

R&D

Fundamental Stance on Research and Development

The Foundation of Our Research and Development Activities

Hikohachi Sato, the founder of TAIYO YUDEN, was a researcher in ceramic materials, and since its establishment, has believed that product commercialization should start from the development of materials. This has been one of the strengths of TAIYO YUDEN, and has resulted in us

creating many products that have been “world firsts.” TAIYO YUDEN’s research and development activities are aimed at further honing the many elemental technologies it has so far developed to create products that contribute to the ongoing development of electronic devices.

— Research and Development Principles —

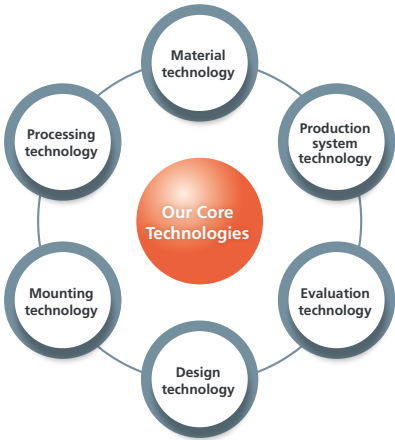
“Innovative advance”

Technology precedence
Promote leading edge technological development as the precursory to innovative product development and become a global leader in technology

Reproducibility
Logically verify the reproducibility of the technology we develop

Technological applicability
Devise technologies which can be applied not only to specific products but also to other areas useful to the markets we serve

Environmental consideration
Develop technologies that are feasible and applicable economically to our manufacturing process and that meet critical environmental standards



Approach to Research and Development

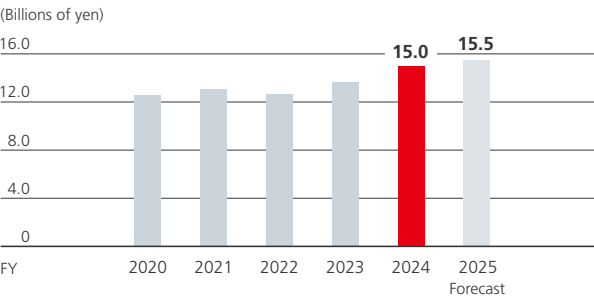
Achievement of Our Vision through Development of Smart Products

TAIYO YUDEN aims to manufacture “smart products” and is actively working to develop and supply steadily such products.

We develop smart products to eliminate the three M’s— *muda* (wastefulness), *mura* (inconsistency) and *muri* (overburden)— over their entire life cycle from design through production, sales, and incorporation into the final product right up to final disposal, to add value for customers and local communities we serve as well as our employees. We believe that our research and development activities aimed at creating a higher standard of smart products will enable us to realize our vision of “To be an excellent company that enjoys the trust and highest regard from all stakeholders.”

R&D Expenses

We recognize that continuing innovations and advancement in our technologies through R&D is the foundation for TAIYO YUDEN to create the future. As such, in recent years we have continuously invested a fixed amount into R&D activities, rather than making major adjustments based on the financial results.



Message from the Officer in charge

Innovative advance: not just a step ahead

Shoichiro Hirakuni
Operating Officer in charge of Research and Development Laboratory

In R&D at TAIYO YUDEN, we value the idea of “innovative advance.” It expresses a stance of aiming for change that greatly surpasses conventional wisdom, not mere incremental improvement. By achieving such leaps, we aim to deliver new value to society.

The idea grew out of the belief that the laboratory should take on longer-term, bolder challenges from a perspective different from the business divisions. Each researcher explores what an “innovative advance” means for their own theme and works with free-thinking creativity, with outcomes expected in line with each role.

That said, achieving “innovative advance” results is never easy; it requires introducing fundamentally different methods and ways of thinking. Lately we have focused on digital twinning* of the development process, and are accelerating validation by leveraging informatics and

simulation. These non-traditional approaches have already produced cases of significant improvement in product characteristics.

To support these challenges, we are also strengthening development through external collaboration. One example is our joint research with Tohoku University, which is enabling faster development.

