned from the experience.

I was motivated by the enjoyment of coming up with new business ideas

I was involved in activities such as commercializing new products and management planning, but I wanted to do something that would significantly influence the company's direction. That's when I learned about Denka Innovation Day and decided to test how far I could go.

When applying for the contest, I struggled to give shape to my ideas, so it was very helpful to receive support from consultants. They gave me lectures on starting a new business, and we had frank discussions about my presentation. I realized the narrowness of my own perspective and that I hadn't thought deeply enough about my ideas in business terms. This has taught me the importance of viewing things from various perspectives, and I also learned many essential points for coming up with a new business.

I was also able to experience how interesting it is to brainstorm business ideas. Balancing it with regular work was challenging, and there were times I had to devote weekends to prepare for presentations. However, I enjoyed working on it until the very end thanks to the cooperation of various people. Additionally, I once again realized the significance and importance of challenging oneself. I would like to share my experience with those around me and contribute to fostering a company culture that embraces challenges.

Dai Emura
Deputy Manager,
Clinical Reagent Manufacturing Dept.
Kagamida Plant, Gosen Site

Taking that first step forward brings new observations

The reason I participated in Denka Innovation Day was that I wanted to learn about planning and proposing new businesses. I learned about the contest shortly after being transferred to the New Business Exploration Dept. and decided to take on the challenge because I thought it would be a good learning opportunity.

I think the biggest benefit of participating was connecting with other departments. For this project, I proposed an idea related to infrastructure and electrical equipment materials, which are outside my area of expertise. To further develop my idea, I conducted interviews with internal experts. This provided me with an opportunity to deepen my knowledge of Denka's unique technologies. Additionally, participating in the contest and interacting with others who had passionate ideas was an inspiring and valuable experience.

Through this experience, I not only learned about the basics of business models, competitive analysis, and marketability essential for planning and proposing new businesses, but also how to research and interview for such information and compile it into clear and understandable materials. Moving forward, I want to refine how I organize ideas and challenge myself to make more compelling proposals for new businesses in Life Innovation, my area of expertise. I hope to create new business ideas that only Denka can achieve by fostering active interdepartmental communication.

Shino Muramatsu
Section Manager,
New Business
Exploration Dept.
Life Innovation

Taking on this challenge allowed me to gain a lot of experience and skills

I decided to take on the challenge of Denka Innovation Day because I wanted to further hone my skills and experience through exploring business ideas and gain new perspectives from interacting with other participants.

In the contest, I was able to learn different perspectives and approaches from consultants, experts, and other participants, which taught me new ways of thinking and forming hypotheses that I had been lacking. The rigorous evaluation and precise feedback also revealed various issues in my work. I feel this experience provided me with a clear direction for the future. Additionally, to prepare for my presentation, I received valuable advice from my supervisors and senior colleagues and had the opportunity to meet with experts related to the field of my presentation. The encouragement and support from my colleagues were also a great source of strength.

Denka Innovation Day is a valuable opportunity to test one's abilities and confidently take on new challenges. It is also a platform to acquire important skills and experience in developing new businesses. Moving forward, I aim to leverage the experience gained through participating to take on leadership roles in new business ventures. With the cooperation of my team members, I want to efficiently bring business ideas to life.

Lin Yuhung
Advanced Diagnostics
Business Development Dept.
Life Innovation

Roundtable Discussion

The Path toward Mission 2030 Emerged at Denka Innovation Day

New possibilities for Denka emerged through the competition, Denka Innovation Day. We believe that new ideas and our employees' willingness to take on challenges will encourage the realization of Mission 2030. We held a roundtable discussion between the awardees from Denka Innovation Day and Ishida, Managing Executive Officer and head of the Denka Innovation Day Secretariat.

Ikuo Ishida
Director and Managing Executive Officer

Kazunori Kawamura
Tohoku Sales Office
Elastomers & Infrastructure Solutions

Koji Asanuma
New Business Creation Dept.
New Business Development

Katsufumi Soda
Engineering Group
Sheet Section
Production Dept. No.2
Isesaki Plant

Canxi Jin
Denka Chemicals G.m.b.H.

Leveraging Denka's abundant human resources and technology

Ishida: First of all, I would like to sincerely express my respect and gratitude for the challenges you have taken on. Can you give us your thoughts on the challenge of Denka Innovation Day and the lessons gained from the event?

Kawamura: This was my first time participating in such an event, but it was truly a valuable experience because I have not focused on creating a business from scratch since joining Denka.

Asanuma: Although I initially formulated a plan with a product-oriented approach, I keenly understood that the most important thing in commercialization is customers' needs through adjusting the plan and listening to potential customers' opinions.

