Innovation Capabilities

Promoting R&D

Dai-Dan places technology for air, water, and light at its core, responding flexibly to the increasingly sophisticated and diverse needs of customers, and promotes R&D to address pressing industry issues like manpower shortages and advanced construction methods. We also engage in R&D to create new businesses that contribute to realizing a sustainable society, generating and providing value unrestricted by limitations of the construction equipment industry.

R&D Case Study 1 Addressing labor shortages and delivering high-quality construction

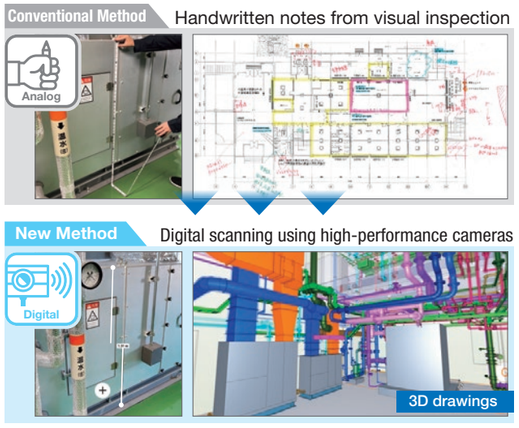
Improving the efficiency and quality of renovation work

As building facilities age, renovation work is carried out. To perform renovations while making use of existing facilities, it is necessary to accurately assess the current status of installed systems. However, for various reasons, the latest information on existing equipment is often not recorded in drawings, making on-site surveys a considerable burden. To counter this, Dai-Dan has streamlined onsite survey work using digital cameras.

Compared to traditional handwritten records, digital camera measurements (scanning) allow us to obtain actual scale data. This not only reduces the workload of on-site surveys but also enables the creation of 3D models, so employees in remote locations can share and easily understand the data.

Utilizing on-site survey technologies, we also achieve high-quality construction through 3D simulations. And by visually presenting easy-to-understand delivery plans to customers, we help stakeholders reach agreement smoothly, reducing rework and improving quality.

Going forward, we aim to further increase the efficiency of on-site surveys, building technology to extract information from scan data on equipment to monitor construction progress, thereby addressing labor shortages and delivering high-quality construction in the building industry.



3D simulation

Effects on Business	Contribution to Business	Related SDGs
Strengthening core businesses	Cost reduction effect of representative sites: 17% decrease (2024 results)	8 DECENT WORK AND ECONOMIC GROWTH, 11 SUSTAINABLE CITIES AND COMMUNITIES

R&D Case Study 2 Initiatives toward realizing smart buildings

Aiming for optimal building operations for Earth and its people

1. The need for smart buildings

In recent years, buildings have been required to address various social issues such as labor shortages in maintenance and management, disasters, and decarbonization. It is believed that traditional building control or operations managed solely by people will become inadequate for overcoming increasingly complex challenges going forward. Therefore, “smart buildings” equipped with advanced control functions are gaining attention. In smart buildings, information from assets such as building facilities and IoT devices is managed in cyberspace, and applications use this information to perform advanced controls. This enables optimal building operations not only for individual buildings, but also for entire communities, for both the Earth and its people.

2. Application development

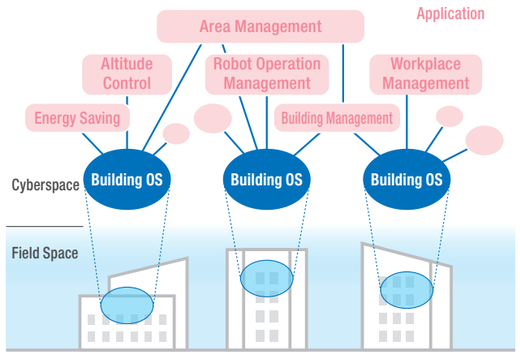
Dai-Dan is developing applications to provide smart buildings with advanced control functions. For example, Dai-Dan has introduced AI-powered pre-cooling and pre-heating control at its Hokuriku Branch. Recently, due to sharp temperature differences, the indoor temperature is often sub-optimal during working hours. Therefore, we use actual measurement data of recent indoor temperatures and other factors to predict the future using a learning model, and control the air conditioning start time so that the room temperature will be suitable at the start of work. This achieves an optimal environment without people having to manually adjust building operations.