Organizationally, we reintegrated the materials development department, placed under the business divisions in recent years, back into the laboratory in April of this year. We believe we have achieved our original aims of strengthening collaboration with the business divisions and promoting development closely tied to their needs. By bringing these outcomes back into the Research and Development Laboratory, we will pursue a balanced portfolio of short-, medium-, and long-term development centered on materials technology, which is one of TAIYO YUDEN’s strengths.

“Innovative advance” embodies TAIYO YUDEN’s strong will to open up the future. We will continue taking on challenges to create products with even greater added value.

* A technology concept that reproduces real-world objects and systems in digital space and supports prediction and optimization by collecting and analyzing data in real time.

Message from the Officer in charge

Early action for the future strengthens development capability

Yukihiro Konishi
Operating Officer in charge of Research and Development Laboratory

I assumed the role of deputy laboratory manager of the Research and Development Laboratory this fiscal year. Since joining the Company, I have built my career around materials development, pursuing higher performance through fine-particle and high-crystallinity barium titanate, the principal material for multilayer ceramic capacitors (MLCCs), and property design via additives. I now oversee materials development as a whole and am also involved in managing the laboratory. Guided by the belief that the maturity of materials determines a product’s potential, we pursue development through both improvement and innovation.

After concluding medium-term management plan 2025 in FY2025, TAIYO YUDEN will move forward to a new medium-term plan beginning in FY2026. At the core of that plan is the strengthening of our development capability. The current challenge in R&D is designing mass-production-level quality based on small-scale experiments. In recent years, product complexity has reached very high levels, making it difficult to reproduce conditions equivalent to

mass-production equipment at the laboratory scale. However, broadly prototyping and validating material compositions and process conditions at mass-production scale requires substantial materials and time, causing efficiency to drop markedly. In response, the new medium-term plan will focus on building an environment that balances experimental quality with efficiency and accelerates development. For example, we plan to advance product-property simulation using historical product databases and computational science, and to develop efficient experimental methods through combinatorial chemistry*.

Human resource development is also an important theme in strengthening our development capability. The factors that determine the performance of capacitors and inductors are distributed across multiple process steps. Accordingly, we will rotate junior developers through assigned themes so they gain experience from materials development to production-process development, fostering personnel with broad experience. For future leader candidates, we will assign responsible roles, such as early promotion as group leaders, according to ability, encouraging growth in both technical and management skills.

We believe the essence of development capability that continuously creates high-value-added products lies in early engagement, with a view to the future. We intend to set multiple, flexible development goals that anticipate customer needs and to build a development organization that can respond quickly to change.

*A method in which many compounds are synthesized concurrently to efficiently search for those with the desired functions.



R&D

Developing Research Talent

At the Research and Development Laboratory, we are strengthening our human capital with a focus on building a more innovative organization and cultivating people.

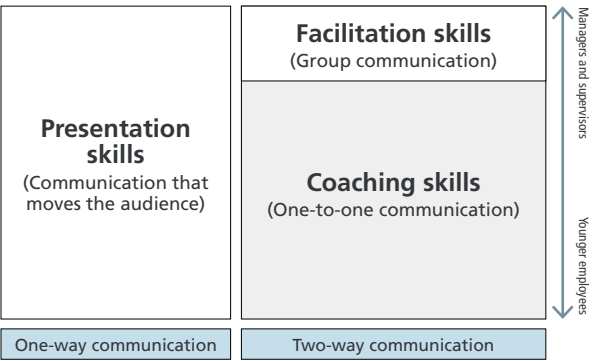
Since FY2021 we have been enhancing communication skills, aiming to realize the collective genius* essential for innovation. We began by strengthening presentation skills to boost individual expression, followed by coaching skills, then facilitation skills to raise group output (Fig. 1).

For presentation skills, we conduct an annual objective, quantitative assessment for members who regularly present at the laboratory. In FY2024, the average score rose 20% versus FY2021. In particular, the frequency of high scores increased, lifting overall skill levels (Fig. 2).