Soda: While I brought new ideas with Asanuma, we had a hard time finding a way to ensure profits. As a result of these activities, I have built relationships with colleagues who work in different departments, such as Asanuma, which I feel will give me a great advantage.

Jin: Through the preparations for the event, I was able to meet and talk to people inside and outside Denka who I had never met before, expanding my network. There were a lot of things that couldn't be done by myself, so gaining support from various people resulted in satisfactory proposals. I would like to use this expanded network for my future projects.

Ishida: Creating something from nothing is very challenging. However, you were able to discover ideas that weren't bound by conventional ways of thinking, enabling me to feel the potential of Denka. Through the challenge of Denka Innovation Day, what do you believe to be Denka's strengths and issues?

Asanuma: I realized that Denka has a lot of people with the desire to make changes. At the same time, I felt that the company doesn't yet have the corporate culture and environment to embrace their passion and use their ideas.

Kawamura: The scope of business is one of Denka's great strengths. Additionally, the businesses aren't separated, but are intertwined in a complex manner. We need to actively take the lead in making connections between each business.

Jin: Denka, a company with a long history, has a variety of management resources. To make use of them, young and mid-career employees should experience different departments, which may create novel inspirations.

Ishida: As you said, Denka has numerous products and technologies. Some of these products and technologies continue to support the company, while others have been withdrawn from their respective business fields. I'm sure you have heard the saying, "Innovation is created from failure." While promoting communication between each department and sharing expertise, we need to take on various challenges. To realize this, we will actively implement job transfers.

Soda: I feel that establishing a department that acts as a "translator" between departments will facilitate cross-divisional collaboration. Different interpretations across locations prevent us from making new ideas take shape. I believe that by creating an organization that communicates ideas in an easy-to-understand manner from the Denka Innovation Center to our R&D facilities, and from there to our manufacturing and mass production sites, we can strengthen these connections.

Denka must take on challenges without fearing change

Ishida: What do you think Denka needs to do for the realization of Mission 2030?

Soda: It is important to start by deepening your understanding of Denka's business and Mission 2030. On top of that, we need to take on challenges to move forward instead of focusing on maintaining the status quo.

Asanuma: I agree with Mr. Soda. What we need is change. It is obvious that we need to change what isn't working well, but for the further growth of Denka, I believe that we have to occasionally change things that are progressing smoothly.

Ishida: Achieving Mission 2030 will be very challenging. Conventional ways of thinking will set limits on the realization of this management plan. I would like all employees to be afraid of the risks of staying the same rather than the risks of change. Denka must change to grow further.

Kawamura: By participating in this competition, I realized the importance of taking the initiative. I struggled to imagine new businesses, but I believe that starting with what you can do will enable you to make new findings.

Jin: The entire organization needs a strong challenger spirit for the achievement of Mission 2030 as well as the growth of Denka following that. For this, I believe it's important for the company not to operate our business by section but to promote active collaboration between its departments and build confidence.

We want our employees to freely explore new possibilities

Ishida: Can you tell us about challenges you will take on in the future?

Jin: While strengthening the sales structure of DCG*1 (Germany), to which I belong, and collaborating with DCU*2 (United States), I will take on the challenge of enhancing Denka's presence in Europe and the United States.

Asanuma: After transferring to the New Business Creation Dept. in April, I'm updating myself while working in this new environment. Because of my experience in Toyokalon, I'm interested in Denka's projects that focus on Africa. The African market is not yet fully developed, so I think that it would be interesting for the company to start new projects there.

Kawamura: As I was appointed as manager of the Tohoku Sales Office, I will pay attention to various things that will enable both myself and the entire organization to go in the right direction. For example, by providing my team with opportunities to tackle challenges like Denka Innovation Day and by actively communicating, we aim to advance toward the same goal while leveraging individual strengths.

Soda: I heard that as many as 500 employees watched the Denka Innovation Day livestream. Conveyed my ideas in such an event allowed me to gain useful information from the viewers. Since many employees are willing to collaborate, I would like to involve people from different departments in creating new products and technologies.

Ishida: I can't help but be excited hearing about the challenges you will take on. While organizing the Denka Innovation Day, we valued autonomy in particular. I would like you to bring new ideas and explore the potential for various new businesses beyond your department. For Denka to remain competitive in a challenging environment, it is crucial for you, the trailblazers of challenge, to involve those around you. I hope that as many people as possible will follow your lead and tackle new challenges.

*1 DCG: Denka Chemicals G.m.b.H. *2 DCU: Denka Corporation

Board of Directors (as of June 20, 2024)

Here is the Board of Directors as of June 20, 2024.