3. Utilization of emulators

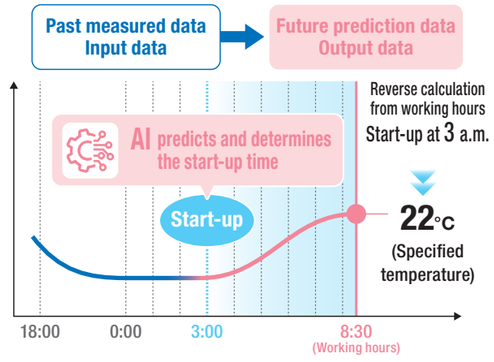
To optimize the control of smart buildings with diverse characteristics, it is necessary to adjust applications to each building. To that end, Dai-Dan is conducting research on emulators within the framework of the University of Tokyo’s social cooperation programs. An emulator simulates actual building equipment in cyberspace software, enabling repeated trial and error in software and supporting the development of applications with more advanced functions.

4. Future outlook

Through these initiatives, Dai-Dan will contribute to addressing labor shortages by streamlining building maintenance and management, enhancing resilience to disasters, and achieving carbon neutrality through advances in energy management and energy conservation.



▶ Image diagram of AI-powered pre-cooling and pre-heating control



Effects on Business	Contribution to Business	Related SDGs
Strengthening core businesses Creation of new businesses	2030 (Forecast)* * Assuming time frame for smart building adoption	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE, 13 CLIMATE ACTION, 17 PARTNERSHIPS FOR THE GOALS

R&D Case Study 3

Contribution to the field of regenerative medicine

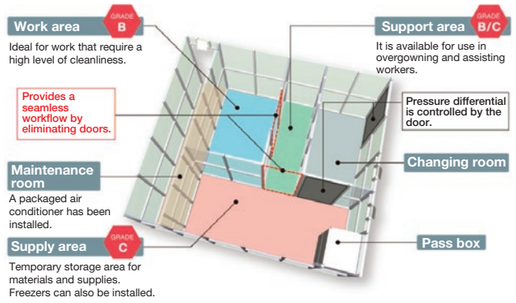
Initiatives related to cell culture environments

Regenerative medicine requires a clean environment for safe handling of cells. In response to demands from many doctors and researchers, Dai-Dan has developed the “All-in-one CP Unit™ (AIO),” which can be easily installed even in limited spaces. This product leverages our know-how in building clean environments and consolidates all functions necessary for cell culture facilities, from changing rooms to cell processing rooms, into a single unit. Compared to constructing a conventional clean room, it provides a clean environment that is space-saving, quick to deliver, and low-cost.

In collaboration with our research partners*, we have developed the “R-CPF (Robotic Cell Processing Facility),” a world-first system to use humanoid robots in the actual clinical field of retinal regenerative medicine. At R-CPF, aseptic conditions have been achieved in laboratory spaces essential for preparing transplant cells. Clinical studies using iPS cells cultured at R-CPF received approval from the Ministry of Health, Labour and Welfare in February 2022, and in December of the same year it was announced that these cells had been transplanted into actual patients.

This was the world’s first transplantation of cells cultured by an open-type robot. The production of transplant cells for regenerative medicine requires aseptic culture environments and high operational reproducibility, which places a heavy burden on operators, so automation is highly desirable. Accordingly, the R-CPF system was designed by combining the versatile humanoid LabDroid Maholo—which is capable of highly accurate life science experimental operations—with the compact All-in-one CP Unit™ (AIO), demonstrating that automation of cell processing at clinical research-level cleanliness is possible. This research was published in the online edition of the scientific journal *SLAS Technology* on October 29, 2023. Dai-Dan will continue to drive R&D to contribute to the advancement of the regenerative medicine industry.

* Research partners: RIKEN, Kobe City Eye Center Hospital, VC Cell Therapy, Inc., Robotic Biology Institute, Inc.



