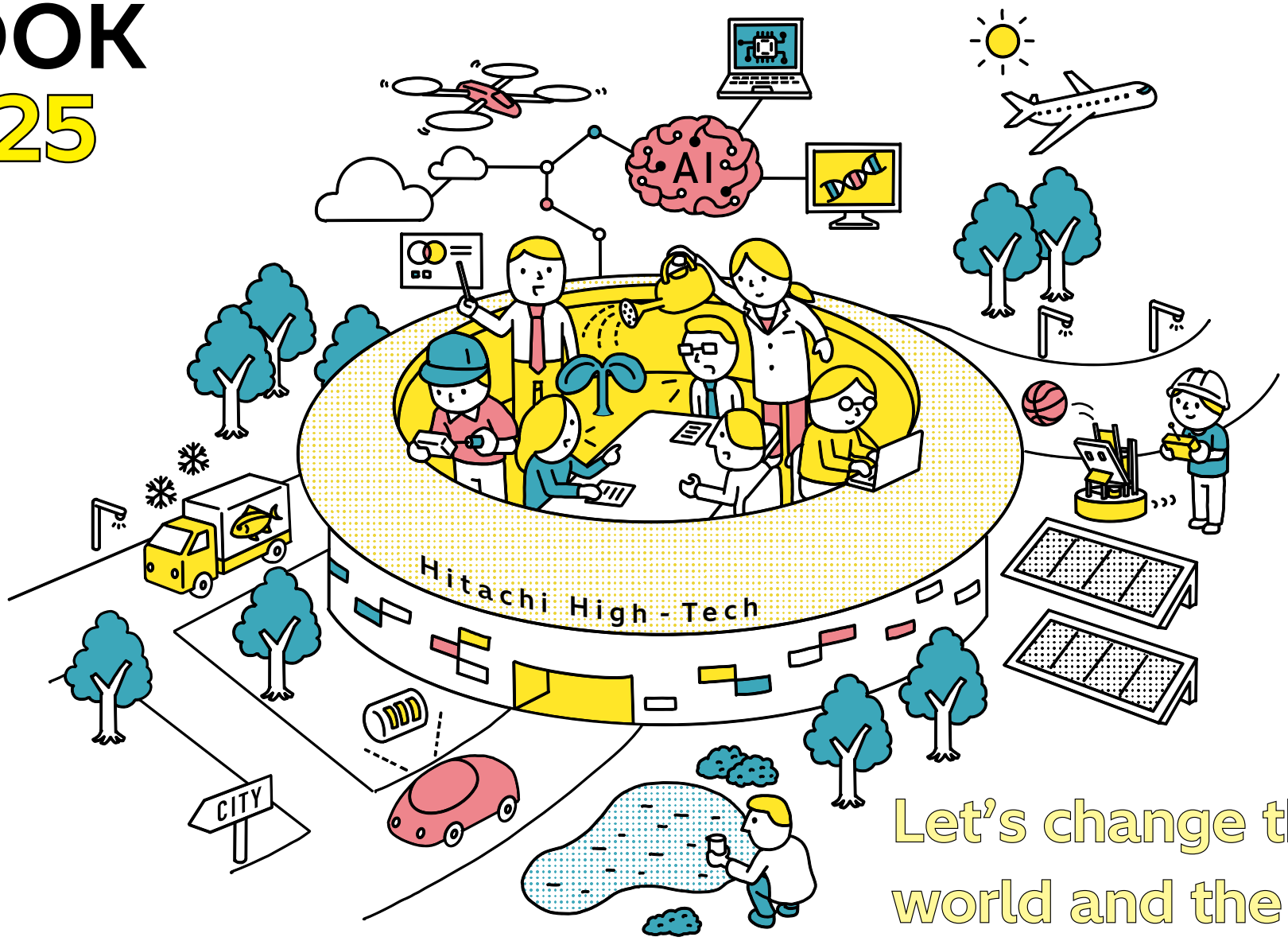
HITACHI

SUSTAINABILITY BOOK 2025



Let's change the world and the future

Contents

Harnessing our power of knowledge to create value for the future

Yoshimitsu Takagi
Hitachi High-Tech Corporation
President and Representative Director

Responding to complex social issues and the new corporate vision

The world today is facing numerous social issues, such as worsening climate change, loss of biodiversity, growing geopolitical risks, and human rights concerns. Rapid and dramatic changes are occurring that are overturning what we once took for granted. Even in such an unpredictable environment, we have established a new corporate vision from April 2025: Changing the World and Future with the Power of Knowledge to contribute to a sustainable society and continue to be an indispensible company.

Starting with an understanding of the real issues of society and our customers, “Front” and “Technology” that are engaged intensely at sites, create highly competitive products, and generate new value from the data obtained from them. Through new value, we will create solutions that improve frontline workers’ productivity and well-being and contribute to a sustainable society, thereby achieving our corporate vision.

Promoting value creation in five Sustainability Focus Areas through business activities

At our company, we have identified the following five sustainability focus areas, based on sustainability topics and areas where we wish to make significant contributions through our businesses and social impact.

Contributing to a Sustainable Global Environment
- Achieving Hitachi’s Environmental Vision (Decarbonization, Circular Economy, Nature Positive)

Contributing to healthy, safe, secure lives
- Solutions that enhance healthcare and support living in a digital society

Contributing to the sustained development of science and industry
- Industrial development through technological innovation and fostering future talent

Establishing a sound management foundation
- Management based on high transparency and ethical standards

Developing and utilizing diverse human resources
- Support for thriving diverse talent and pushing ourselves to maximize value

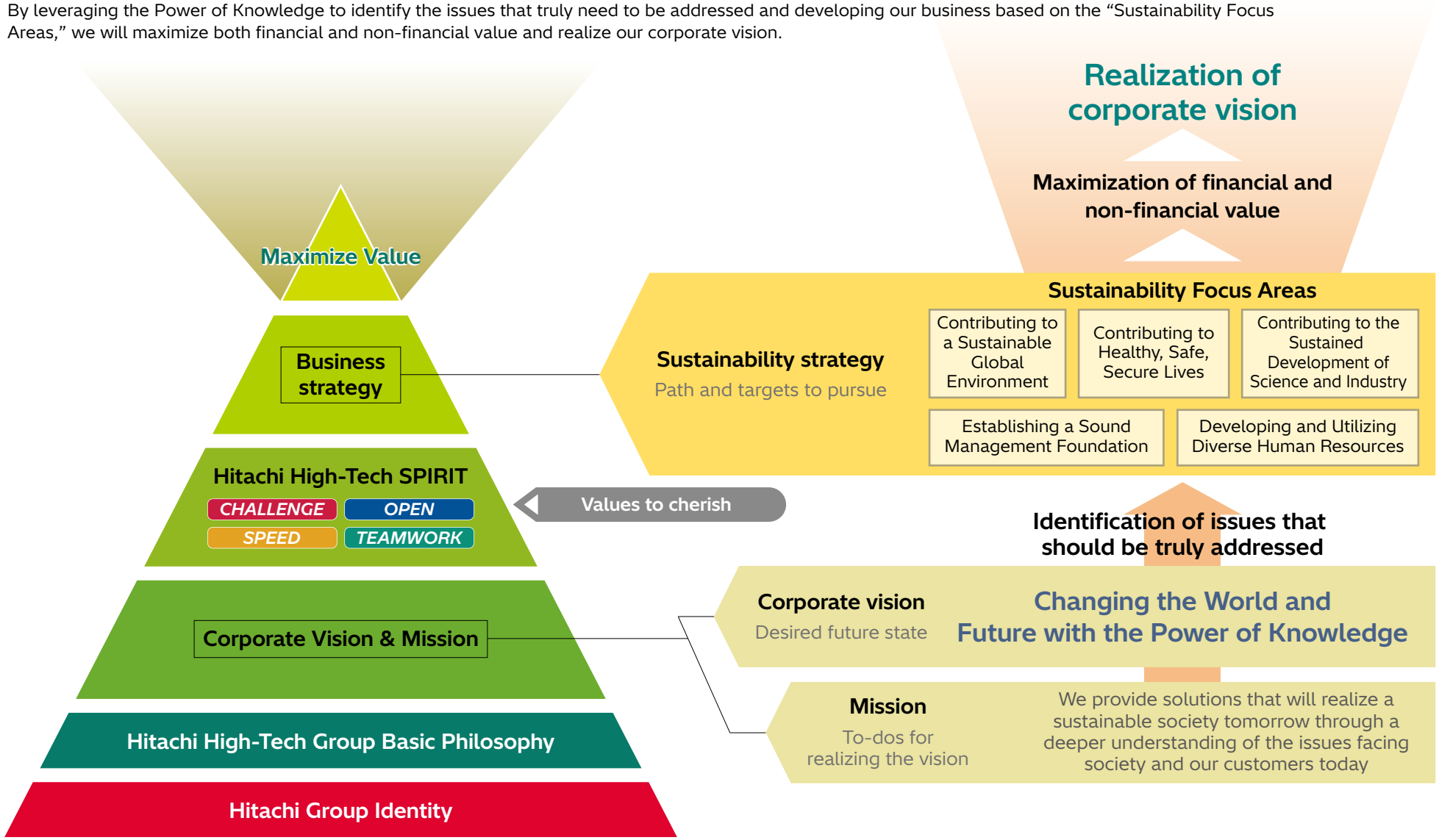
By placing these sustainability focus areas at the core of our business activities, we aim to expand value creation stemming from solutions to social issues.

Maximizing social, environmental, and corporate value through the power of kowledge

With each individual demonstrating the power of knowledge and accelerating initiatives for sustainability focus areas through dialogue and collaboration with diverse stakeholders, we will maximize social, environmental, and corporate value, and work toward achieving a Harmonized Society where the global environment, people’s happiness, and economic growth are in harmony, thereby changing the world and future.

Hitachi High-Tech's Sustainability Value Creation

The Hitachi High-Tech Group has designated important management issues selected through a certain process as "Sustainability Focus Areas."
By leveraging the Power of Knowledge to identify the issues that truly need to be addressed and developing our business based on the "Sustainability Focus Areas," we will maximize both financial and non-financial value and realize our corporate vision.



How we decide!

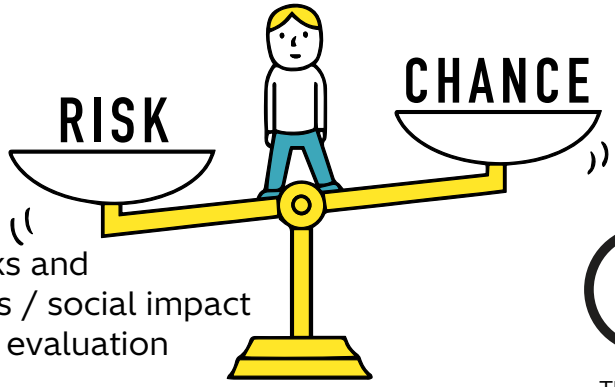
Process for identifying Sustainability Focus Areas

In 2024, the Hitachi High-Tech Group re-evaluated material sustainability issues (sustainability focus areas) using a process common to the Hitachi Group.

STEP. 1 Listing sustainability issues

By referencing international standards such as ESRS*1 and SASB*2, we have created a list of sustainability topics

*1 ESRS - European Sustainability Reporting Standards
*2 SASB - Sustainability Accounting Standards Board



STEP. 3 Business risks and opportunities / social impact analysis and evaluation

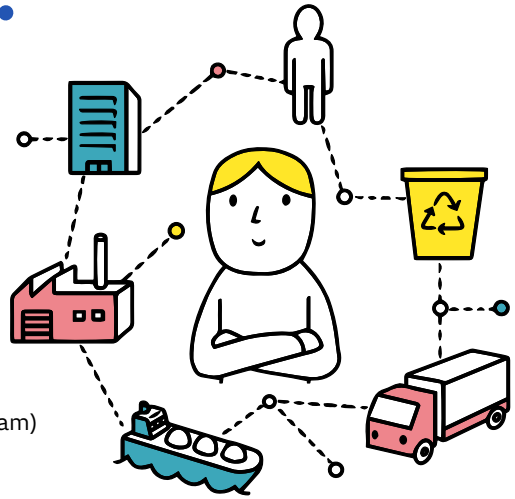
We analyze and evaluate business risks and opportunities/social impact of sustainability topics, considering the characteristics and value chains of each business.

STEP. 5 Determining Sustainability Focus Areas

The Sustainability Promotion Committee presents and finalizes proposals for sustainability focus areas.

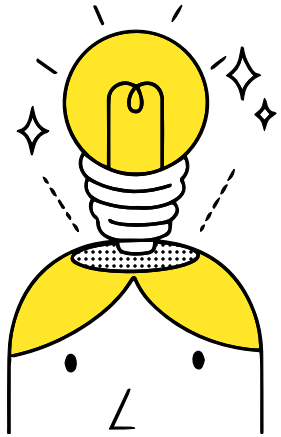
STEP. 2 Value chain mapping

We identify stakeholders involved in the value chain (upstream/Hitachi High-Tech/downstream) by business segment, and natural capital dependent on the value chain.

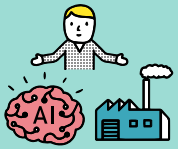


STEP. 4 Preparation of Sustainability Focus Areas proposals

We organize the sustainability topics with significant influence on business and social impact, as well as areas we particularly want to contribute to through our business, and prepare proposals for sustainability focus areas.



Sustainability Focus Areas for the Hitachi High-Tech Group

Sustainability Focus Areas	Categories	Focused initiatives	Related SDGs
1. Contributing to a Sustainable Global Environment 	Decarbonization Circular economy Nature positive	**Reduce environmental burden through advanced technology and value chain**	
		Development, manufacturing, and recycling of batteries for circular transformation	
		Promote effective use of resources in value chain	
		Promote regional, forest and biodiversity conservation activities	
2. Contributing to Healthy, Safe, Secure Lives 	Healthcare	**Implement healthcare services tailored to individuals**	
	Improving QoL	**Develop infrastructure for digital society**	
	Secure lives	**Ensure safe and secure lives through beam and analysis technology**	
3. Contributing to the Sustained Development of Science and Industry 	Development of science and industry	**Strengthen resilience of entire supply chains**	
		Improve productivity at industrial sites	
		Technological innovation and stable supply of semiconductors	
	Creating future human assets	**Foster ability to open up future with power of science**	
4. Establishing a Sound Management Foundation 	Governance	**Sophistication of risk management**	
	Digital platforms	**Leverage new technologies and digital tools to accelerate business**	
	Creating innovation	**Technological innovation and ideas that generate innovation**	
	Human rights	**Respect human rights in value chain**	
5. Developing and Utilizing Diverse Human Resources 	Human resource development	**Raise value for each person through human capital investment**	
	Diverse Perspectives	**Create opportunities for diverse human resources to thrive**	
	Workplace environment	**Establish safe and secure workplace environment**	

Discovered in the City!

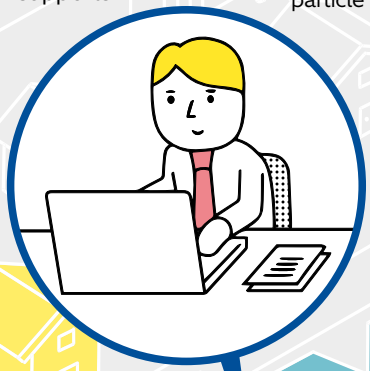
Hitachi High-Tech's Solutions

The Hitachi High-Tech Group provides a variety of solutions to address the diversified challenges of society and customers through its core technologies of observation, measurement, and analysis. These Hitachi High-Tech's solutions are actually utilized everywhere in the cities where we live.

Contributing to the sustainable development of society and our lives at the forefront of semiconductor development and manufacturing

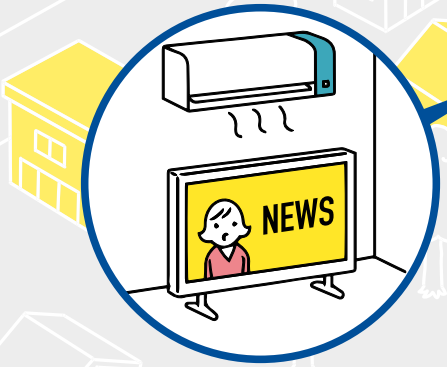
Nano-Technology Solution

The Nano-Technology Solution Business is working together with customers at the forefront of semiconductor device development and manufacturing—which supports the evolution of our digital society, including electronics such as PCs and smartphones, AI, 5G, autonomous driving, medical devices, and more—creating new value. Through products such as CD-SEMs, plasma etching systems, and defect inspection devices—supporting processing, measurement, and inspection processes in semiconductor manufacturing—we aim to realize a sustainable society that is kind to both people and the earth through the power of technology.



Personal Computers

CPUs, the brain of personal computers, are also semiconductors. Hitachi High-Tech provides solutions that support semiconductor production processes essential to our daily lives.

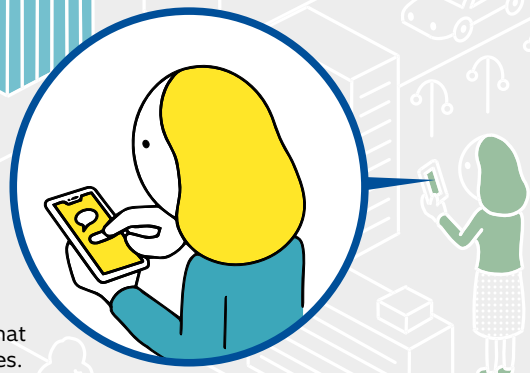


Home Appliances

There are many examples of semiconductor applications inside the home as well. Not only TVs and air conditioners, but even rice cookers can make delicious rice thanks to semiconductors finely controlling the heat output.