Chairman and Director

Manabu Yamamoto

Representative Director, President, Chief Executive Officer (CEO)

Toshio Imai

Representative Director, Senior Managing Executive Officer

Kazuo Takahashi

Chief Technical Officer (CTO)
Purchasing & Logistics Dept.,
Environment and Safety Dept.,
Quality Assurance Dept., Engineering Dept.

Director and Managing Executive Officer

Ikuo Ishida

Chief Human Resource Officer (CHRO)
Chief Compliance Officer (CCO)
Corporate Planning Dept.,
Best Practice Promoting Dept.,
HR Dept.,
Corporate Communications Dept.,
DCU, DCG*1, Chinese Business
Production &
Process Technology Dept.,
Digital Strategy & Innovation Dept.,
Sustainability Promotion Dept.

Directors

Rumiko Nakata

Outside

Mizuhiro Uchida

Audit Committee Member

Toshio Kinoshita

Outside
(Audit Committee Member)

Akio Yamamoto

Outside
(Audit Committee Member)

Miyuki Matoba

Outside
(Audit Committee Member)

*1 DCU: Denka Corporation
DCG: Denka Chemicals G.m.b.H.

Managing Executive Officers

Kazuya Tokumoto

President of
Denka Performance
Elastomer LLC

Rimiru Hayashida

Corporate Financial Officer (CFO)
Accounting Dept.,
Finance Dept.

Yukio Sasagawa

Gosen Site

Hideki Toya

Chief Scientific Officer (CSO)
New Business Development
Innovation Center

Executive Officers

Masanobu Kosaka

DCHA, DSPL, DAPL*2,
Managing Director

Michio Kawamura

Chiba Plant

Masahiro Kawai

Omi Plant

Takeshi Hagiwara

Masahiro Omata

Elastomers & Infrastructure Solutions

Kei Hara

Polymer Solutions

Ken Watanabe

Deputy Division Director of the New Business Development New Business Creation Dept.
Special assignment (Strengthening of group internal control)

Hiroto Horiuchi

Electronics & Innovative Products

Tetsuo Noguchi

Shibukawa Plant

Koji Nishimura

Omuta Plant

Taro Inada

Life Innovation

Akinori Adachi

Administrative Dept.,
Legal Dept., Secretary Dept.,
Internal Control Dept.

*2 DCHA: Denka Chemicals Holdings Asia Pacific Pte. Ltd.
DSPL: Denka Singapore Pte. Ltd.
DAPL: Denka Advantech Pte. Ltd.

Calcium carbide electric furnace operations management

A Specialist's Perspective

What kind of future do on-site specialists anticipate based on Mission 2030?

Ensuring Worksite Safety to Become a Company Loved by the Local Community

One of Denka's flagship products is Chloroprene Rubber. At the Omi Plant where calcium carbide, the raw material of this product, is manufactured, the one responsible for the operations management of the electric furnaces is Noboru Sakaguchi. He is a specialist that has been involved in this area of work for close to 40 years and is currently working as a foreman to support the worksite.

Sakaguchi is focused on creating a work environment in which everyone can work the same way. At the calcium carbide manufacturing site, dust fills the air and people sometimes have to work in a hot environment. In 2020, in pursuit of a safer and more efficient workplace, Sakaguchi implemented a tool to monitor operational conditions at the facilities in real time. Looking to the future of the plant, Sakaguchi says, "Last fiscal year, a female employee was assigned to our worksite for the first time since we began operating the electric furnace. My goal is to create a workplace where everyone, regardless of gender, can work in the same environment."

He goes on to share his hope for the company, "I want our company to continue to be loved by the local community." His two children have also joined Denka and are following in his footsteps. Sakaguchi is taking on the challenge of creating a better plant, starting with the work environment, to make Denka a company that Omi can be proud of and that his family is happy he works at.

Calcium carbide

Reacts with water to produce acetylene gas and is used as the raw material in organic and inorganic synthetic products, such as Chloroprene Rubber and calcium cyanamide.

Specialist

Noboru Sakaguchi

Electric Furnace Group, Electric Furnace Section, Inorganics Department, Omi Plant

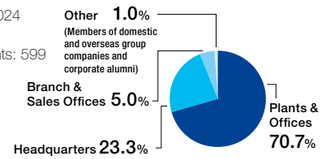
Joined the company in 1985. Since then, he has consistently been involved in the operation of calcium carbide electric furnaces. Since 2021, he has been responsible for coordinating with departments and processes related to manufacturing as foreman.

"The Denka Way" Reader Survey Results

Thank you for reading The Denka Way, our PR magazine. From January to February 2024, we conducted a reader survey among all Denka employees.