All-in-one CP Unit

Robotic Cell Culture Processing Facility “R-CPF”

Effects on Business	Contribution to Business	Related SDGs
Creation of New Businesses	Number of AIO installations in the field of regenerative medicine: 11	3 GOOD HEALTH AND WELL-BEING

Message from the Head of Technical Research Laboratory

Shoichi Nakai
Innovation Division Head of Technical Research Laboratory

Efforts toward green transformation and digital transformation, such as realizing a decarbonized society, preserving the global environment, increasing productivity in response to a declining birthrate and aging population, and work style reforms, are major challenges for providers of optimal building equipment to customers.
To flexibly and timely address challenges in a rapidly changing era, Dai-Dan quickly senses market changes and user needs and promotes agile development and PoC (Proof of Concept). Through research and development, we aim to provide prompt services and value, and contribute as a company that “Creates Value in Spaces”.
We will continue to create new value by providing people with comfortable, optimal spaces contributing to the creation of a rich and sustainable society.

Intellectual Property Management

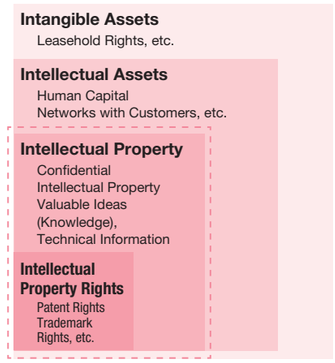
We are steadily building a foundation of technological strengths as assets that contribute to the building equipment industry and new businesses for exclusive use and team building, to secure business advantages.

Creation of Intellectual Property

Dai-Dan Intellectual Property Strategy 2022 is an internal strategy to promote the creation and utilization of intellectual property to enhance the value of our company-wide technological assets. In addition to patented inventions, we have established a system to voluntarily propose and accumulate useful ideas—including design and construction know-how. In FY2024, we certified two new pieces of knowledge for use on construction sites.

Dai-Dan will continue to foster a culture of innovation and creativity among all employees, while generating intellectual property.

Intellectual properties held..... 197
((As of the end of FY2024, including knowledge)



Broad Sense of Intellectual Property: Intellectual Property Rights + Confidential IP, Valuable Ideas (Knowledge), Technical Information
Paraphrased and edited based on the Ministry of Economy, Trade and Industry’s “What are Intellectual Assets and Intellectual Asset Management?” diagram
https://www.meti.go.jp/policy/intellectual_assets/teigi.html

Internal and intellectual property training

The Intellectual Property Department provides annual e-learning, newly compiled each year to reflect the latest trends, covering essential topics such as how to consult on ideas and key points regarding works of authorship, which are indispensable for both on-site engineers and R&D personnel. The e-learning participation rate increased from 75% in FY2023 to 82% in FY2024 (all technical staff). We will continue to pursue these initiatives in the future.

Utilization of Intellectual Property

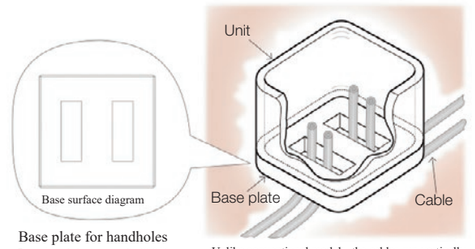
Focusing on utilization

At Dai-Dan, we are always mindful of the utilization and protection of intellectual property in our management. For example, regarding the idea for underground handholes for electrical cable connections, in addition to knowledge, we also secured a formal design right. This allows everyone at Dai-Dan’s worksites to share the convenience while enhancing our business advantage by deterring easy imitation by other companies.

For trademarks, we have registered the brand message on the right. When used together with the House Mark*, it conveys the company’s core business image directly and delivers a message of proven achievements and trust in on-site construction to customers and the general public.

* House Mark: A mark used by a company in business activities, serving to help consumers recognize the company’s products or services.

Knowledge: Underground handholes for electrical cable connections
There is a device that pushes cable up from the base.



Base plate for handholes
Registered design no. 1783033

Unlike conventional models, the cables run vertically for easier arrangement of multiple cables, while also making the unit compact.
It is also portable thanks to its small form and detachable base plate.

建物の「いのち」をつくる。
Registered trademark no. 6930874