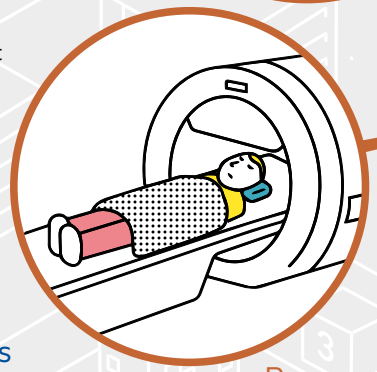
Smartphones

Smartphones, which are very familiar to us, are a typical example of semiconductor use. At Hitachi High-Tech, we are involved in the processes of semiconductor manufacturing that are applied in a variety of devices.



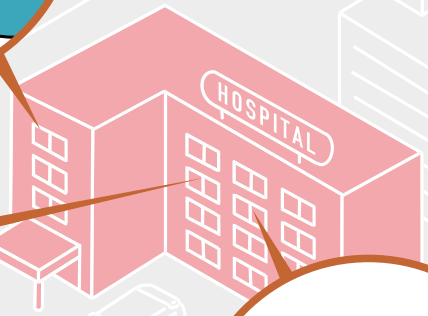
Radiation Therapy

Radiation used for cancer treatment includes X-rays, proton beams, and heavy ion beams. Hitachi High-Tech is the only company in the world that offers all three types of radiation therapy systems. We are also moving forward with the development of next-generation particle therapy systems.



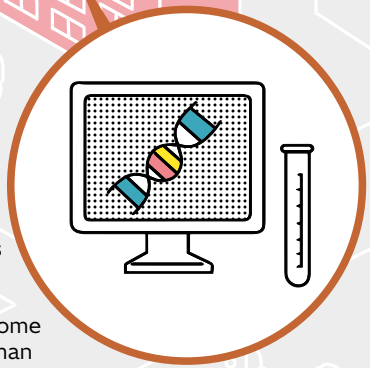
Blood Testing

At Hitachi High-Tech, we manufacture biochemical and immunodiagnostic testing systems that assess patients' pathological and metabolic functions, as well as HPLC systems that measure blood drug concentrations for cancer therapy and other treatments.



Personalized Medicine

Personalized medicine refers to treatments tailored to an individual's constitution and disease characteristics, based on genetic testing. Hitachi High-Tech provides its genome map analysis solution—which analyzes human genome structural polymorphisms—to research institutions, contributing to the realization of optimal healthcare services for each individual.



Toward a society where everyone can live safely and securely with "Diagnosis×Therapy×Digital"

Healthcare Solutions

The Healthcare Solutions Business not only develops diagnostic and therapeutic systems but also promotes digital healthcare utilizing this data. Aiming for "smiles for patients together with healthcare professionals" and the realization of "a society without fear of cancer" we continue to take on the challenge of creating healthcare innovations that support overall medical optimization.

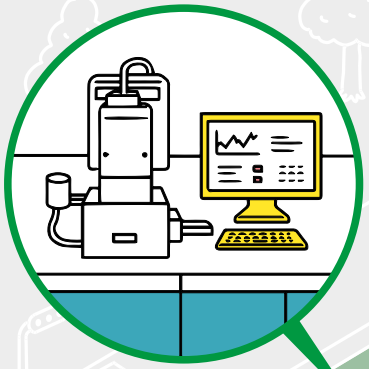
Discovered in the City!

Hitachi High-Tech's Solutions

Strengthening global front-line capabilities and taking on the challenge of creating new businesses

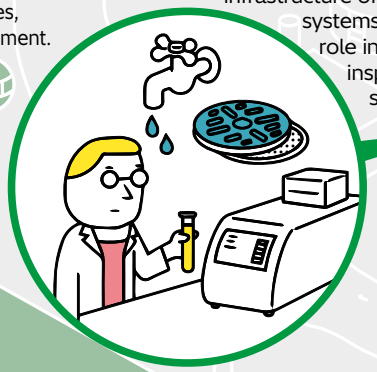
Industry & social infrastructure solutions

The Industry & Social Infrastructure Solutions Business solves challenges in fields such as communication infrastructure, battery life cycles, mobility & connected, and environmental energy. Based on societal trends and customer challenges, we are aiming to create and scale the next pillar businesses for the industrial sector.



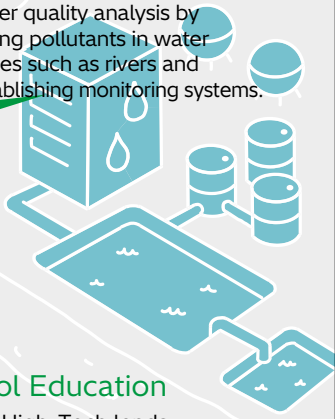
Research & Development

Hitachi High-Tech's analytical systems and electron microscopes play an active role in R&D at universities and corporations. They help drive innovation in various fields, such as more refined semiconductor manufacturing, unraveling novel viruses, and new drug development.



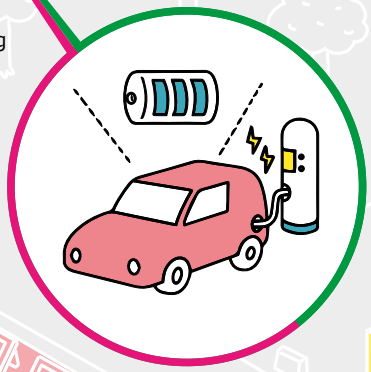
Monitoring Water Supply and Sewerage Systems

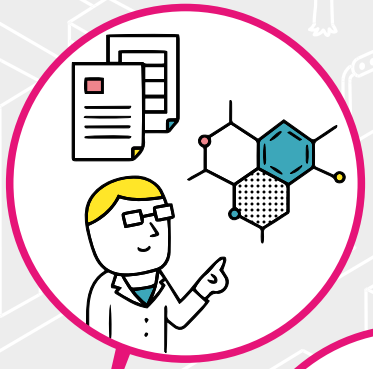
Thanks to water supply and sewerage systems, we can enjoy fresh water from the tap and safely discard wastewater. Hitachi High-Tech has long contributed to maintaining the social infrastructure of water supply and sewerage systems. We continue to play an active role in water quality analysis by inspecting pollutants in water sources such as rivers and establishing monitoring systems.



Electric Vehicle (EV)

Hitachi High-Tech provides manufacturing and inspection systems essential for safe and secure batteries, as well as comprehensive solutions covering the entire battery value chain (from mineral resources to battery materials, battery manufacturing, and recycling). By supporting the entire product life cycle, we are comprehensively promoting resource circulation for the stable supply of batteries and reduction of environmental burdens.



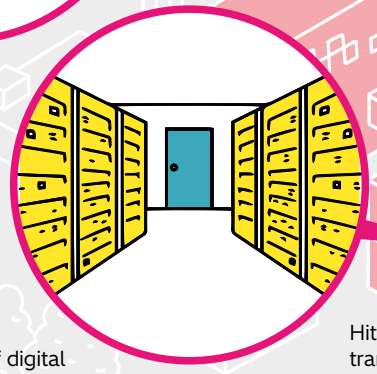


X-Informatics

As a solution for the diversified challenges faced by manufacturing industries, informatics solutions that drive DX Promotion in R&D are attracting attention. At Hitachi High-Tech, we are working on various informatics businesses, including materials informatics, which uses experimental data and AI technology to improve the efficiency of materials development.

School Education

Hitachi High-Tech lends tabletop microscopes to educational institutions conducting advanced science education. We encourage the advancement of science by introducing the wonders of the microscopic world—usually unavailable in daily life—to many children at schools.

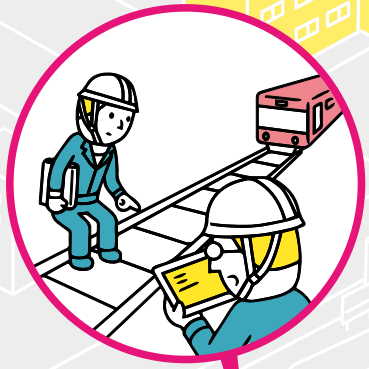


Telecom-munications Infrastructure

Hitachi High-Tech also contributes to the construction of digital infrastructure. To support the rapidly increasing data transmission volume due to DX and other factors, we provide optical communication components and modules, and are also involved in the engineering design of optical integrated circuits enabling low power consumption communication. We also contribute to the reduction of CO_2 emissions, and our solutions are expected to be utilized in green data centers.

Railways

Hitachi High-Tech has supported public transportation, including the Shinkansen bullet train, Japan's main artery. To meet the needs of railway operators requiring efficient and high-precision inspection devices, such as rail (track) inspection, trolley wire (overhead wire) inspection, and the inspection of train track equipment, we are advancing cutting-edge technology development.



Creating specialized measurement and inspection solutions with core "analysis" technologies

Core Technology Solutions

In the Core Technology Solutions Business, we offer electron microscopes (SEM, TEM, FIB), spectrophotometers, X-ray fluoresce analyzers, as well as thermal analyzers and liquid chromatographs, for processes from research and development to manufacturing and quality control in fields such as batteries, advanced materials, electronics, semiconductors, and biopharmaceuticals. By collaborating with universities and research institutions, we will create dedicated measurement and inspection solutions using our core "analysis" technologies.

Special Feature

Changing the future together

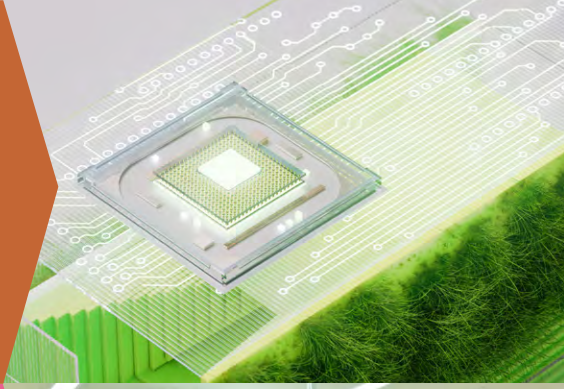
Dialogue with co-creation partners

**Changing the future and the world with the power of Knowledge.
For that, the presence of co-creation partners capable of pursuing new value together is indispensable.
With the intersection of various ideas and technologies, we will create new value for society.
Through dialogues with co-creation partners, discover how Hitachi High-Tech envisions the future.**

Dialog.1

Nano-Technology Solution × SEMI JAPAN

Semiconductors that contribute to achieving a sustainable society



Dialog.2

Healthcare Solution × Kyoto University

More accurate, safer, and simpler. Towards stress-free radiation therapy, together

Dialog.3

Core Technology Solution × TOYOTA MOTOR CORPORATION

Tackling challenges and innovation with foreign matter inspection technology supporting the future of fuel cells

Dialog.4

Industry & Society Infrastructure Solution × OFF-GRID FIELD

Aiming to become a city-building mobility company: Evolving from improving construction site environments to disaster prevention and regional hubs

Semiconductors that contribute to achieving a sustainable society

Reiko Eda
Manager
Sustainability
SEMI Japan

Tetsuya Shigetomi
General Manager
Service Planning Dept.
Digital Service Div.
Nano-Technology Solution
Business Group
Hitachi High-Tech
Corporation

The Road to a One-Trillion-Dollar Market —— A Society and Economy Driven by Semiconductors

Shigetomi The semiconductor market is now one of the fastest-growing industries in the world. At Hitachi High-Tech, we offer a lineup of semiconductor manufacturing process products such as CD-SEM, plasma etching system, and defect/foreign matter inspection and analytical systems. But what role do semiconductors play in modern society?

Eda Semiconductors are truly the core technology that supports today's social infrastructure. They are used in all products that support our daily lives, from smartphones and computers to automobiles and medical devices, making major contributions to quality of life improvement. Furthermore, they form the foundation that supports the advancement of cutting-edge technologies such as AI, quantum computers, and IoT, and are essential for accelerating innovation. The scale of the semiconductor market has reached about $520 billion over 50 years, but in just a few years, by 2030, it is expected to exceed $1 trillion in market growth. This accelerated growth indicates that the entire industry is rapidly shifting to the very core of society and the economy.

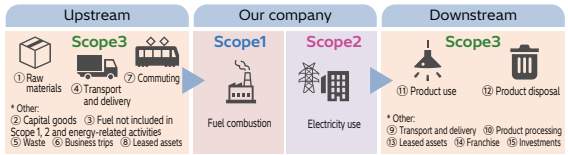
The Forefront of Sustainability in the Semiconductor Industry —— Scope 3 and Current Industry Collaboration

Shigetomi On the other hand, to achieve a sustainable society, there are many challenges that the entire semiconductor industry must address. Amid such circumstances, as an industry leader, what initiatives is SEMI promoting?

Eda As a global semiconductor industry organization, SEMI supports industry development from various angles, including policy recommendations to governments, talent development, and strengthening collaboration across the entire value chain. We believe that our particular strength is providing a platform for non-competitive areas that address common issues beyond corporate competition. To achieve a sustainable society, under the SEMI Sustainability Initiative, each company participates in voluntary working groups set for each theme, cooperating with one another.

Representative themes include responses to regulations such as PFAS, ESG (environmental, social, and governance), and climate change, and we address challenges that are difficult for companies to tackle alone. Among these, the issue we place the most emphasis on is addressing climate change. In November 2022, SEMI launched the SCC (Semiconductor Climate Consortium). Within the SCC, the entire industry examines and implements effective reduction measures across all Scope 1–3*1 emission categories to reduce greenhouse gas emissions across the entire value chain.

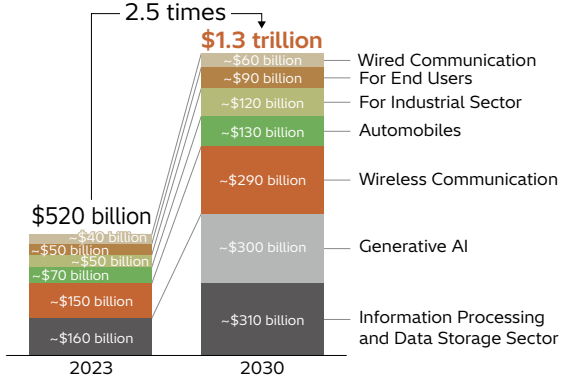
*1 Supply chain emissions. When companies consider CO_2 emissions, they calculate their own as Scope 1 and Scope 2, and the activities upstream and downstream in the supply chain as Scope 3. Scope 3 is classified into 15 categories.



The circled number indicates the category of Scope 3.
Source: Green Value Chain Platform

With robust growth in semiconductor demand, the market is expected to reach $1.3 trillion by 2030.

Global Semiconductor Market



Shigetomi At our company, addressing climate change is also one of our key initiatives. Aiming for net zero by 2050, we are working to reduce greenhouse gas emissions across the entire value chain.

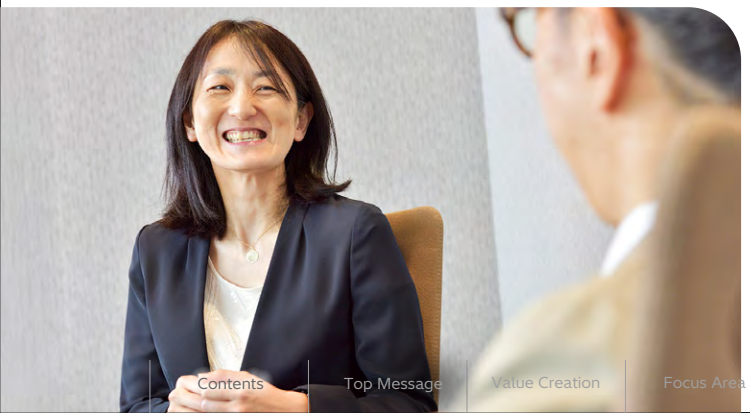
Eda To reduce greenhouse gas emissions, a response that looks at the entire value chain is required. As you know, although there is a cross-industry international standard called the GHG Protocol for calculating Scope 3 emissions, there has not been a guideline that meets the unique needs of the semiconductor industry in actual operations. Therefore, led by the Scope 3 WG (Scope 3 Working Group), we have promoted information sharing and issue identification in the semiconductor value chain, and recently published guidelines for calculating Scope 3 Category 1 (emissions from purchased products/services) as well as Category 11 (emissions from the use phase of sold products). The aim is to supplement existing guidelines, protocols, and best practices. By providing guidelines tailored to the semiconductor industry, it seems that alignment of perspectives among companies is gradually advancing.

Shigetomi Hitachi High-Tech is also paying close attention to the activities of the Scope 3 WG. We see the establishment of industry guidelines as a significant step forward. Scope 3 accounts for the majority of our CO_2 emissions, with about 90% coming from Category 1 and Category 11 in particular. Therefore, reducing these emissions is an important challenge.

For Category 1, we use CO_2 emissions data supplied by our procurement partners for the products and services provided to us in our calculations. Visualizing emissions not only reflects each company's initiatives, but also helps us plan our own reduction strategies. We have also started sending out e-mail newsletters to provide information on environmental regulations and other related topics. This supports the activities of procurement partners who do not have enough time to gather information. For Category 11, to reduce CO_2 emissions during product use, we assess our environmental impact across the entire product life cycle, and through eco-design (environmentally conscious design)*2 and life cycle assessment (LCA)*3, CO_2 emissions reduction and resource circulation are promoted. In addition, by responding digitally to customers' challenges, we are achieving shorter development times and higher productivity, contributing to lowering our environmental impact in semiconductor development and manufacturing.

*2 A design method that identifies and assesses factors that impact the environment at every stage of a product's life cycle, from raw material extraction to disposal, and incorporates measures to reduce our environmental impact.

*3 A method for quantitatively assessing our environmental impact at each stage of the product life cycle by comparing the use of the developed product and conventional products.