Survey Overview
Period: January 22 – February 2, 2024
Target: All employees
Number of respondents: 599

Respondent Profiles

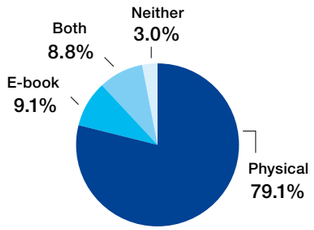


This PR magazine serves as a tool to learn about businesses, products, and major events at Denka.

We received more than double the number of responses compared to the previous survey (2022), indicating increased interest in the PR magazine and a growing perception of its value. In particular, respondents expressed a desire to learn more about other offices and their products. We plan to continue our Business Value Creation series, making it even easier to understand.

Format

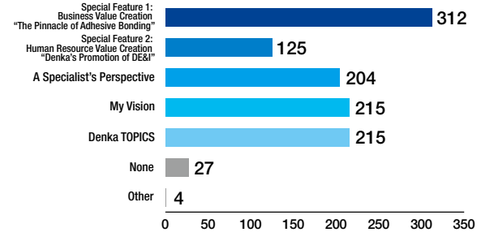
The Denka Way is available in both physical and e-book formats. Which do you read more often?



The results were unchanged from the previous survey, with 80% of respondents reading the physical format.

Favorite articles

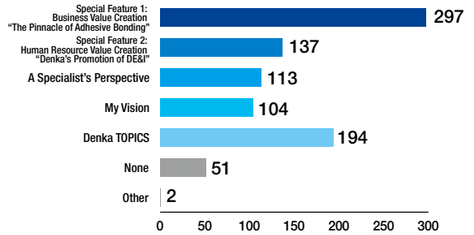
What was your favorite article in the Winter 2024 issue of The Denka Way? (Multiple answers allowed)



The most popular was Special Feature 1, "The Pinnacle of Adhesive Bonding." Among the wide variety of Denka's business activities, many people expressed a desire to learn more about fields that they are not involved with in their day-to-day work.

Useful series

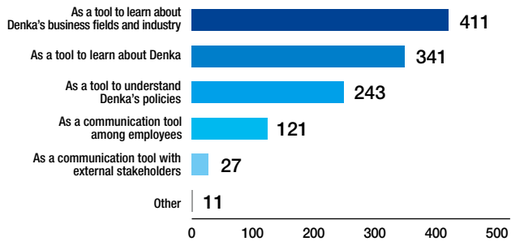
Which articles in the Winter 2024 issue of The Denka Way were useful to you? (Multiple answers allowed)



Many respondents said that Special Feature 1 was useful. It was also found that Denka TOPICS, which provides an overview of major events at Denka, was very popular.

Purpose of use

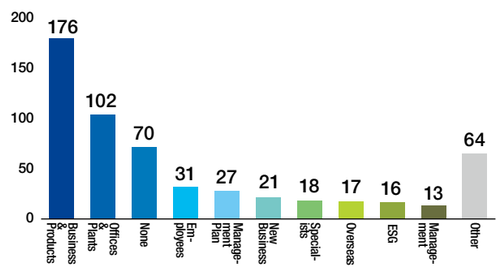
How do you utilize The Denka Way? (Multiple answers allowed)



The most common use of the PR magazine is as a tool to learn about Denka's business fields and operations, indicating that it is primarily used as an information-gathering tool.

Sought-after articles

What topic would you like us to cover in future articles?



Many respondents expressed a desire to learn more about Denka's business and products. In addition, there were many requests from employees in offices and plants to know what kind of products other divisions produce.

Pick Up

Mar.

Bring Your Kid to Work Day held at Denka's headquarters!

On March 9, Denka held its first "Bring Your Kid to Work Day" at its headquarters. The event was attended by 28 children of Denka employees and their parents. Various programs were prepared to help the children learn more about the company where their mother or father works.

In the "Questions to the President" section, where children were free to ask President Imai questions, they raised various questions such as "Which Denka product do you think is the most amazing?" and "What has been your happiest moment as president?" After the Q&A session, President Imai commented, "I have received many questions from investors and journalists since becoming president, but the questions from all of you today were the most challenging. They were all really good questions."

The event ended successfully and we received feedback from all participants saying that it was a satisfying day for both parents and children. We plan to hold the event again in the future, so if you are interested, please join us!

Check out some of the programs!

Experiment class

In the most popular experiment class, we made bouncy balls. Wearing white coats and gloves, the children stirred laundry starch into salt water. Some even made square bouncy balls!