Toward a Future Where We're Glad to Be in the Semiconductor Industry —— Fulfilling Our Responsibilities for the Environment and Society

Eda Going forward, I feel that industry-wide collaboration will become even more important. For example, we are working on developing calculation methods for PCF (Product Carbon Footprint) and systems to exchange emissions data smoothly across the supply chain. If information independently collected by each company can be shared in a common format, it will not only improve industry-wide efficiency but also make it easier to launch specific actions toward reduction.

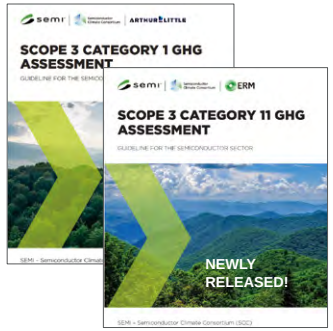
Shigetomi I see. Standardizing formats will make it easier for our procurement partners to organize and submit information, reducing their operational workload. As a result, it may allow for more proactive cooperation than ever before.

Eda Visualizing and working to reduce our environmental impact is not something that can be accomplished by a single company alone. Precisely because this is a non-competitive area, I believe it is important for the entire industry to pool its expertise and move forward, supporting one another. Connecting each company's efforts to the momentum of the entire industry—that's the role we hope to play.

Shigetomi As members of the semiconductor industry, let's fulfill our responsibilities toward the environment and society, while recognizing that semiconductors are contributing to people's lives and the advancement of society—and that we are all playing a part toward achieving this. Let's work together to create a future that makes us feel, 'I'm truly glad to be part of this industry,' and proud to share that with our families and friends.

Scope 3 Category 1 & 11 GHG Assessment Guidelines for the Semiconductor Industry

3.1 3.11



SEMI Japan Forest Initiatives

Since 2023, SEMI has been promoting a global tree-planting project called SEMI Forest. This is an initiative for supporting tree planting online for about $1 per tree, and it is also being developed in Japan as the SEMI Japan Forest. The current number of trees planted in the SEMI Japan Forest is 28,150. When converted to CO_2 absorption, it is about 20 tons, which is equivalent to the annual CO_2 emissions from six to seven manufacturing plants handling 300 mm wafers. More than just companies and organizations, invididuals are also able to participate starting from 25 trees. Of course, this is noted as part of corporate ESG activities and climate change responses, but it is also attracting attention as an easy way for anyone to get involved in sustainability.

More accurate, safer, and simpler. Towards stress-free radiation therapy, together

Mitsuhiro Nakamura
Professor Department of Advanced Medical Physics Graduate School of Medicine, Kyoto University

Takashi Mizowaki
Professor and Chairman Department of Radiation Oncology & Image-Applied Therapy Graduate School of Medicine, Kyoto University

Development driven by the determination to retain domestically prodcued devices

Nakamura We are currently conducting clinical trials using the X-ray therapy system OXRAY, which was co-developed with Hitachi HighTech. You were involved from the development stage of the preceding X-ray therapy system, weren't you Dr. Mizowaki?

Mizowaki I started developing the relevant X-ray therapy system under my predecessor Professor Hiraoka in 2002. At that time, in the field of radiation therapy, while intensity-modulated radiation therapy (IMRT)[*1] had already appeared, technologies for accurate localization to tumors, such as image-guided radiation therapy (IGRT)[*2], were just emerging, and only overseas manufacturers were capable of releasing such products. Therefore, when formulating specifications for the joint development, we anticipated that IGRT would likely be standardized ten years later when practical use was expected, and strongly advocated for including that functionality. As a result, IGRT became widespread, and we were able to jointly develop a device that met clinical needs.

Nakamura Yet subsequently in 2016, the company developing the X-ray therapy system at that time changed its management policy, and development was almost halted, right?

Mizowaki I heard that new development of the X-ray therapy system was discontinued to focus management resources on other fields, but by that time, a prototype of the next generation was already underway. Above all, losing an X-ray therapy system capable of Motion Tracking Irradiation[*3] and dual-axis simultaneous rotational irradiation[*4] would have been an enormous loss.

Once domestically developed technology is lost, restarting development becomes extremely difficult from both know-how and resource standpoints, and this is not just limited to X-ray therapy systems. This could lead to a decline in national strength in the future, which would be a significant loss. That is exactly why I felt a strong sense of mission that we absolutely must preserve domestic technology.

*1 A method that varies the intensity of radiation within the irradiation field during exposure and performs irradiation according to the tumor's shape.
*2 A technique to compare treatment planning images and images taken right before treatment, correcting the positional error of the tumor with millimeter precision and irradiating with greater accuracy.
*3 A method that tracks the location of cancer moving due to breathing in real time and moves the irradiation field accordingly.
*4 A method that enables highly accurate and efficient treatment of complex-shaped tumors by using two independent rotational axes to irradiate from different planes.

Linear Accelerator System OXRAY
An image-guided X-ray therapy system that integrates irradiation technology and imaging technology cultivated by Hitachi Group, which was launched in July 2023. The O-ring-type gantry structure with enhanced rotational freedom allows for continuous irradiation from multiple directions (different planes) without moving the patient bed, bringing expected improvements in dose distribution. Equipped with two pairs of kV imaging devices and alignment systems capable of capturing X-ray images and cone-beam CT images, it contributes to faster position matching. The ultra-compact accelerator tube and the multileaf collimator that shapes the irradiation field are mounted on a gimbal mechanism, enabling tracking irradiation for moving targets by changing the direction of therapeutic X-ray irradiation.

Nakamura I feel the same way. As for X-ray therapy systems, even if the majority are made overseas, continuing domestic development leaves possibilities for the next generation. Were there any moments when you felt that domestically produced equipment provided truly unique strengths?

Mizowaki The speed of development, for sure. Because there were no language or cultural barriers, it was possible to smoothly resolve problems and improve software. That's why, at the beginning of the joint development of OXRAY, there was talk of using an overseas-made positioning device, but I strongly insisted, "Please, at the very least, let Hitachi be in charge of development of that."

Helping to lower the impact on patients, with shorter treatment times

Nakamura OXRAY was introduced in 2023, and compared to its predecessor X-ray therapy device, its performance has improved dramatically.

Mizowaki The previous X-ray therapy device was also a groundbreaking system, but it had several issues, the biggest one of which was the irradiation field size was narrow and could not accommodate extensive targets. Because of this, it only covered about 40% of the diseases that should originally be treated with external irradiation. However, by expanding the irradiation range and increasing the rotational angle of the gimbal with OXRAY, more than 90% of conditions eligible for radiation therapy can now be covered. Being able to provide treatment for a wider range of conditions than ever before is a significant advancement.

Nakamura What particularly stood out to me was that the irradiation time for Motion Tracking Irradiation has been dramatically reduced. Motion Tracking Irradiation was possible with the previous X-ray therapy device, but it required irradiation from various directions, resulting in a considerably long irradiation time of over 30 minutes. During treatment, there were times when patients had to maintain uncomfortable positions, such as raising an arm they did not want exposed to radiation, and the longer the irradiation time, the greater the physical impact. With OXRAY, by integrating Motion Tracking Irradiation and Volumetric Modulated Arc Therapy (VMAT)*5, the entire process from positioning to completion of irradiation can now be finished in less than ten minutes.

There is also data showing that, with longer irradiation times, the position of tumors inside the body can shift, so being able to complete treatment more quickly not only reduces the impact on patients, but is also a significant advantage in delivering more precise pinpoint irradiation.

*5 An application of IMRT, this method delivers radiation while rotating without stopping the device.

To achieve more accurate treatment tailored conditions of the day

Mizowaki In the future, to further reduce the impact on patients, achieving marker-less motion tracking irradiation is indispensable. Currently, in Motion Tracking Irradiation, a gold marker must be placed inside the body to accurately locate the tumor, which is a significant impact on the patient. To promote wider adoption of Motion Tracking Irradiation, it is necessary to develop the capability to track tumors without using gold markers. Currently, research is underway to achieve marker-less motion tracking irradiation.

Another essential point is preparing for Adaptive Radiation Therapy (ART), which is expected to become mainstream in radiation therapy going forward .

Nakamura That's right. Motion Tracking Irradiation is a technique that synchronizes irradiation with periodic movements such as breathing, but even as we're speaking right now, there are many non-periodic internal changes, like the bladder filling with urine or the stomach filling with gas. Therefore, the shape and position of the lesion or organs can change from day to day. Ideally, treatment plans should be redone according conditions of the lesion or organs on a given day, and making that possible is what Adaptive Radiation Therapy (ART) is all about. In addition to the feature of pinpoint irradiation from non-coplanar angles, we believe the ability to realize ART is one of OXRAY's strengths.

Since OXRAY can capture images from two directions, it is possible to more accurately reflect the internal condition of the body for that day and makes it easier to plan ART. Drawing on these characteristics, our lab is developing new treatment methods and plans to reflect the results in "OXRAY" in the future.

Mizowaki Looking at cancer treatment from a broader perspective, anti-tumor immunity—that is, the immune system's ability to recognize and eliminate cancer cells—means that if immunity functions 100% properly, cancer would never develop. In other words, if we can prevent impairment or damage to the immune function, we may not need anticancer drugs or radiation therapy at all.

Of course, achieving such a treatment is currently extremely challenging, but there are reports that radiation therapy not only directly attacks cancer cells but also triggers the body's immune system and promotes an immune response to cancer. Going forward, I believe there will be a trend toward exploring new directions that combine pinpoint irradiation, as you mentioned, with immunotherapy to prevent recurrence.

Nakamura In order to achieve new kinds of cancer treatment, collaboration between clinical settings and device development is necessary. As a medical physicist who understands both clinical and engineering perspectives, I hope to serve as a bridge to maximize the collaborative effect and contribute to cancer treatment.

Core Technology Solutions × TOYOTA MOTOR CORPORATION

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Analytical Instruments System Design Department 1
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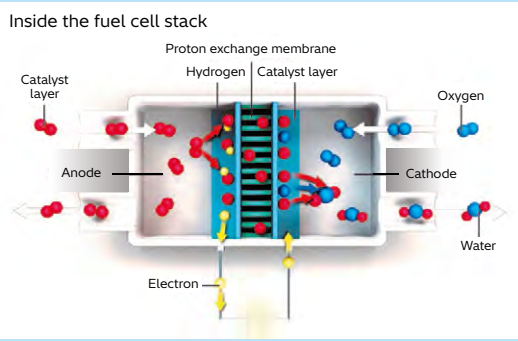
Hydrogen Factory
TOYOTA MOTOR CORPORATION

Tackling challenges and innovation with foreign matter inspection technology supporting the future of fuel cells

Fuel cell mounted in the second-generation MIRAI, achieving both high output and downsizing



The fuel cell consists of a central proton exchange membrane sandwiched between a catalyst layer, a gas diffusion layer, and a separator. Oxygen taken in from outside air is supplied to the cathode-side separator, while hydrogen as fuel is supplied to the anode side. The hydrogen is separated into protons and electrons by the anode-side catalyst, and the resulting electrons are pushed into an external circuit to generate electricity for the motor drive. Meanwhile, the protons travel through the exchange membrane to the cathode side, where they react with oxygen on the catalyst to produce water. This chemical reaction generates no gases that pollute the atmosphere.

New challenges for foreign particle inspections of fuel cells, aimed at improving performance and mass-production

Hoshino Fuel cell vehicles generate electricity by inducing a chemical reaction between hydrogen and oxygen using fuel cells, and use the generated electric energy to drive. TOYOTA develops, manufactures, and provides fuel cells to society. In the development of the second-generation MIRAI, we set a target of making fuel cells higher output, more compact, and lower cost. To achieve this, the proton exchange membrane, which is the core of the fuel cell, was designed to be thinner. However, while making it thinner improved the performance itself, a new issue emerged: it became more susceptible to adverse effects from minute metallic foreign matter that can enter during the manufacturing process.

To ensure the quality of the cell, even the presence of extremely small metallic foreign matter at the 100 μm level cannot be allowed. If metallic foreign matter is mixed in, the power generation capability decreases. Because fuel cell units have

a multilayer structure, if foreign matter gets between layers, it was difficult to detect minute foreign matter with existing optical inspection equipment.

Additionally, since production delays and extended delivery times were issues with the first-generation model, there was strong demand for improved production speed and enhanced mass production capability for the second generation. Therefore, inspection also required technology capable of detecting foreign matter both quickly and with high precision.

Takahara It was due to this background that Toyota consulted with us about "whether it would be possible to use X-rays to detect foreign matter inside the cells." This was the beginning of our collaboration. After that, you were put in charge, and since the development of the equipment, we have been working together on continuous improvement and refinement. The first time we met was in the clean room, wasn't it? I remember we went to check up on conditions there when we were both dressed from head to toe in cleanwear, making it almost impossible to see anyone's face.

Hoshino From that moment, you always worked so carefully, and I was impressed by your sincerity, even with technical aspects. I think we made quite a few requests on our side, but the way you were able to respond in a flexible manner was a huge help.

Achieving high-speed, high-precision X-ray inspection technology

Takahara When we first started working together, what was required of X-ray inspection was both speed and accuracy—to reliably detect even finer foreign matter at high speed. Moreover, the information provided by traditional two-dimensional X-ray images was insufficient, and a new method was needed to capture foreign matter in three-dimensional structures.

Hoshino High-precision 3D imaging such as CT takes a long time for inspection, which is not realistic for mass production processes. I heard from my predecessor that a major topic was how to acquire 3D information quickly.

Takahara At first, even we thought it would actually be very difficult to calculate 3D information in such a short time, but you wanted to calculate the "surface area" as an inspection index more accurately frmo 2D images. With that request, we saw the potential in an approach that estimates the thickness and area of the foreign matter from density variations in the 2D images.

Hoshino Based on the hypothesis that there might be a correlation between image density and the surface area of foreign matter, Hitachi High-Tech Science (now Hitachi High-Tech Analysis Corporation) provided several metal samples with different thicknesses, created using FIB (Focused Ion Beam) technology. By imaging these samples and verifying the correlation between density differences and actual surface area, we gained confidence that surface area could be estimated with a certain degree of accuracy.

Takahara From there, we began the process of incorporating that estimation algorithm into the inspection system. This technology, which made it possible to determine the 3D size of foreign matter within a few seconds of imaging, proved to be a major turning point in the development project.

Hoshino With improved foreign matter inspection accuracy, we were able to relax the standards, which had been set higher in consideration of safety margins. As a result, over-detection was suppressed, enabling more accurate assessments, which also contributed significantly to yield improvement.

Takahara Achieving such inspection technology was not made possible by Hitachi High-Tech alone. We were able to achieve this outcome because TOYOTA clearly shared specific on-site requirements, and we worked together to break down the issues step by step.

Becoming a partner for overcoming on-site challenges to achieve a hydrogen-based society

Takahara Introducing the equipment on-site is not the end—continuous adjustments are necessary even during the operational phase afterward. For example, if the environment around the production line changes, noise can enter inspection images, causing them to become distorted and making proper inspection impossible. Each time that happens, we review the imaging conditions and processing parameters to ensure stable inspection results.

Hoshino We also value the perspective of connecting inspection results to manufacturing improvements. When foreign matter is discovered by inspection, how can we prevent contamination, and how can we feed this back into the process? Rather than simply removing foreign matter, our goal is to create mechanisms that prevent it from occurring in the first place—in order to achieve this, inspection devices should not merely be determination tools, but should act as a "trigger for awareness" that helps improve manufacturing at the production site.

Takahara It's exactly because you approach things with that attitude that we also feel we can evolve the equipment together as we consider each issue. In the development of next-generation technologies as well, we hope to further collaborate with TOYOTA's production sites to provide even more effective inspection solutions.

Hoshino At TOYOTA, our goal is not only to improve the performance and quality of our products, but also to achieve a hydrogen-based society in the future. We want to expand applications not only to passenger cars, but also to large trucks, construction machinery, and ships. To make fuel cell vehicles more familiar and accessible, technological advancements as well as a stable mass production system are essential. Having partners like this who can overcome on-site challenges together with us through inspection technology is extremely significant.

Takahara At Hitachi High-Tech, we also recognize that continually developing technologies rooted in on-site needs is ultimately the path to contributing to society. TOYOTA has elevated our standards. That's how I feel. We want to continue deepening our co-creation while always maintaining a forward-looking perspective.

Aiming to become a city-building mobility company: Evolving from improving construction site environments to disaster prevention and regional hubs

Shigetaka Hirosato
OFF-GRID FIELD
CEO

Takahisa Yashiro
Manager
Life Cycle Management
Solutions Dept.
Battery Solutions Business Div.
Industrial & Social Infrastructure
Business Group
Hitachi High-Tech

Helping to resolve environmental problems at construction sites off-grid mobile houses

Hirosato The construction industry still has a persistent image of being a harsh and dangerous working environment, and for younger generations and women, it is difficult for them to even consider it as a career option. The desire to help change that situation, even a little, was the starting point for establishing OFF-GRID FIELD. By first improving on-site environments, we hope to increase interest and willingness to participate in the industry.

Yashiro Recently, the impact of labor shortages and overtime restrictions due to work style reform has also become an issue.

HIrosato That's right. On site, temporary offices such as prefabs are often used, and preparation of air conditioning, toilets, communication equipment, and procurement of supplies takes considerable effort to create a basic working environment. Supervisors who should be focusing on construction management end up spending their time on these peripheral tasks, resulting in longer working hours.

Yashiro And those temporary offices can't really be called comfortable environments.

HIrosato In summer, the risk of heatstroke is higher and it's hard to secure private rooms for changing clothes. Searching for a way to improve such on-site challenges and provide a comfortable space for workers, we arrived at the concept of an off-grid mobile house. These mobile houses have facilities like air conditioning and toilets, with the necessary supplies incorporated from the start. By creating a system where a mobile house can be set up a site with just a phone call, we've significantly reduced the setup time and effort. Not only is setup simple, but because the house is insulated, it's highly energy-efficient and offers sufficient cooling even in summer.

Experiencing flexible collaboration and quick response through the implementation of self-sustaining power systems

Yashiro An off-grid mobile house requires a system that can provide power without relying on external sources. The key issue was how to build an inexpensive and safe system within the constraints of limited indoor space and location. Initially, we ran a trial with a combination of battery storage using so-called 'B-grade cells'—which didn't meet vehicle standards but were sufficient for light use—and solar panels. However, once we began operation, we found concerns about the reliability of charging and output stability.

Hirosato Hitachi High-Tech responded quickly to the issues that arose, and ultimately replaced all battery storage with vehicle-grade Class A cells. Since we are still in the phase of market development while watching what kind of demand there is, what we seek is more of a trial-and-error style—acting first while anticipating some uncertainties. If we aim for perfect precision from the start, both size and costs go up, and it tends to become over-designed. In that regard, your proposal and responsiveness were a real help.

Yashiro Actually, it all began when we at Hitachi High-Tech provided the self-sustaining power system for mobile houses and unmanned mobile convenience stores introduced to Takenaka Corporation's construction site at the Expo 2025 Osaka, Kansai, Japan.

Inside the OFF-GRID FIELD headquarters utilizing mobile houses.
Comfortable office work is possible inside the air-conditioned vehicle

Horisato Regarding the introduction of mobile houses and trailers at the Expo 2025, we received a lot of positive feedback as a new kind of mobility that changes the image of conventional onsite offices. Additionally, through the mobile convenience store initiatives, we've discovered that there is high demand not only at construction sites but also in other fields. There are many other possibilities, such as providing public services as a mobile community center to communities lacking transportation infrastructure. On the other hand, I feel that more suggestions are still needed regarding operating costs, especially rental fees. We hope to take such feedback into account for future improvements and deployments.

Off-grid park concept that balances disaster preparedness and facilitating interaction

Hirosato When it comes to introducing mobile houses, I believe it is also important to consider their use in times of disaster. The off-grid mobile houses we are developing serve as temporary offices or rest areas at construction sites during normal times, but have the potential to be used as evacuation shelters or support hubs during disasters. Being able to secure electricity and communications even when lifelines are cut off is a major advantage.

Yashiro From the perspective of disaster response, standalone power supplies and portability are big advantages, but the Off-Grid Park concept that you are working on also

has an aspect as a community hub in addition to disaster preparedness, doesn't it?

Hirosato Currently, our company is developing rental and sales businesses for off-grid mobility, and the Off-Grid Park serves not only as a parking facility for rentals, but also as a demo site for companies wanting to test disaster countermeasures and off-grid technologies, as a place for students and local residents to experience and learn, and as a community space for everyday use. We hope to utilize it as an attractive space for people to gather and as a place to increase public awareness.

Yashiro The Off-grid Experience Park Odawara, scheduled to open in the Odawara Hayakawa area, will be a facility that embodies exactly that concept. We at Hitachi High-Tech are also beginning efforts to expand this Odawara model to underutilized lands and unused parks throughout Japan. As an independent area with infrastructure for electricity, water, and communications, we hope it can serve as a disaster prevention base, a place for community interaction and agricultural experiences, and a gathering place for children—expanding its potential as a multipurpose local asset.

Creating a sustainable future with partners who tackle social issues

Yashiro For Hitachi High-Tech, opportunities to collaborate with clients like you—who face social issues head-on and tackle them concretely with partners—are extremely valuable. We find great fulfillment not only in providing solutions but also in forming partnerships that can accompany clients from the initial stages of business concept development.

Hirosato Actually, we are now planning our "third vehicle" after the currently deployed mobile house and trailer house. Unlike traditional one-off production, we are aiming for future mass production, and we continue to receive support from Hitachi High-Tech—such as being introduced to production partners.

Yashiro Our company has a network of more than 3,000 clients in Japan and overseas. We hope to leverage this strength and continue collaborating with OFF-GRID FIELD.

Hirosato What I am aiming for is a community-building mobility company. Of course, our solutions help during disasters, but in usual times, I want to create sustainable, open community hubs where people gather and interact. Through our collaboration with Hitachi High-Tech, I hope to continue delivering such new value to society.

Off-grid mobile house. Even in locations without developed electric or communication infrastructure, independent power operation is possible through solar panels, storage batteries, and control devices, as well as satellite internet (Starlink).

Off-grid Experience Park Odawara conceptual image (Partial opening planned by the end of fiscal 2025, full opening in 2027). Developing as a field to raise awareness of off-grid mobility by deepening corporate and regional partnerships

Focus Area 1

Contributing to a Sustainable Global Environment

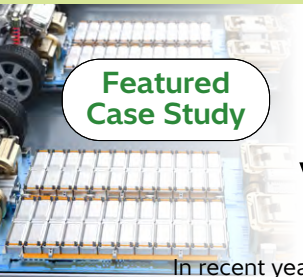
Decarbonization

Circular Economy

Nature Positive

Basic Ideas and Visions

Corporate management in harmony with the global environment plays an important role in the sustainable development of society and companies. In addition to reducing resource and energy consumption and environmental burdens associated with our business activities, Hitachi High-Tech Group aims to achieve sustainable consumption and production through the provision of environmentally conscious products and services and initiatives throughout the entire value chain.



Featured Case Study

Building a Circular Value Chain for LiB

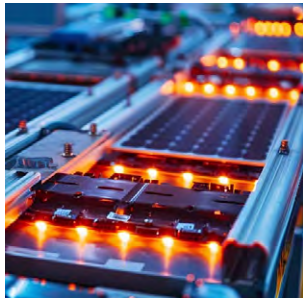
In recent years, the expansion of electric vehicles including commercial EVs is expected as initiatives to reduce CO_2 emissions for achieving a decarbonized society. However, LiBs (Lithium-ion Batteries) used in EV batteries contain rare metals such as lithium, nickel, and cobalt, raising concerns about supply shortages and price hikes. Even for electric vehicles, CO_2 emissions occur during the manufacturing and disposal processes. Therefore, to promote EV conversion, it is necessary to reduce CO_2 emissions throughout the lifecycle and to promote resource recycling.

Hitachi High-Tech is developing the LiB-LCM (lithium-ion battery lifecycle management) business, covering everything from LiB manufacturing and EV introduction & operation to the reuse and recycling of used LiBs deployed in EVs.

column

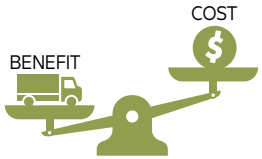
Supporting LiB manufacturing with advanced foreign particle detection technology

The key to safe and high-quality battery production is preventing foreign particle contamination. If foreign particles are mixed in, not only battery performance and safety but also yield can be affected. Therefore, it is important to introduce high-performance X-ray Particle Contaminant Analyzer to detect foreign particles at an early stage. Hitachi High-Tech's X-ray Particle Contaminant Analyzer can rapidly detect minute metallic contaminants as small as 20μm and identify their elemental composition. By supporting LiB manufacturing for the shift to EVs, we play a role in a sustainable future.



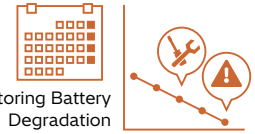
EV Introduction Support Solutions

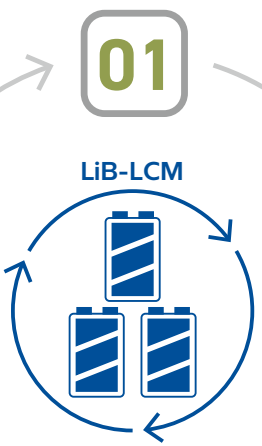
The main hurdles to EV adoption are the high vehicle and charger costs, and charging operations. This solution supports decision-making for EV adoption by visualizing the total cost-effectiveness, including not only the adoption costs for EV vehicles and charging equipment, but also electricity rates and maintenance costs during operation.



Battery Condition Management Solution

As EVs are used, battery capacity gradually decreases, making operational changes, battery replacements, and retirement decisions necessary. With this solution, we provide real-time battery status data, making it easier for customers to determine the necessary maintenance and residual value.





Manufacturing Equipment, Analysis, and Informatics Solutions

We provide LiB manufacturing equipment, X-ray Particle Contaminant Analyzer, high-resolution FEB measurement equipment, and also materials required for LiB production. By utilizing the data obtained from these, we support the automation and digitalization of LiB manufacturing and help improve performance and productivity.

Recycled Material Component Analysis

By utilizing the analytical systems and analyzers such as X-ray fluoresce analyzers, ICP emission spectrometry equipment, and high-resolution SEM solution analysis from the Hitachi High-Tech Group, we support recycling efficiency by analyzing elements, composition, and solutions in recycled materials.

Used LiB Reuse/ Recycling Solution

After automotive LiBs complete their service as EV batteries, their use in other applications is anticipated. We provide platforms that match users with retired batteries for EVs with companies that reuse or recycle those batteries, promoting effective resource utilization. Since batteries with clear usage history, condition, and contents can be supplied to the market, highly transparent transactions can be realized.

Power storage for hospitals and stores, power supply during disasters, etc.

Battery Cube

Featured Case Study
Providing comprehensive solutions through LiB-LCM, contributing to Circular Economy realization

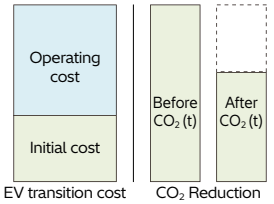
Creating Environmental value through LiB Business

Hitachi High-Tech aims to solve issues throughout the battery lifecycle by building LiB-LCM.
The five businesses work organically together to support the entire value chain.

01 EV Introduction Support Solutions

Visualization and Optimization of Lifetime Costs for EV Introduction and Operation

Since EVs are expensive in terms of vehicle price and chargers, initial introduction costs are higher compared to internal combustion engine vehicles, but fuel (electricity) and maintenance costs are lower. In response, we digitally support the visualization of the complex calculation of EV lifetime costs and formulation of optimal business plans.



02 Battery Condition Management Solution

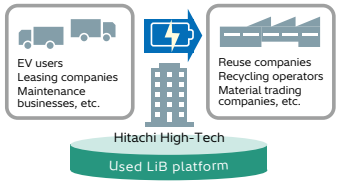
Optimizing operation and maintenance with remote degradation diagnosis service

If the degree of battery deterioration can be easily and instantly determined in real time, it is not only beneficial for operation and maintenance but also enables detailed planning for replacing EVs or batteries. Therefore, we are providing a service that remotely monitors the deterioration status of in-vehicle LiBs. This contributes to the efficient operation of EVs by fleet operators who manage many vehicles, as well as to the reduction of environmental burdens and other benefits.

03 Used LiB Reuse/Recycling Solution

Understanding issues in storage battery reuse/recycling to facilitate smooth secondary use

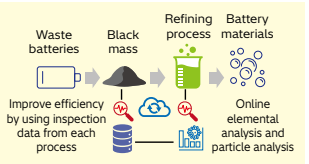
An example of destinations for battery reuse is businesses deploying stationary storage battery. However, in order to use used batteries as storage batteries, it is necessary to procure homogeneous types, structures, and conditions in bulk, but the difficulty of each business operator dealing with this individually is recognized as a problem. In addition, for recycling companies, process inefficiency can occur such as inspection time being prolonged if the content of discarded batteries is unknown. This solution aims to overcome these reuse/recycling challenges and build an environment where EV batteries can smoothly transition to secondary use.



04 Recycled Material Component Analysis

Supporting recycling process efficiency and achieving high profitability for the business

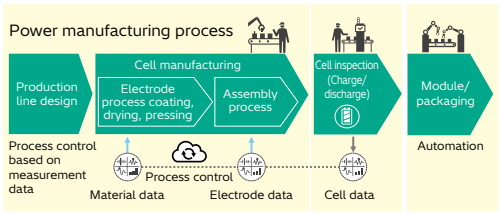
In the hydrometallurgical refining process, which extracts valuable metals such as nickel and cobalt from discarded LiBs, we propose "online monitoring" using spectrometers to grasp valuable metal concentrations in solutions in real time, thereby supporting recycling process efficiency. Furthermore, by combining "production volume prediction" that forecasts reaction conditions and proposes optimal control, we achieve high-efficiency recovery of valuable metals and contribute to high profitability in recycling business operations.



05 Manufacturing Equipment, Analysis, and Informatics Solutions

Supporting manufacturing processes by reducing disposal loss and enabling early mass production ramp-up

In LiB manufacturing, battery defects become apparent in downstream processes such as aging or charge/discharge testing, leading to increased man-hours for identifying the root cause and resulting in higher manufacturing costs. Therefore, by using electrode analysis technology for early detection of battery defects, we contribute to improving productivity by reducing defect rates and to minimizing battery disposal loss. Furthermore, by reflecting manufacturing process conditions and electrode analysis results in informatics, we enable the early ramp-up of mass production in new lines.



column

Solving resource depletion and procurement risk caused by increased LiB demand through MI

Amid accelerating digital transformation (DX), product and material development sites requiring decarbonization and resource conservation are increasingly seeking greater efficiency through data utilization. Among these, MI (Materials Informatics), which derives optimal materials or formulations from past research data, is drawing attention. In LiB manufacturing, addressing the procurement risks of rare resources due to surging demand is an urgent issue, and MI utilization is expected to lead to sustainable manufacturing.

Featured Case Study

Received the highest A score from CDP for "Climate Change" and "Water Security," and selected as a "Supplier Engagement Leader"

In FY2024, Hitachi High-Tech was selected as an "A List" company, receiving the highest rating in both the "Climate Change" and "Water Security" fields by the UK's CDP*1. CDP is an international evaluation body for environmental information disclosure that assesses and publishes companies' initiatives. Since Hitachi High-Tech began responding to CDP in 2010, it has promoted initiatives to realize decarbonization and a society in harmony with nature, resulting in receiving the highest rating simultaneously in three fields for the first time.

In the "Climate Change" field, Hitachi High-Tech received high marks for its efforts to reduce greenhouse gas emissions across the entire value chain. Moreover, in the area of "Water Security," information disclosure was highly rated as a highly transparent TNFD report that analyzes the relationship between business and the natural environment based on the recommendations of TNFD*2. Furthermore, excellent initiatives throughout the whole supply chain were recognized, and Hitachi High-Tech was also selected as a "Supplier Engagement Leader."

*1 Carbon Disclosure Project. An international non-governmental organization (NGO) established in the UK
*2 Taskforce on Nature-related Financial Disclosures

Hitachi High-Tech's initiatives for climate change

Newly achieved carbon neutrality at 1 site in Japan and 3 overseas Group companies

Kasado Area Site

In FY2024, newly, the Kasado Area and overseas Group companies—Hitachi High-Tech America, Inc., Hitachi Instrument Co., Ltd. (Suzhou), and Hitachi Instruments Co., Ltd. (Dalian)—achieved carbon neutrality. The new manufacturing building in the Kasado Area implements various environmental measures, including installing solar panels on the roof and adopting renewable energy.

By FY2024, there are seven domestic sites that have achieved carbon neutrality, including the Kasado Area. Hitachi High-Tech aims to achieve carbon neutrality at all domestic and overseas sites by FY2027.

Eco-design evaluations are conducted for all developed products to enhance the environmental value of products and services

Since FY2016, Hitachi High-Tech has implemented eco-design assessments for all newly developed products. Alongside environmentally conscious design complying with international standard IEC62430, we have identified 30 environmental impact items—including those affecting climate change—and are working to improve by evaluating the reduction of environmental burdens from multiple perspectives. Particularly, reduction of "CO_2 emissions during product use (Scope 3 Category 11)" also contributes to the reduction of customers' CO_2 emissions.

Eco-Design Example Ultrahigh-Resolution Schottky Scanning Electron Microscope SU3800SE/SU3900SE

Supporting the continuous reduction of environmental burdens with space- and energy-saving design

The SU3900/SU3800SE series are products that, as FE-SEM (Field Emission Scanning Electron Microscope), offer sufficiently high-resolution observation capability, allow data acquisition without restrictions on the size or weight of loaded samples, and are operable with ease.

Eco-Design Points

1. **Energy-saving of power consumption (rated)**
Equipped with the latest Schottky electron gun, high-resolution observation is possible even at low accelerating voltages, reducing power consumption (rated) by 50% (4.0kVA → 2.0kVA).
2. **Reduced footprint**
The footprint (installation area) is reduced by 13%, leading to improved air conditioning efficiency of the installation facility and to environmental value such as reduced building materials and energy.

Scope 3 Category 1*3 reduction focused, toward achieving net zero across the entire value chain

Hitachi Group's long-term environmental goal is to achieve "net zero" across the entire value chain by FY2050. Accordingly, Hitachi High-Tech is promoting the adoption of renewable energy and carbon offsets to achieve zero Scope 1 and 2 emissions at all sites by FY2027. In addition, we are addressing human rights, labor, and environmental issues throughout the supply chain via regular briefings to procurement partners. In particular, efforts to reduce Scope 3 Category 1 emissions are prioritized, working together with business partners.

*3 Emissions associated with purchased products and services

Partner Briefing (Naka Area)

Featured Case Study **Achieved CDP Score A in Two Areas: “Climate Change” and “Water Security”**

Hitachi High-Tech’s Initiatives for Water Security

Identified Two Priority Sites for Survey According to TNFD Recommendations: Fuji Oyama Works and Naka Area

Hitachi High-Tech discloses information based on the TNFD framework, evaluating which sites should be prioritized for environmental risk response in line with the TNFD definitions, from both “Area of Concern” and “Important Area” perspectives, and selects sites that score high in both as “Priority Areas.” As a result of the evaluation, Fuji Oyama Works and Naka Area were identified as priority sites for surveys.