Exchange of business cards with the president

The president and the children exchanged business cards and shook hands one by one in the president's office. Some children brought their own original business cards, with some exchanging their cards with their friends.

Office tour

We introduced the children to the workplaces where their fathers and mothers usually work and let them see and touch actual product samples. Fashion wigs (Toyokalon) were especially popular.

Looking back on "Bring Your Kid to Work Day"

Haruka Shiratani
Secretariat
Corporate Planning Dept.

Because this was our first project, we weren't sure if everyone would like it, but it ended up being successful thanks to everyone's support. Thanks to everyone who participated!

Participants' comments

Hiroaki Inamura
Business Planning Section
Business Promoting Dept.
Polymer Solutions

It was a great opportunity for the children to learn about our workplace. Adults also enjoyed the office tour.

Mr. Inamura's son

The experiment class was the most fun! The office was really neat and cool! I would like to participate in this event again!

Apr.

Ceremonies held to commemorate the company's 109th anniversary and welcome new employees

On April 1, a ceremony to commemorate Denka's 109th anniversary was held. After President Imai gave a speech to mark the anniversary, the President's Award and awards to commend 10, 20, 30, and 35 long years of service were presented. In the afternoon, an entrance ceremony for FY2024 new employees was held. A total of 168 new employees, 75 in section G and 93 in section M, joined the company this year. After a congratulatory address by President Imai, new employees at each office were introduced, and the ceremony concluded with a speech by a representative of the new employees.

Apr.

Mitsubishi Corporation and Denka sign a joint-venture agreement in the fullerene business

Mitsubishi Corporation (MC) and Denka are pleased to announce our signing of a joint-venture agreement in the business of fullerenes, carbon molecules that form the base of cutting-edge materials. Under the terms of our agreement, Denka shall acquire from MC a 50% stake in Frontier Carbon Corporation (FCC), a company dedicated to the manufacturing and sales of fullerenes. MC and Denka look forward to combining our respective expertise in sales and technology to promote the growth of fullerene applications. Our shared goal is to leverage FCCs operations to address societal challenges by developing systems to boost production and meet the growing demand for these cutting-edge materials.

Apr.

Exhibiting at the China International Battery Fair (CIBF) 2024

Denka's Special Conductive Materials Dept. exhibited at the China International Battery Fair (CIBF) 2024, the world's largest battery-related exhibition held in Chongqing, China, from April 27 to 29. This is the 16th time this fair has been held, and more than 2,200 companies, including battery manufacturers, related equipment manufacturers, material manufacturers, and raw material manufacturers, exhibited their products. Denka exhibited at the fair to promote ultra-pure acetylene black, a product of the Special Conductive Materials Dept., as a conductive material for lithium-ion batteries (LiB) in the Chinese market, gather customers' needs, exchange information with existing customers and distributors, and have technical exchanges with potential customers.

May

FY2023 Financial Results Briefing held

The FY2023 financial results briefing was held in a hybrid format of in-person and Zoom webinar. Approximately 90 people attended the briefing for institutional investors, analysts, and financial institutions, and 14 people attended the briefing for journalists. Operating income was 13.4 billion yen, a significant decrease of 18.9 billion yen from the previous year. Net income was 11.9 billion yen, impacted by a gain of 17.4 billion yen on sale of strategic cross-shareholdings and an impairment loss of 6.8 billion due to the termination of norovirus vaccine development. For FY2024, continued sluggishness is anticipated in the first half, with a gradual recovery factored in from the second half. After the briefing, many active and in-depth questions were asked by key analysts and others regarding the roadmap toward achieving Denka's highest profit in FY2025.

May

Decision to invest in capital expenditure on the construction of a plant for the production of low-dielectric organic insulating material

Denka has decided to make a capital investment of approximately 7 billion yen in the production of low-dielectric organic insulating material (product name: SNECTON). SNECTON features the required electrical properties for raw materials to reduce the loss of electrical signals with next-generation high-speed telecommunications and is expected to show a significant growth in demand in the future. In Mission 2030, Denka has set a strategic capital spending target of 80 billion yen for the ICT & Energy business domain. The present investment will be positioned as one of the core components.

May

Denka signs a business collaboration agreement for the collection of used polystyrene at public facilities

Ichihara City in Chiba Prefecture, Denka, and one of its equity method affiliates, Toyo Styrene Co., Ltd., signed a business collaboration agreement on May 24 at Ichihara City Hall for the collection of used polystyrene in Ichihara City along with the start-up of a polystyrene chemical recycling plant. Collection at public facilities in the city will begin in July. Going forward, Ichihara City and the Denka Group will accelerate the development of this collection system to realize a circular economy.

(Photo credit: Ichihara City)