Hitachi High-Tech Analysis Fuji Oyama Works (left) / Hitachi High-Tech Naka Area (right)

Hitachi High-Tech Analysis Fuji Oyama Works

Woodlands of Hitachi High-Tech Science Certified as a Natural Symbiosis Site and OECM

At the Fuji Oyama Works, most of the water used for operations is drawn from groundwater, and business activities are conducted with consideration for the local natural environment to maintain groundwater management. We have established the “Woodlands of Hitachi High-Tech Science” on site and are conducting conservation activities. Efforts such as tree planting using local native plants and eradication of invasive species were recognized in FY 2024 by the Ministry of the Environment, certifying it as a “Natural Symbiosis Site*1” and an “OECM*2”. Furthermore, in recognition of our distinguished efforts to improve the environment both inside and outside the factory, we received the Director-General of the Kanto Bureau of Economy, Trade and Industry Award at the FY2024 Excellent Greening Factory Award.

*1 A private conservation area certified by the Ministry of the Environment that contributes to the conservation of biodiversity. Introduced as part of the “30by30” goal, which aims to conserve and protect at least 30% of national terrestrial and marine areas by 2030

*2 Other Effective area-based Conservation Measures. A region contributing to biodiversity conservation outside protected areas

Visualizing contributions to reducing environmental burdens and estimating forest CO_2 absorption

At Hitachi High-Tech, we focus not just on environmental conservation activities, but also on quantifying and visualizing contributions to the reduction of environmental burdens to create new value in our environmental initiatives. In fiscal 2024, the amount of CO_2 absorbed in the “Woodlands of Hitachi High-Tech Science” was estimated as a pilot project. Photographs, laser measurements, and field surveys were conducted on the premises using drones.

This survey’s target area

On-site survey situation

Going forward, the Hitachi High-Tech Group will quantitatively manage value created through ecosystem protection, restoration, and regeneration, thereby contributing to realizing a substantive carbon-negative status, while systematically expanding our “value creation initiatives in environmental activities.”

Hitachi High-Tech, Naka Area

Ongoing forest cultivation in the “Hitachi High-Tech Yasato Forest” planted by employees, contributing to various environmental value including water resource conservation

Naka Area is the site with the highest water usage among the Hitachi High-Tech Group and implements various measures aimed at improving water resource use efficiency. As part of these efforts, we have leased a nearby national forest in Naka Area and are engaged in forest cultivation activities. The forest, named “Hitachi High-Tech Yasato Forest,” began in 2005 when Hitachi High-Tech employees and their families planted saplings, including Japanese cypress. The saplings, which were about 30 cm tall when planted, have now grown to over 10 meters in height. Forest cultivation brings many environmental value such as contribution to prevention of global warming, conservation of water resources, and maintenance of the ecosystem; ecological system. Hitachi High-Tech will continue maintaining and holding forests over the long term.

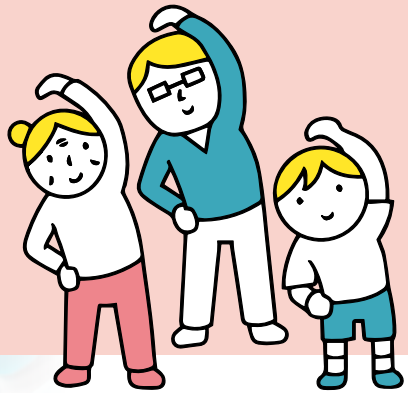
Focus Area 2

Contributing to Healthy, Safe, Secure Lives

Healthcare

Secure lives

Improving QoL



Basic Ideas and Visions

"Healthy, safe and secure lives" is a common desire for all people. By further mastering the "Observation, Measurement, and Analysis" (measurement and analysis technology) that we have cultivated up until now, the Hitachi High-Tech Group will contribute to a future where people can continue to live healthy and fulfilling lives, centered on three fields of medicine, water/food, and social infrastructure.

Featured Case Study

Towards creating "a society without fear of cancer"

Approximately 20 million people worldwide are newly diagnosed with cancer every year. Especially in Japan, where the population is aging rapidly, it is said that one in two people will be diagnosed with cancer at least once in their lifetime.
Hitachi High-Tech is contributing to the promotion of early diagnosis, personalized treatment, work-compatible treatment, and the achievement of both the healthcare quality improvement and cost reduction in cancer treatment, through the integration of cutting-edge analysis, automation and treatment technologies, and digitalization.

Healthcare Solutions from Hitachi High-Tech that comprehensively support "Testing-Treatment-Prognosis"

The basics of cancer treatment are said to be "testing and diagnosis – treatment – prognosis (follow-up)." Hitachi High-Tech provides products and solutions for each cancer treatment process, contributing to improved QoL for people through each offering.

First, "testing and diagnosis." Hitachi High-Tech offers world's top level of Clinical chemistry and immunoassay analyzers, capillary electrophoresis sequencers supporting genomic medicine, and other high-precision, high-sensitivity products that contribute to early cancer detection. In recent years, as population has been aging and the number of cancer patients have increased, the number of clinical tests for samples has also grown, and there is a greater need in clinical settings to handle more samples in limited time. Hitachi High-Tech's Clinical chemistry and immunoassay analyzers are characterized by high precision and sensitivity, contributing to improved testing efficiency and reduction of operator workload.

Next is "treatment." There are three standard treatments for cancer: "surgery," "chemotherapy (anticancer drugs)," and "radiation therapy." Hitachi High-Tech provides radiation therapy systems such as particle beam and X-ray systems. In this field, as the population ages and the number of cancer patients increases, there is a growing need for treatment methods that reduce the burden on the body. Hitachi High-Tech contributes to relieving the burden during the treatment period by providing radiation therapy that is low-exposure and minimally invasive.

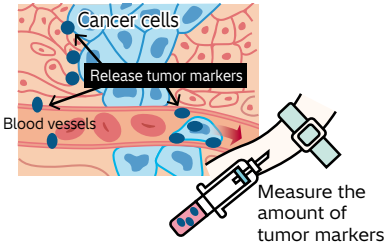
And then, "prognosis (follow-up)." After treatment, this process is considered important to evaluate the effectiveness of anticancer drugs and manage side effects to reduce the risk of recurrence or metastasis and improve survival rates. Hitachi High-Tech provides devices for monitoring blood drug concentrations—including anticancer agents—contributing to follow-up care as well.

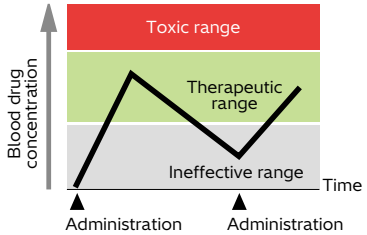
In recent years, we have also focused on the field of "personalized medicine," which aims to realize optimal healthcare for each individual by utilizing these technologies (see next page for details).
We are expanding solutions to realize "a society without fear of cancer".

Testing and Diagnosis
Blood tests, imaging tests, pathological tests, etc.

Treatment
Surgery, chemotherapy (anticancer drugs), radiation therapy

Prognosis (follow-up)
Assessing the effectiveness of anticancer drug treatment and managing side effects





Hitachi High-Tech Initiatives

Providing devices that measure tumor markers in patients' blood. Contributing to early detection of cancer and improved testing efficiency through high measurement accuracy and sensitivity.

Product Example: Clinical Analyzer 3500

Hitachi High-Tech Initiatives

Providing equipment and technology that concentrates radiation on cancer to destroy it. Contributing to reducing patients' burden through low-exposure, minimally invasive radiation therapy.

Product Example: Proton Therapy System PROBEAT-CR

Hitachi High-Tech Initiatives

Providing devices for monitoring blood drug concentrations, including anticancer agents. Aiming to expand the range of drugs that can be measured.

Product Example: LM1010 High Performance Liquid Chromatography

Featured Case Study
Towards creating “a society without fear of cancer”

“Human Genome Analysis Solution” enables treatment optimized for each individual

In recent years, in cancer care, “personalized medicine” —where genes and proteins are thoroughly examined for diagnosis and choosing treatment drugs, and treatments are tailored to each patient—has been spreading. We introduce Hitachi High-Tech’s “Human Genome Analysis Solution”—connecting early cancer detection and optimized treatment.

“Personalized Medicine” to enhance each individual’s QoL

Personalized medicine refers to healthcare where treatment is tailored to the individual, based on genetic analysis of the patient’s constitution and disease-related genes. In conventional medicine, patients diagnosed with the same disease have received the same treatments, but the effects and side effects can vary individually. Recent research has revealed that such individual differences are related to genes, and even for the same disease, there are several differences at the molecular level, including genes and proteins. Against this background, the concept of personalized medicine was born from the idea: “Can’t we provide treatment tailored to each patient?”

There are various advantages to personalized medicine. First, you can select treatments expected to be effective. By avoiding treatments unlikely to be effective, the risk of side effects can be reduced, enabling early return to social life.

There are also benefits in drug development. Even for diseases where clinical trials are difficult, grouping diseases with the same genetic characteristics can make such trials possible, allowing efficient development of new drugs.

What is “genome map analysis technology” that supports personalized medicine?

Recently, Hitachi High-Tech has been expanding its solutions that contribute to personalized medicine. One example is a solution that detects and analyzes genomic structural variations by combining the “OhmX” system developed by Nabsys 2.0 LLC in the U.S., which became a consolidated subsidiary in August 2024, and Hitachi High-Tech’s “Human Chromosome Explorer” software. The core technology here is the “genome map analysis technology,” collaboratively developed with Nabsys, Inc.

The human body consists of 37 trillion cells. One of the main components, protein, is produced according to genetic information. Genes are made of DNA, composed of sequences of four types: A, T, G, and C (Figure 1). This DNA sequence is called the “genome.” If the sequence differs from what it should be, the correct protein may not be produced, which can be the cause of disease. (Figure 2).

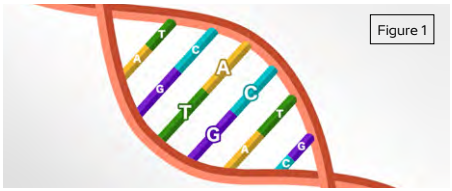


Figure 1

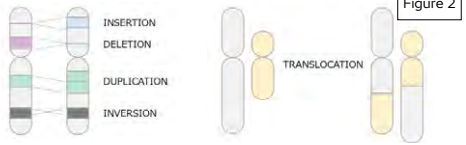


Figure 2

Technologies for checking DNA sequences include “DNA sequencers.” However, while it’s possible to see each A, T, G, and C in DNA, it has been difficult to comprehensively grasp information about the entire genome. With “genome map analysis technology,” this is now possible.

First, markers are attached to specific DNA sequences. When these pass through a microchannel, a potential difference occurs as the marked locations pass through, and this is detected as electrical signals (Figure 3). Then, a genome map is created based on these electrical signals. Using Hitachi High-Tech’s digital technology to analyze the genome map and comparing it with the standard genome, abnormalities in the genome can be detected (Figure 4). With this technology, it is now possible to quickly and accurately detect large-scale genome abnormalities that were previously difficult to identify.

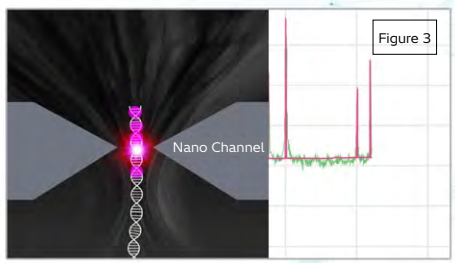


Figure 3

Figure 4

In recent years—when connections between cancer development and genome abnormalities are ever more evident—expectations are increasing for genome map analysis technology to help uncover new genome abnormalities for developing new diagnostic and therapeutic drugs. In October 2024, Hitachi High-Tech further accelerated developments by starting a contract analysis service business using genome map analysis technology in partnership with GeneBay Inc. Going forward, we will continue to contribute with digital technology and innovation to realize optimal healthcare services for each individual.

Featured Case Study

Supporting new ways of working in medical areas with the Clinical Analyzer LABOSPECT 006 α

Sasebo Kyosai Hospital has introduced two LABOSPECT 006 α units. They see the advantages of this two-unit system—when one requires maintenance, the other can be used, and both deliver the same analysis results.

In recent years, revisions to medical laws and ISO 15189 certification have expanded the work scope of medical laboratory scientists, and the need to reduce the workload of testing operations has increased.
The LABOSPECT 006 α was developed under the concept of supporting new ways of working in labs, and it has been recognized for contributing to reducing the workload of medical laboratory scientists, winning the Japan Power (Nippon Brand) Award at the 67th Top Ten New Products sponsored by Nikkan Kogyo Shimbun, Ltd.
This time, the engineer in charge of LABOSPECT 006 α interviewed two people at Sasebo Kyosai Hospital, where the analyzer is in use, about its effectiveness post-introduction.

"Just press the button and let it handle the rest"— further automation is the key to solving challenges

Standardizing maintenance was a challenge as operations increased

Takizawa In recent years the work scope of medical laboratory scientists has expanded, so could you please walk us through your daily work routine?

Inada Our laboratory is divided into two areas: specimen testing, which analyzes samples collected from patients, and physiological function tests, such as electrocardiograms and ultrasounds. Our team is responsible for the former. The daily workflow starts with quality control of our analytical systems, then analyzing each specimen from inpatients as they arrive, and providing results before outpatient services begin. Afterwards, as outpatients come in throughout the morning, we analyze more specimens and finally conduct another round of quality control to follow up with the next day—this is the main workflow.

However, in recent years, on top of the decreasing number of medical laboratory scientists, the Work Style Reform for Physicians, which began in April 2024, has advanced task shifting and sharing*1, resulting in expanded responsibilities such as attending various committees and preparing related materials.

Takizawa Among your daily tasks, are there any that you feel are particularly time-consuming or take extra effort?

Inada Quality control work and maintenance of our analytical systems. There are many steps—such as cleaning nozzles and setting detergents—and many require manual work, which took up a significant portion of our workload.

The biggest problem was that the maintenance tasks were not standardized. Some people would use one approach, while others did things differently, so maintenance procedures were not unified. This caused discrepancies in work and accuracy when we rotated tasks.

*1 Transferring and sharing tasks previously performed by doctors with other medical professionals, thereby reducing the doctors' workload.

Streamlining analysis operations also eases the psychological burden on medical laboratory scientists

Iwanaga The equipment we were using was more than ten years old, and I felt it was about time for an upgrade. At that time, I had the opportunity to meet a Hitachi High-Tech sales representative at a conference, and given that a new product had just been released, we decided to upgrade them.

The deciding factor was the ability to make our analytical work more efficient and standardized. As mentioned earlier, the roles differ from one laboratory to another. Lately, it's become

Featured Case Study

Supporting new ways of working in medical settings with the Clinical Analyzer LABOSPECT 006 α

common for a single medical laboratory scientist to cover the work of multiple labs. As a result, maintenance is increasingly handled by technologist who may not be very experienced. We really wanted to switch to a system that anyone could operate easily, and the LABOSPECT 006 α matched that requirement perfectly.

Takizawa After actually starting to use it, what benefits have you experienced?

Inada First, the ability to conduct analyses safely and accurately. The LABOSPECT 006 α is equipped with a reagent replacement scheduling function and an automatic detergent switching feature. Additionally, it automatically performs blank calibration*2 when the system is started up, enhancing safety and accuracy.

Especially with reagents, when usage was high, we sometimes had to stop the system suddenly to replace the reagents, causing problems for the lab technicians. Now that we can keep spare reagents ready, that has been eliminated, greatly reducing the mental workload for us as medical laboratory scientists.

Another helpful feature is being able to check the progress of maintenance tasks at a glance with a single button. Maintenance timing is also notified by alarms, so our original goal of anyone being able to easily operate the system has been achieved.

*2 Updating and adjusting the calibration curve used as a standard when measuring the concentration of substances in specimens.

From “easy for anyone to use” to “no need for human intervention”

Takizawa We developed the LABOSPECT 006 α with maximizing our customers’ operational efficiency as our top priority. We’re very pleased to hear that you’re actually seeing those benefits. As we work on future product development, we’d love to hear your thoughts if there are features you’d like to see or devices you feel are needed at your labs.

Inada As I mentioned earlier, staff shortages are increasingly becoming an issue, and the range of tasks handled by medical laboratory scientists continues to expand. Going forward, I feel that a generalist role—someone who can handle a wide range of tasks at a certain level—will be required more than a specialist focused solely on analytical operations. With that in mind, I think further automation—where the system handles some tasks at the push of a button—will be the key.

On a broader note, I ultimately think something like a smart lab would be the ideal. For example, a system that uses AI to propose optimal healthcare or the right maintenance and operation methods for each individual situation. If there were an environment where the latest technical information was automatically integrated and instantly shared with other systems or software, I think efficiency could be improved even further.

Iwanaga It's also about cost. Currently, every hospital is facing tough management circumstances—they are reducing the number of beds, yet labor costs are increasing. So not just hospital managers, but each of us as staff need to be cost-conscious in our daily work.

From a cost reduction perspective, minimizing equipment breakdowns is currently the most pressing requirement. If equipment stops, operations are delayed, inconveniencing doctors and patients, and additional costs are incurred. And as Inada mentioned, automation is key as well. As the responsibilities of medical laboratory scientists continue to expand, if we can leave certain tasks to the system and focus on patient care, it would help reduce both our workload and costs.

Takizawa I’m always aware that medical laboratory

scientists’ work is extremely demanding, and I genuinely want to support you in any way I can. As you mentioned earlier, I want to advance things to the point where all you have to do is push a button, and the rest is handled by the system. To achieve that, feedback from the users at labs is absolutely essential. Although our usual work is done at the factory, moving forward, we want to increase our direct contact with labs and listen carefully to the problems you are facing.

Clinical Laboratory Dept., Corporate Chief Engineer Furuya (second from the left) and the analysis team

"Photonic Integrated Circuit Engineering Services" that Contribute to Building the Next-Generation Digital Infrastructure

Promoting green data centers

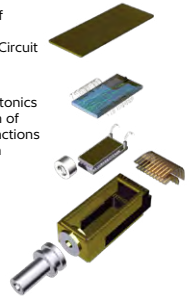
Recently, alongside the expansion of services utilizing generative AI and self-driving systems for automobiles, the volume of data transmission is rapidly increasing. In large-scale data centers, thousands of servers and network devices operate, consuming vast amounts of electricity, causing rising demands for environmental consideration such as carbon neutrality both in Japan and overseas. The focus is on photonic-electronic integrated technology, which integrates circuits handling electrical and optical signals to produce photonic integrated circuits (PIC). Since it enables faster and lower power communication compared to conventional electronic circuits, it contributes to reducing CO_2 emissions and is expected to be used in green data centers. With the spread of photonic-electronic integrated technology, high-performance data centers with about 40% less power consumption than current consumption are expected to be realized by 2030.

Development of next-generation high-speed, long-distance transmission photonic integrated circuits

Our Group company, VLC Photonics S.L., provides design services for photonic integrated circuits that contribute to high-speed, large-capacity transmission. We have established a system that can consistently handle everything from trial development to initial mass production, providing end-to-end engineering services for photonic integrated circuit development. Currently, we are mainly developing photonic integrated circuits to enable high-speed communication between data centers several tens of kilometers apart.

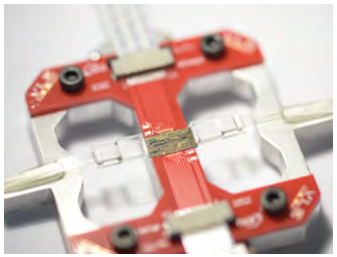
In addition, we are advancing technology development for photonic integrated circuits for high-speed modulation in anticipation of next-generation high-speed data centers in 2030. This technology contributes to promoting the "All-Photonics Network (APN)," which implements optics-based technology from networks to terminals, enabling a low-power, high-speed information transmission and information processing infrastructure. We are currently providing photonic integrated circuit engineering services and optical components for the development of APN under IOWN (Innovative Optical and Wireless Network)*. We will continue to promote expansion of photonic-electronic integrated applications and technology development to further accelerate the creation of new innovations.

* IOWN (Innovative Optical and Wireless Network): A new network concept announced by NTT in 2019. It consists of the "All-Photonics Network" featuring optics-based technology throughout, "Digital Twin Computing" for future prediction by combining the real world and digital world, and the "Cognitive Foundation" that connects and controls all things.



Structure of Photonic Integrated Circuit (PIC)

Silicon Photonics (Integration of Optical Functions on a Silicon Substrate)



Actual Photonic Integrated Circuit (PIC)

Optical Wafer Performance Testing

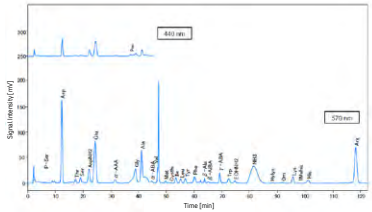
Analytical solutions by the Hitachi High-Tech Group for ensuring food safety and security

Issues related to food such as food shortages due to climate change and population growth, harmful substances contained or mixed in foods, and food fraud never end. Various analytical solutions by the Hitachi High-Tech Group are playing an active role in ensuring food safety and security.

Future Food Ingredient Development

The "high-speed amino acid analyzer," which quantitatively analyzes amino acids in samples for quality control of foods and pharmaceuticals, as well as for biochemistry research and contract analysis, can be used in the development of alternative meat—regarded as future food ingredients—and in evaluating the nutrition of edible insects.

Amino Acid Analyzer LA8080 AminoSAAYA



Measurement Example of Soy Meat (Biological Fluid Analysis Method)

Analysis of Harmful Substances

The "atomic absorption spectrophotometer," which quantitatively analyzes mainly metallic elements by utilizing the absorption of light by atoms, can detect lead contained in food additives. Additionally, "high-performance liquid chromatographs" can be used to analyze antibiotics added to animal feed and fungicides present in disposable wooden chopsticks.

Polarized Zeeman Atomic Absorption Spectrophotometer ZA4000

High-Performance Liquid Chromatograph Chromaster® PLUS

Identification of Food Ingredients

The "Fluorescence Spectrophotometer," which measures fluorescence emitted from a sample when irradiated with light, can be used to identify types of starch and determine the degradation of edible oils.

Fluorescence Spectrophotometer F-7100

Delivering Japanese Food Ingredients Worldwide While Maintaining Freshness Using Temperature-Sensing QR Code Labels

Development of the Cold Chain (Low-Temperature Distribution) as an Issue Amid the Japanese Food Boom

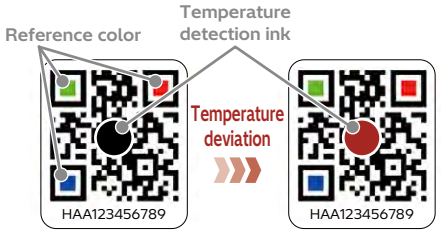
Currently, the popularity of Japanese food is increasing overseas, driven by growth in inbound tourism and the rise of Japanese culture. Exports of agricultural, forestry, fishery, and food products are trending upward, and reached a record high of ¥1,507.3 billion in 2024.

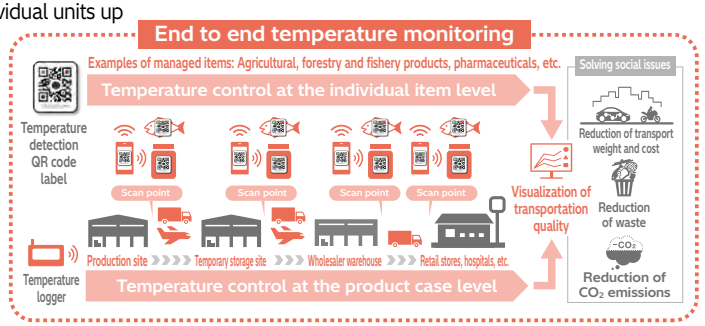
However, many agricultural, forestry, fishery, and food products require temperature control, and there has been uncertainty as to whether freshness and quality can be maintained when delivered overseas. As a result, there are concerns over increased costs due to excessive packaging and loss of brand value due to quality decline, making the development of a cold chain (low-temperature distribution) that ensures safety and quality an urgent issue. Furthermore, the food distribution supply chain must also address environmental issues such as the disposal of plastics and reduction of CO_2 emissions.

Proper temperature control throughout the entire supply chain is possible

To address these issues, our Group companies—Hitachi High-Tech Nexus, Hitachi, Ltd., and Hitachi Solutions—developed the temperature management service "MiWAKERU®" as a team. The key point lies in the QR code label that can be directly attached to products. Special ink that changes color with temperature is used, so if the product deviates the controlled temperature range, the color of the ink in the center changes. In addition, when read with a smartphone, management information such as scan time, product ID, and temperature deviation details is automatically recorded and can be shared on a server. This allows easy confirmation, for each individual item, that the temperature has been properly maintained from production through sales and consumption.

Furthermore, wide-ranging temperature monitoring from individual units up to product cases enables visualization of current transportation quality from shipping points to destinations, making it possible to reduce transportation costs, waste, and CO_2 emissions.





* QR Code is a registered trademark of Denso Corporation.

Reducing transport costs for aquaculture amberjacks and CO_2 emissions

In July 2024, Hitachi High-Tech Nexus signed a collaboration agreement utilizing "MiWAKERU®" to expand sales channels for Kagoshima Prefecture products—including seafood—by maintaining freshness and increasing added value. End-to-end temperature monitoring was conducted for aquaculture amberjacks produced in Kagoshima Prefecture until its arrival at restaurants in Singapore. As a result of the monitoring, we made the "visualization of freshness" of amberjacks possible, realized safe and secure transportation quality, and contributed to a 10% reduction in transportation costs and an 11% reduction in CO_2 emissions by reducing the number of excess refrigerants used.

Temperature control is not limited to agricultural, forestry, and fishery products. By leveraging the features of "MiWAKERU®," Hitachi High-Tech aims to support temperature management in a wide variety of fields including pharmaceuticals, chemicals, and processed foods.

Best Four winner in the private and group division of the "Digi-Den Koshien" organized by the Cabinet Secretariat

In March 2025, the "End-to-End temperature monitoring of aquaculture amberjacks until its arrival at restaurants in Singapore," jointly conducted by Hitachi High-Tech Nexus and Kagoshima Prefecture, won a place among the Best Four in the private and group division of the "Digi-Den Koshien" contest hosted by the Cabinet Secretariat. This recognition was based on the reductions in transportation costs and CO_2 emissions achieved in the amberjack transport example introduced above.

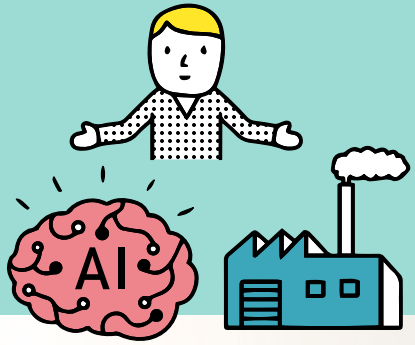
In April 2025, the effectiveness of "MiWAKERU®" was further validated externally when it received the Special Jury Prize at the 54th Japan Industrial Technology Awards organized by Nikkan Kogyo Shimbun.

Focus Area 3

Contributing to the Sustained Development of Science and Industry

Development of science and industry

Creating future human assets



Basic Ideas and Visions

To develop science and industry, advanced technology that supports them is essential. The Hitachi High-Tech Group supports the improvement of R&D and production sites productivity, as well as higher product quality by fully utilizing and advancing our "measurement and analysis technology", "automation and control technology", "manufacturing capabilities", thereby contributing to the sustainable development of science and industry. In addition, we help develop the next generation by carrying out social contribution activities utilizing our products.

Featured Case Study

Informatics solutions accelerating materials research, development, and manufacturing

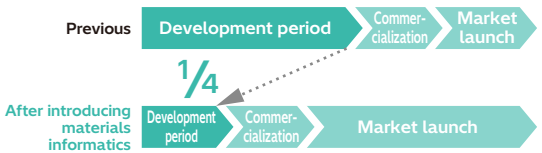
"Informatics solutions" are gaining attention as approaches to solve various challenges in manufacturing. We explore the value and strengths provided by Hitachi High-Tech's informatics business, including materials informatics (MI)!

Materials development transformed by digital and data

In research and development for manufacturing industries—including materials development—there are challenges such as "enormous experimental and labor costs and time required" and "knowledge and know-how from experiments becoming individualized and resulting in low reproducibility." Additionally, in recent years, there has been a greater demand for advanced materials development and environmentally conscious new products that not only deliver product performance but also contribute to solving global issues such as climate change, loss of biodiversity, increasing waste, and resource shortages.

Driving digital transformation (DX) in research and development, and informatics solutions exemplified by "MI," are expected as ways to break through this situation. Informatics refers to the domain of technologies related to information science as a whole. MI, a field within informatics, leverages massive experimental and materials data, and AI-driven machine learning, and employs information science and computational science methods to streamline materials development.

Examples of the effect of introducing materials informatics



Solving challenges through our informatics business

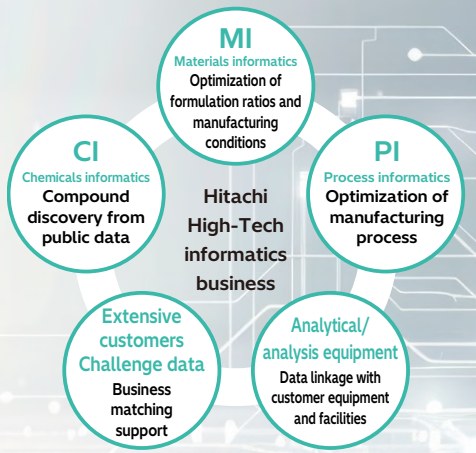
Hitachi High-Tech is contributing to solving issues in diverse fields such as chemicals, fuel cells, semiconductors, and drug discovery through informatics.

Until now, the standard practice in material searches has been for researchers to select and design compounds based on their knowledge and experience, then repeat syntheses and characterize their properties. However, by leveraging MI, which allows AI to learn from past experimental and materials data, candidates for the next round of experiments can now be calculated and presented. In addition to aiming to reduce the amount of time spent exploring material mixing ratios and manufacturing conditions or experimental costs, decreasing the number of experiments also helps reduce CO_2 emissions and other environmental burdens. Furthermore, through data analysis, it becomes possible to visualize the factors that contribute to specific properties, making the knowledge that has traditionally been individualized in materials development visible. By shifting to data-driven development, we are also working to resolve challenges such as low reproducibility and talent shortages.

Hitachi High-Tech's informatics solutions are not limited to MI. We also provide total solutions such as "Process Informatics (PI)," which applies informatics in the materials manufacturing process and reduce time and costs by studying experimental and prototyping conditions through data-driven method, and the proprietary Hitachi High-Tech cloud service "Chemicals Informatics (CI)," which searches for high-quality patent documents and compounds from vast open data to support strategic R&D.

Hitachi High-Tech's strengths in the informatics business

At Hitachi High-Tech, alongside these three informatics solutions, we also offer business matching support utilizing insights and an abundance of customer challenge data cultivated as a specialized trading company in the industrial sector. In addition, as core products of Hitachi High-Tech, we offer seamless data integration through analytical and measurement instruments, which form the basis of informatics, providing optimal solutions for all issues arising in DX. The strength of Hitachi High-Tech lies in a business structure that, through diverse talent and a broad array of services, can flexibly and comprehensively address customer demands.



Example of effects of utilizing chemicals informatics

An example of searching for additives that improve both the strength of biodegradable resin (polylactic acid resin) and the biodegradation rate

Development period

36 months » 2 months Time to Market!

Shortened by 34 months!

Development cost

¥93 million » ¥4 million

Labor costs + Experiment costs

Approx. ¥89 million reduction!

By reducing the number of experiments

CO_2 emissions

56% reduction!

Implementation Case Study
Informatics solutions accelerating R&D DX

TOMOEGAWA CORPORATION

Utilizing MI technology for human resource development aimed at product design optimization

TOMOEGAWA CORPORATION, a leading company covering businesses such as toner and semiconductor/display-related fields, has adopted our SaaS-based MI tools and analytical support services by data scientists to optimize manufacturing and development.

The company faced the issue that it took time to train development engineers for optimizing raw materials and manufacturing conditions in product design.

Hitachi High-Tech addressed TOMOEGAWA CORPORATION's challenges by enabling smooth implementation through not only providing MI tools but also offering analytical support (consulting) by data scientists. First, engineers with little product design experience were tasked with analytical work using the MI tools.

As a result, while it would normally take two to three years to train engineers, utilization of the MI tools enabled them to reach the same level of insights as veteran engineers in just about three months. Furthermore, we received high praise for deepening MI knowledge through ongoing support after MI tool introduction, which provided assistance on how to use MI and approach data. Even when the personnel who became capable of utilizing MI were reassigned, ongoing support ensured they smoothly continued to use the system without stumbling.

Comments from the user

Kento Sugiura
TOMOEGAWA CORPORATION
iCas Company
R.&D. Division Technical R&D Laboratory

Achieving results in development of unexperienced areas!

I was tasked with developing a new product in a field I had never worked with before, utilizing MI. I'd heard the term MI but didn't know details, vaguely thinking "I probably need to collect data." However, as development progressed, Hitachi High-Tech's data scientists taught me about organizing the data and how to set up the MI tool, which gradually led to satisfactory data results. By using MI, I realized I could produce results with no discrepancy from the "correctness" pointed out by veteran developers.

news & topics

The compound discovery support service "Chemicals Informatics" received the 2024 JSMS Award for Technical Developments, Japan

The technology for material exploration using "Chemicals Informatics (CI)" based on publicly available data was awarded the "2024 JSMS Award for Technical Developments, Japan" by the Society of Materials Science, Japan. This award is presented to individuals or organizations who have made outstanding technological contributions in the field of materials science and engineering. Hitachi High-Tech's "CI" was recognized as effective and beneficial for operational efficiency in organic and inorganic material exploration.

Hitachi High-Tech and Institute of Science Tokyo start research on PFAS detection

Hitachi High-Tech started joint research with National University Corporation Institute of Science Tokyo on PFAS (organic fluorinated compounds) detection using "CI." This research examines a method for simple and rapid detection of PFAS, which may affect human health. Combining Institute of Science Tokyo's peptide-based synthetic polymer detection and identification technology with Hitachi High-Tech's CI, the goal is the efficient search and generation of peptides useful for PFAS detection.

What is PFAS?
PFAS have properties such as heat resistance, water resistance, and oil resistance, and are widely used in a range of products including everyday goods and industrial supplies. On the other hand, because they are difficult to decompose, PFAS accumulate in seawater and soil even after disposal, raising concerns about contamination of tap water. Moreover, consuming contaminated tap water causes PFAS to accumulate in the body as they are not decomposed, raising concerns over long-term health effects. However, current PFAS detection methods are complex and time-consuming, making the streamlining of detection operations an issue.

Data platform that enables highly efficient semiconductor production

Digital-centric solutions to challenges at manufacturing sites

Semiconductors are essential to our increasingly digitized lives, from smartphones and PCs to home appliances, automobiles, and communications. In recent years, in addition to demand for more advanced semiconductor manufacturing, there has been increased demand for greater development efficiency and cost reduction, forcing the manufacturing field to address a variety of challenges.

Hitachi High-Tech develops and provides digital solutions to improve customer productivity by leveraging data to "Processing, Observation, Measurement, Analysis" obtained through products such as wafer processing equipment, CD-SEM using electron beam technology, and wafer inspection equipment using optical technology. We help solve challenges in customers' semiconductor manufacturing processes and support the creation of new value.

Aiming to shorten development periods as well as prototyping and mass production periods

By utilizing the data platform, we aim to shorten the development period by about 50% and the prototyping and mass production period by about 80% compared to conventional methods. We are working on leveraging generative AI to cope with the increasing amount of data each year, optimizing platform architecture, and developing solutions to automate workflows. Going forward, we plan to advance verifications and improvements at co-creation sites, solve issues on customers' development and mass production lines, and promote the introduction of solutions that provide continuous value.

In the future, we will also collaborate with various manufacturing, metrology, and inspection equipment owned by our customers and aim to establish a digital service ecosystem covering the entire semiconductor manufacturing workflow, including processing, inspection, measurement, and analysis. Furthermore, these efforts will promote sustainable semiconductor production, reduction of environmental burdens, and the construction of secure networks.

Becoming a partner who works closely with customers to improve productivity

Currently, co-creation sites with customers are operating in three key world semiconductor production regions: the US, Taiwan, and South Korea. Establishing co-creation sites near customers not only enables speedy problem-solving and value delivery, but also reduces transportation and movement for development and evaluation, achieving lower energy consumption and CO_2 emissions. By leveraging Hitachi High-Tech's data platform to create Lumada* solutions that generate customer value, we support technological innovation and contribute to solving technical and management challenges of customers.

* A collective term for solutions, services, and technologies utilizing cutting-edge digital technologies to generate value from customer data and accelerate digital innovation

Overseas customer co-creation sites. From left: Portland in North America, Taiwan, South Korea

The new manufacturing building in the Kasado area will start operation from FY2025 and become a carbon neutral factory with the introduction of solar power generation systems and other technologies.

To enhance the production capacity of etch system in the semiconductor manufacturing equipment business, a new manufacturing building was built in the Kasado area, Kudamatsu City, Yamaguchi Prefecture. Production started there in FY2025. In the new manufacturing building, digitalization and automation of the production lines are being promoted to respond to the expansion of demand in the semiconductor-related market.

Hitachi High-Tech has set the goal of achieving carbon neutrality at all business sites by FY2027. In the new manufacturing building, we are also working further on energy-saving efforts, such as the introduction of renewable energy, proactive adoption of solar power generation systems and power monitoring systems. Taking the launch of the new manufacturing building in the Kasado area as an opportunity, we will continue to support our customers' remarkable progress and growth.

From National Institute of Technology (KOSEN)! Society 5.0-Type Future Technology Human Resources Development Project — Support Activities in the Semiconductor Field

The National Institute of Technology is promoting the "Society 5.0-Type Future Technology Human Resources" development project to foster future technology leaders who realize Society 5.0*. Hitachi High-Tech supports this development project and conducts outreach classes and factory tours under "COMPASS 5.0 Semiconductor Field," one of the component projects. In FY2024, we conducted outreach classes at National Institute of Technology (KOSEN), Maizuru College (Kyoto), accepted corporate visits from three colleges in Hokkaido, gave outreach classes at National Institute of Technology, Asahikawa College, and held factory tours for National Institute of Technology, Kisarazu College (Chiba), among many other activities.

In January 2025, two field engineers from Hitachi High-Tech gave practical classes based on on-the-job experience in the general elective subject "Introduction to Semiconductors" for 4th and 5th year students at Asahikawa College. The classes covered topics such as semiconductor microfabrication technology and the application of electron beam inspection and metrology equipment.

Employees of Hitachi High-Tech with students from Asahikawa College, Tomakomai College, and Kushiro College who visited for corporate tours

* A concept for a future society advocated by the Cabinet Office. "A human-centered society that balances economic development and the resolution of social issues through a highly integrated system merging cyber and physical spaces."

Sowing Seeds of Curiosity for the Future of Science — Science Education Support

Hitachi High-Tech conducts science education support activities for children and students utilizing in-house products such as tabletop electron microscopes, aiming to contribute to fostering science-oriented human resources. Currently, we provide a variety of science education opportunities to over 50,000 children around the world every year. Every year, schools that borrow electron microscopes receive high recognition for their research. In FY2024, Otusma Ranzan Senior High School's "Year-Round Observation of Pollen Loads of Western Honeybees," which participated in the "1st Junior and Senior High School Student Poster Presentation" hosted by the Japanese Society of Microscopy, won the Grand Prize.

We are also promoting global activities through our local subsidiaries. Hitachi High-Tech America, Inc. and Hitachi High-Tech (Singapore) Pte. Ltd. jointly lent an Electron Microscope to a museum in Singapore, and in 2024 provided many fascinating programs, including those on marine ecology and natural history. Hitachi High-Tech will continue to promote unique science education support activities for children and society in the future.

Electron Microscope lent to the Lee Kong Chian Natural History Museum in Singapore

Sponsoring "RoboCon 2025" — Supporting the Nurturing of Budding Engineers

RoboCon: A contest of technical skill and creativity

From FY2025, Hitachi High-Tech will sponsor the "NHK Student RoboCon — ABU Asia-Pacific RoboCon Japan Representative Selection" and "ABU Asia-Pacific Robot Contest."

We will also provide special cooperation to the College of Technology RoboCon. RoboCon is a contest in which students create robots according to given competition tasks and compete in technical skill and creativity. The winning team of the "NHK Student RoboCon" was granted the right to participate in the "ABU RoboCon" (Mongolia) held in August 2025.

The Kyoto University received the "Hitachi High-Tech Special Award"

At "NHK Student RoboCon 2025," the Kyoto University Mechanical Engineering Society received the "Hitachi High-Tech Special Award," a special prize from sponsor companies. The team was recognized for equipping its robot with a unique cargo bed and a superb dribbling mechanism.

Kyoto University Mechanical Engineering Society, winner of the "Hitachi High-Tech Special Award"

Hitachi High-Tech Sponsorship Message

With "Passion drives you" as the slogan, supporting each and every individual's step toward challenge

Within the students taking on the challenge of RoboCon resides the very passion that forms the starting point for the Power of Knowledge — the corporate vision of Hitachi High-Tech, "Changing the World and Future with the Power of Knowledge." The experience gained by learning, testing, and refining technology will ultimately become a great force that changes society. The "You" in the sponsorship slogan "Passion Moves You" refers to three things: "the participating students themselves," "the robots they create," and "spectators and stakeholders." We believe that passion leads to the Power of Knowledge, which changes the world.

Focus Area 4

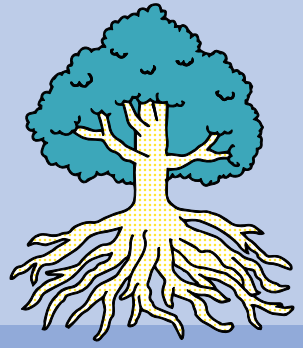
Establishing a Sound Management Foundation

Governance

Digital platform

Creating innovation

Human rights



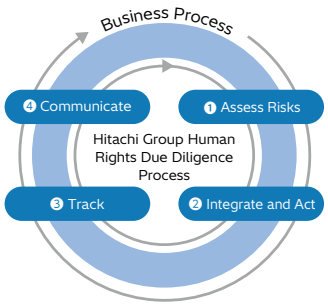
Basic Ideas and Visions

Establishing a sound management foundation is essential for the sustainable growth of a company. In order to increase corporate value over the long-term, Hitachi High-Tech Group will strive to improve the effectiveness of corporate governance and aim to be a company that is trusted and needed by society.

Human rights due diligence to fulfill the responsibility of respecting human rights throughout the entire value chain

Hitachi High-Tech pledges to fulfill its responsibility to respect human rights by conducting human rights due diligence, based on the United Nations' "Guiding Principles on Business and Human Rights." In promoting human rights due diligence, we recognize the importance of understanding the impact of our business activities on human rights, implementing measures to prevent or mitigate risks, and continually monitoring and improving their effectiveness. Accordingly, we regularly identify compliance risks and also investigate issues related to human rights and labor. In the event that a problem arises, a temporary meeting is convened to deliberate on fact-finding, root cause investigation, corrective measures, and recurrence prevention, among other responses.

HRDD Process



Revision of the "Hitachi High-Tech Group Human Rights Policy"

To strengthen efforts to respect human rights, which are essential in conducting global business activities, we revised the "Hitachi High-Tech Group Human Rights Policy" in May 2025. We recognize that "respect for human rights" is the foundation for building trust with our stakeholders worldwide and must be upheld in order to achieve sustainable growth.

topic

Awarded "Gold" placing in the top 5% in sustainability evaluation by EcoVadis

In the sustainability evaluation by EcoVadis, an international rating organization headquartered in France, we ranked in the top 5% of companies assessed and, for the first time as Hitachi High-Tech, received a "Gold" rating. Our efforts toward realizing sustainability throughout the entire value chain—including greenhouse gas emissions reduction, initiatives for labor and human rights, and adherence to corporate ethics, ensuring responsible business activities towards local communities and the global environment—were highly rated.

GOLD | Top 5%
ecovadis
Sustainability Rating
JAN 2025

Committee established to promote the use of Gen AI, aiming to improve productivity

In FY2024, a committee was established to promote the use of Gen AI, aiming at improving operational efficiency and work style reform. In this committee, we prepared guidelines for use, launched a portal site for information sharing, and conducted training for workplace representatives selected from each department to lead the promotion of generative AI. Going forward, while developing the usage environment and ensuring security, we will continue to advance the use of generative AI for various purposes, such as improving productivity and creating new business services.

Intellectual property strategy that supports business expansion and creation

At Hitachi High-Tech, our activities are not limited to traditional measures such as protecting created intellectual property or avoiding intellectual property risks; we also analyze IP information to support business expansion and the creation of new businesses. For example, the IP Division conducts initiatives such as promoting intellectual property education for employees and establishing systems for inventor rewards and intellectual property rights commendation, aiming to stimulate employee activities for IP creation. In addition, we are actively working to create solutions across departments, such as providing venues for discussions among engineers from different design divisions and opportunities where sales, marketing, and design divisions can hold discussions unconstrained by existing products or system structures.

Providing opportunities for discussion across departments

Focus Area 5

Developing and Utilizing Diverse Human Resources

Human resource development

Workplace environment

Diverse Perspectives

Basic Ideas and Visions

It will be crucial to continuously provide creative and innovative values to customers and society in order to succeed against competitions in the global market while realizing sustainable growth. Hitachi High-Tech Group recognizes human resources responsible for providing value as one of the most invaluable management resources, and aims to foster reform-minded human resources who are able to create continuous innovation.

Featured Case Study

Raise value for each person through human capital investment

The Hitachi High-Tech Group regards people themselves as one of the assets of a company and we believe that improving the value of each and every individual as a human resource leads directly to sustainable value creation throughout the Group. Based on this view, we will continue to provide career development support that emphasizes employees' individual values, job satisfaction, and their personal meaning of work. We will also accelerate the development of human resources who can respond to business from a global perspective, and human resources who can demonstrate the highest level of skills in manufacturing. In addition, we will continue to cultivate personnel who can make full use of digital technology, for which there is a growing need. We also strive to foster a corporate culture in which all employees can demonstrate their abilities and creativity to the greatest degree possible.

Cultivating Personnel with a Global Outlook

To accelerate the early development of human resources capable of handling business from a global perspective, we actively promote overseas assignments for young employees. We conduct overseas training using one-year overseas training programs and company-sponsored study abroad programs, and have established common foundational education for national staff working at overseas bases, further enhancing efforts to develop global human resources.

A chance to revisit the basics of sales and broaden perspectives

Ms. Hashimoto

profile

Hitachi High-Tech Analysis, East Japan Sales Department.
Underwent training for one month from November 2024 at Hitachi High-Tech IPC (Malaysia) Sdn.Bhd.

Since joining the company, I had continued doing the same work in domestic sales, so I participated in overseas training because I started to wonder, “Is it okay to continue as is?” Locally, I was in charge of product training sessions for members of Hitachi High-Tech Malaysia and user support for X-ray fluoresce analyzers and X-ray fluorescence film thickness gauges. Through the experience of explaining to overseas customers, I was able to reaffirm that the fundamentals of sales are the same, and that building experience in domestic sales is important. Additionally, through training at a company with a trading division, I believe I was able to gain a broader perspective that connects to overall business transactions for the entire division.

With the members of the Kuala Lumpur office at the welcome party

Participating in product use scenes led to a deeper understanding of customers

Ms. Nakai

profile

Hitachi High-Tech, Medical Systems Design 3rd Dept.
Underwent training for 10 months from April 2024 at Roche Diagnostics GmbH(Roche) in Germany.

The reason I participated in overseas training was because I became interested in Europe through interactions with our partner companies in various European countries. In Japan, opportunities to see how products I was involved with were actually used were limited, but being able to witness real usage scenarios and hear customer feedback firsthand made me truly glad.
Through the training, I was able to understand how our partner Roche installs our products at customer sites, so I want to compile these findings and make use of them in future work.

With the members of the Mannheim office

Developing and Utilizing Diverse Human Resources

Featured Case Study

Raise value for each person through human capital investment

Cultivating Skilled Manufacturing Personnel

At Hitachi High-Tech, we actively foster skilled workers, and as a part of this, we have long participated in the National Skills Competition and the National Competition for People with Disabilities (National Abilympics) held annually. Over the years, including international competitions, we have produced many medalists.

Why has the Company continued these initiatives? Our high-tech products, such as semiconductor inspection equipment and analytical systems, are supported by the constant development of cutting-edge technology and the highest level of skill to turn it into products. Each skilled worker is responsible for this, and it is essential to foster and pass down skills to the next generation who will carry "world-class manufacturing."

Therefore, while the competition results are of course important, we place just as much value on the "process of taking on challenges" and "what happens to participants afterwards." To compete in the National Skills Competition, participants train over two to three years, honing not only their skills but also their independence and sense of responsibility—qualities that shape character. We believe that improving individual skills in this way contributes to strengthening Hitachi High-Tech's overall technical and organizational capabilities.

In FY2024, Tazawa represented Hitachi High-Tech and Japan at the 47th World Skills Competition (France), winning a silver medal in the CNC Turning category. Also, at the 62nd National Skills Competition (Aichi Prefecture), eight participants competed in four categories. In the "Mechatronics" category, a silver medal was won, and in the "Milling" category, the Effort Award was received. Furthermore, at the simultaneously held 44th National Competition for People with Disabilities (National Abilympics), two participants competed in two events, with a silver medal won in the "Database" event. We will continue pursuing "world-class manufacturing" and devote ourselves to nurturing young skilled workers and passing down skills.

Mr. Tazawa

profile

Manufacturing & Technology Business Group
Naka Manufacturing Division
Naka Manufacturing Department

I have some regret, but I am happy I was able to compete on the world stage and experience it firsthand.

Of all four silver medal winners, I achieved the highest score, just one step away from gold. Because I worked hard aiming to be the best in the world, I honestly feel "regret." However, having reached a technical level where I can compete globally as a result of rigorous training is my greatest joy. Going forward, as an instructor, I will quickly find the best teaching methods for each individual and utilize my skills and experience to nurture competitors.

Career development support

Hitachi High-Tech provides career development support that emphasizes the meaning, significance, and values of work for each employee. Specifically, we offer career development training by age group, counseling by career counselors, and individual career consultations at the in-house Career Consultation Office. Additionally, we have introduced systems for short working hours for career development approved by the Company, as well as leave systems for study abroad, self-development, and volunteering.

The Company's characteristic is having a support system for independent career development. Based on the idea that "Only you can chart your career," we aim to create a "win-win" relationship where both organization and individuals achieve growth together.

1on1

Communication that involves regular dialogues between supervisors and subordinates. Subordinates consider their desired future selves (Will), share this with their supervisors, and receive support. Supervisors create an environment where subordinates can thrive and encourage their career autonomy.

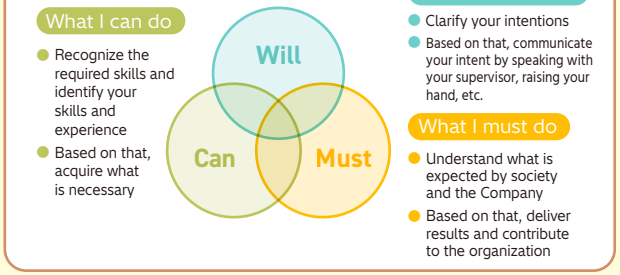
Examples of 1-on-1 topics

The important thing is to properly resolve what you are currently concerned about.

Will-Can-Must Interview

To strengthen actions for autonomous career formation, we promote dialogue between supervisors and subordinates. During the annual (standard period: June) Will-Can-Must interview, discussions are held on "work you want to do" and "skills/experience you want to enhance."

The Will-Can-Must framework



Career Consultation Office

The Company has established a Career Consultation Office for employees. Career consultants respond to the concerns of employees who encounter difficulties at work or in the workplace, or who wish to build a more fulfilling career. Reported effects of career consultation include "clarification of issues," "broader perspectives," and "clearer goals."

Focus Area 5

Developing and Utilizing Diverse Human Resources

Promoting Gender Inclusion and Opportunity

From the perspective of gender inclusion, we train female leaders, raise awareness among management, promote efficient working styles, and establish work-life balance support systems, striving to create an environment where more women can fully demonstrate their abilities.

Female manager network

In August 2024, the Women's Leadership Network was launched. Volunteer members organize and manage learning opportunities for women's careers and forums for dialogue aimed at creating workplaces where diversity can thrive. We hold networking and study sessions and other activities.

Mentoring program for women

This is a program in which mentees (junior employees) receive practical advice and feedback, and networking opportunities, through dialogue with mentors (senior female managers from other departments). Surveys of participants have shown there has been a positive change in how they view their careers.

Accessibility – Disability and Neuro-Inclusion

We work to deepen understanding of people with disabilities and neurodiversity, establish support systems, raise awareness, and foster an inclusive culture.

Promoting recruitment of neurodiversity human resources

Neurodiversity (neurological diversity) is a concept created from the combination of the words "Neuro" (brain, nerve) and "Diversity", and refers to the idea of respecting and valuing differences in individual characteristics arising from the brain and nerves as diversity, and seeking to utilize these differences within society. Traditionally, job postings in Japan have only offered two options: general employment, or employment for people who disclose that they possess a Mental Disability Welfare Certificate. There were no job postings that met the needs of job seekers who, while not holding a welfare certificate, are aware of certain characteristics they possess, wish to disclose them, and seek employment with support. At Hitachi High-Tech, we have been actively promoting the recruitment of neurodiversity human resources since FY2023.

Cultural and Geographic Inclusion

We are working to create systems and frameworks that empower everyone, regardless of nationality, ethnicity, or region.

Cultural Understanding Day

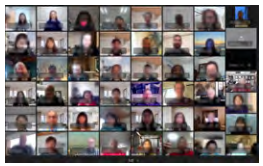
In October 2024, employees of the Hitachi High-Tech Group held the first collaborative event with the SEAI region (Southeast Asia and India) titled "Cultural Understanding Day," aimed at fostering connections among employees and deepening cross-cultural understanding. On the day, 140 people participated, including both locally and online attendees. Speakers from six Group companies across seven countries presented quizzes about each country's culture, deepening cross-cultural understanding.

Collaboration Across Generations

We support the success and contributions of all generations through collaboration and mentoring.

5th Diversity Global Event

In February 2024, we held the 5th Diversity Global Event. The theme was "Power of Multigeneration." This event allowed participants to become aware of generational stereotypes and their own unconscious biases, and learn a mindset for generating innovation while respecting each individual's uniqueness. It also provided an opportunity for communication among employees.



Respect for Individual Identity and Uniqueness – LGBTQIA+

We are working to create an inclusive workplace environment that respects each individual's uniqueness and differences, where everyone can fully express themselves and thrive without being subjected to discrimination.

Efforts to promote understanding of LGBTQIA+

We are raising employee awareness by distributing practical guides to create an LGBTQIA+friendly workplace and encouraging participation in various seminars. Employees from the Company also participated in Tokyo Pride*, held in June 2025.

* Asia's largest event aiming to solve various human rights issues with a focus on LGBTQ+

Developing and Utilizing Diverse Human Resourcese

Promotion of work style reform

To realize more productive ways of working, each department is working to effectively utilize working hours and promote more focused work styles, thereby drawing out the abilities of each employee and aiming to enhance organizational capabilities. Furthermore, in addition to reducing total working hours, we aim to maximize organizational and individual performance by promoting autonomous and flexible work styles, pursuing happiness and well-being for employees in both “work” and “life.”

Example of work style reform initiatives

(Diverse work styles)

- Work-from-home system
- Satellite offices
- Working at locations necessary for childcare, nursing care, or caregiving, or at the residences of relatives
- Abolition of daily minimum working hours requirement under the flextime system
- Setting non-working days, etc.

(Communication)

- Publication of email newsletters
- Dissemination via intranet site
- Employee awareness surveys, etc.

(Physical and mental health)

- Monitoring of working hours
- Various lectures and seminars (well-being, sleep, psychological safety, etc.)
- Mindfulness experience

Support for balancing work and family

In support of balancing work and family, we are working to develop and promote systems that employees engaged in childcare or nursing care can use, mindful of legal reforms. We have expanded eligibility for working from home, satellite office work, and spot remote work to all employees, and for the flextime system, allow employees to autonomously choose their working hours within a certain range in accordance with fluctuations in workload (possible to have three days off every week by having a non-working day), thus promoting “hybrid work,” which provides greater flexibility in where and when people work.

At Hitachi High-Tech, we are promoting the “Full Support for Childcare Project” to ensure that employees who are expecting can take childcare leave for the period they desire with peace of mind and cherish the milestone of childbirth.

Support system for balancing work and childcare

Pregnancy	Pre-Dad and Pre-Mom Seminar Leave for infertility treatment (up to 1 year) Pre-Childcare Leave and Return-to-Work Support Seminar	Childcare Future Concierge	Hitachi High-Tech Childcare Support Website
	Prenatal medical appointment leave Pregnancy disability leave, etc.		
Childbirth	Maternity leave Spousal maternity leave		
Childcare leave	Childcare leave		
Return to workplace	Leave for nursing a child, etc. Shortened working hours Financial support for balancing childcare and work Childcare and caregiving support allowance, etc.		

Support system for balancing work and caregiving

Information provision
Establishment of a caregiving concierge (consultation desk) Work-caregiving balance seminar Distribution of handbook to support work-caregiving management
Financial support
Childcare/caregiving support allowance, work-caregiving balance financial support, work-caregiving system building support incentive
Leave system
Caregiving leave, annual caregiving leave

Mr. Onose

Hitachi High-Tech Diagnostic Systems Software Design Dept.

After taking parental leave, I continue to balance work and childcare by utilizing flexible work styles!

During parental leave, I experienced all housework and childcare except breastfeeding.

Being able to focus exclusively on childcare immediately after birth was a valuable experience for both myself and my family.

After taking parental leave, I actively used the work-from-home system to balance childcare, such as taking my child to and from daycare, with work.

We have been able to build a relationship where we support each other as a family and raise our children together.

During childcare leave, I lived my life according to the baby’s rhythm. No two days were ever the same, and I was always thinking about what the baby needed while discussing with my wife as we raised our children. By participating in childcare from the infant stage, our family bond has grown even stronger.

Mr. Ito

Hitachi High-Tech Software Design Dept.

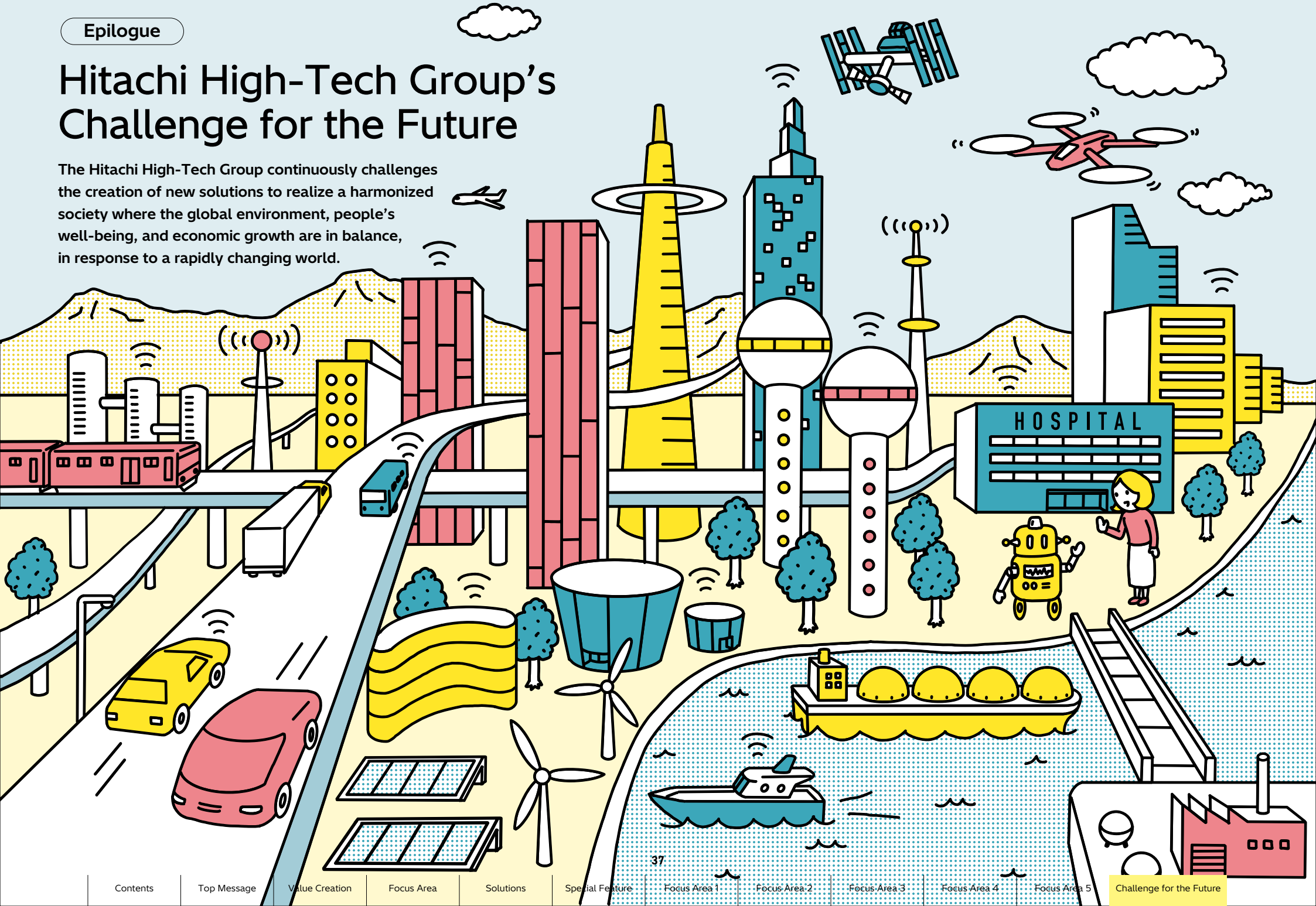
Flexible working system

- Flextime work system
- Satellite office work
- Annual leave taken by the hour
- Spot remote work
- Efforts to eliminate transfer without family, etc.

Epilogue

Hitachi High-Tech Group's Challenge for the Future

The Hitachi High-Tech Group continuously challenges the creation of new solutions to realize a harmonized society where the global environment, people's well-being, and economic growth are in balance, in response to a rapidly changing world.



Hitachi High-Tech Group's Challenge for the Future

Blast Furnace

Steelmaking by Hydrogen Reduction

Significantly reducing CO_2 emissions in steelmaking processes

Blast furnaces are the largest sources of CO_2 emissions in steelmaking processes. The key points of decarbonization are "blast furnace hydrogen reduction," which replaces coal with hydrogen for reducing iron ore, and "electric furnace conversion," which manufactures iron from scrap using electric energy. Each is expected to reach a penetration rate of about 20 to 40% by 2030. The strengths of Hitachi High-Tech and the Hitachi Group can be utilized in areas such as "quality control and automatic feeding of raw materials," "real-time monitoring and automatic control of blast furnaces," and "product strength inspection."

Reuse and Recycling

Contributing to component analysis of recycled materials and measuring material strength

The demand for recycled materials is increasing due to rising awareness of environmental issues and the potential for future resource price hikes. While home appliances must meet legally mandated recycling rate standards set for each product, the fluctuations in available recycled materials raise concerns over reduced production volumes and mislabeling issues. Hitachi High-Tech and Hitachi Group can provide value through technologies such as component analysis and material strength measurement, enabling strength assurance and analysis of contents and purity of recycled materials.

Bioplastic

Contributing to the production of non-edible biomass raw materials, which are essential

Bioplastics are expanding production capacity due to strengthened regulations, especially in Europe. In particular, bioplastics are expected to be alternatives to petroleum-based plastics that cannot be recycled. The key to market expansion lies in technologies for utilizing non-edible biomass raw materials such as algae, waste materials, and livestock waste. The strengths of Hitachi High-Tech and the Hitachi Group can be utilized in fields such as "identification, characterization, and functional evaluation of microbial cells and by-products," "automation of cultivation operations," and "biomass certification."

Space Experiment

Contributing to pharmaceutical development by utilizing zero-gravity space

The "Kibo" experiment module, operated by the Japan Aerospace Exploration Agency (JAXA), is installed on the International Space Station (ISS) and is used for experiments related to the generation of crystals, mainly protein crystals. If the structural information of proteins can be grasped, it can contribute to pharmaceutical development by searching for areas to regulate protein function and designing molecules, and conducting experiments in the zero-gravity space has the advantage of reducing observations that would otherwise require thousands of iterations to just a few. Hitachi High-Tech and the Hitachi Group can provide value by supporting the monitoring of experimental conditions in space environments and assisting with the recovery of experiments.

Fuel Cells

Supporting analysis and manufacturing for a wide range of applications

Fuel cells, which are generated from water and oxygen and prevent the emission of air pollutants and greenhouse gases, are used for mobility power sources, backup power supplies, and power generation in factories. Polymer Electrolyte Fuel Cells (PEFC) are used for mobility power sources, Phosphoric Acid Fuel Cells (PAFC) for backup power supplies, and Solid Oxide Fuel Cells (SOFC) for power generation in factories, with research and development ongoing in each area. The strengths of Hitachi High-Tech and the Hitachi Group can be utilized in areas such as "reaction mechanism analysis" and "manufacturing support for separator grooves."

Cultured Meat

A potential breakthrough in solving environmental and food issues

Cultured meat is artificially grown outside the animals' body from small amounts of cells taken from animals such as cattle or pigs. Livestock farming accounts for 18% of global greenhouse gas emissions, and as the population increases, the required protein supply in 2050 will be about double that of 2005, bringing growing attention to environmental and food supply concerns. The strengths of Hitachi High-Tech and the Hitachi Group can be utilized in areas such as "determination of three-dimensional cell structures," "development of methods for analyzing meat structure and composition," "simplification of virus contamination detection," and "automation of cultivation operations."

Hitachi High-Tech Group's Challenge for the Future

Image of unmanned factory

Automation, Autonomy, and Risk Reduction

Solving labor shortages in developed countries using 5G

High-speed communication technologies such as 5G are making MEC (Multi-access Edge Computing)*1 possible, allowing manufacturing/testing equipment and material handling devices*2 to make autonomous decisions and operate, which is gradually becoming a reality. In particular, developed countries with aging populations are focusing on this as a means to supplement labor shortages and maintain cost competitiveness. Inspection technologies and the IoT platform "Lumada,"*3 which are strengths of Hitachi High-Tech and the Hitachi Group, may contribute to maintaining and developing the assembly-based manufacturing industry in developed countries.

*1 Edge computing technology or standards that enable distributed processing via 5G
*2 Devices used to improve efficiency in logistics operations
*3 A collective term for the solutions, services, and technologies provided by Hitachi, Ltd. that create value from customer data and accelerate digital innovation.

Biopharmaceuticals

Contributing to development and manufacturing after market share expands

Biopharmaceuticals, mainly made from biological sources, are expected to improve therapeutic efficacy, reduce side effects, and expand the range of applicable diseases. The share of biopharmaceuticals among the world's top 100 pharmaceutical products is expected to exceed 50% by 2026, and as pharmaceutical companies concentrate resources on new drug creation, development and manufacturing are increasingly being outsourced, leading to greater horizontal division of labor within the industry. The strengths of Hitachi High-Tech and the Hitachi Group can be utilized in fields such as "judging cell characteristics (structure, function, quantity)," "simplifying virus contamination detection," and "automation of cultivation operations."

Regenerative Medicine

Contributing to the purification, evaluation, and transportation of cell-processed products

Regenerative medicine products are rapidly being developed in countries such as Europe, the United States, and South Korea. Although the number of approved products has increased in Japan in recent years, there are many challenges: in R&D, quality management methods must be constructed from scratch taking into account the characteristics of cell-processed products; in manufacturing, purification and evaluation technologies are needed to stably supply high-quality cells. As a result, Japan lags behind in development from competitors in the world. The strengths of Hitachi High-Tech and the Hitachi Group can be utilized in areas such as "quality judgment based on cell status observation," "automation of cultivation operations," and "transportation management including temperature and vibration."

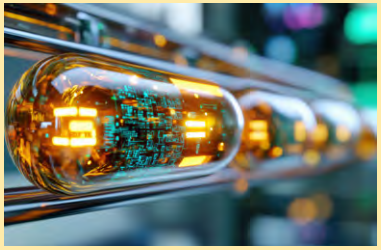


Image of a medical microrobot

Quantum Computer

Accelerating innovation in materials development and drug discovery

Quantum computers, which apply the principles of quantum mechanics, are believed to process complex problems at high speed that are difficult for conventional computers to solve. There are two types: the "annealing-type" specialized for combinatorial optimization problems and the general-purpose "quantum gate-type." Especially if the quantum gate-type is realized, combining it with materials informatics may trigger innovation in areas such as materials development and drug discovery. The strengths of Hitachi High-Tech and the Hitachi Group can be utilized in areas such as "support for setting themes applicable to quantum gate-type," and "physical property measurement."

Image of a quantum computer

IoT Sensor

Expansion of the medical field through the evolution to ingestible/implantable devices

Compact and highly reliable sensors are expected to be utilized in the healthcare field. Their use is evolving from wearables to ingestible/implantable types, and may expand to areas such as managing transplant candidates, medication management for mental disorders, daily health monitoring, and simple home testing. Hitachi High-Tech's strengths can be leveraged in areas such as "biological/sample testing technologies for multiple organs," "medication and efficacy management technologies," "analysis of nanomaterials," and "quality control of sensor-equipped or reusable devices."

X-Informatics

Solving every challenge in material and product development

Efforts such as generating descriptors through analytical technologies, quantifying properties, improving prediction accuracy, and speeding up result verification are commonly required in all materials and product development, and the use of X-informatics is expected to spread even further in the future. For example, in the development of batteries and next-generation batteries, "catalysts" play a key role, but platinum, a rare precious metal, is used, making high costs a challenge. On the other hand, while new catalysts are evaluated only by their power generation curves*1 , their reaction mechanisms*2 have not been fully elucidated, resulting in slow development progress. Utilizing X-informatics can contribute to improving the functionality of platinum catalysts and is expected to significantly accelerate the development of batteries and next-generation batteries.

*1 A graph showing the operational range of a generator
*2 A mechanism in which chemical energy is converted to electrical energy through redox reactions at the positive and negative electrodes

Changing the World and Future with the Power of Knowledge

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