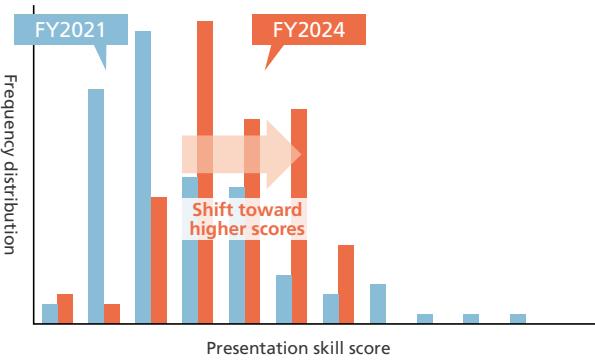
We also quantify progress on roadmapping skills, a program ongoing since FY2022. In FY2024, the average score by theme improved significantly from FY2022, achieving the target set at program launch. We will continue to strategically develop mid- to long-term roadmaps through backcasting.

*The idea that combining individual talents enables genius-level outcomes as an organization.

(Fig. 1) Initiatives to strengthen communication skills



(Fig. 2) Changes in presentation skill scores



TAIYO YUDEN's Research Facility

We are committed to upholding our claim to be “the TAIYO YUDEN of technology and the TAIYO YUDEN of development.” Based on this, we opened the R&D Center (Takasaki City, Gunma Prefecture, Japan) in 1998 with the aim of continuing to create the world’s best products. Establishing the R&D Center has accelerated our R&D activities, and today it serves as a source of development and technological progress, and a foundation of creativity focusing on the future.

In 2020, we opened the Shin-Kawasaki Center SOLairoLab as a co-creation hub for external collaboration. Leveraging the concentration of research institutions and startups in the Shin-Kawasaki Sozo no Mori (“Forest of Creation”) area, the center strengthens our marketing and solution development through external engagement.

In FY2024, we engaged with over 550 visitors at the center and actively advanced efforts to create new markets with external partners and to help solve social issues. We also support student development, and have hosted a university “Practice School” program at the center. This time, doctoral students and faculty stayed for six weeks and explored our

development challenges using a materials-plus-informatics approach. We will continue to actively pursue open innovation that creates both social and economic value.



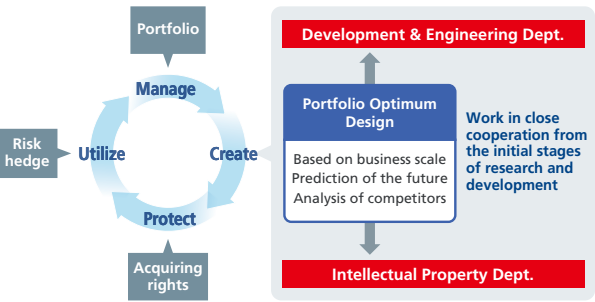
Final presentation of the Practice School

AIRBIC, a building where the Shin-Kawasaki Center SOLairoLab is located

Activities on Intellectual Property Rights

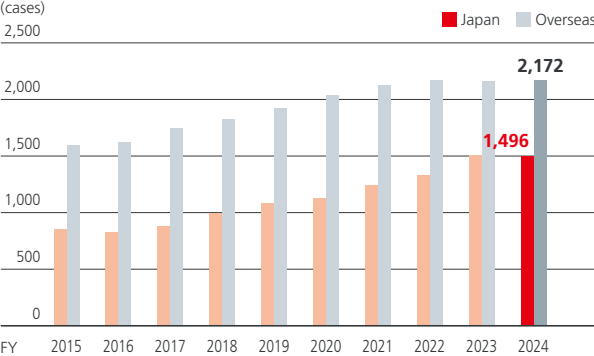
Basic Policy
We, TAIYO YUDEN, endeavor to obtain, maintain and protect intellectual property rights for proper use, and also to respect the intellectual property rights of third parties, in accordance with our CSR Code of Conduct.

Protection of Intellectual Property Rights
To stay ahead in research and development and secure solid intellectual property rights from our results, the Intellectual Property Department works closely with the Development and Engineering Department from the earliest stages. We also leverage our intellectual properties through a unique management approach that is optimized for each business unit.



Number of Patents Held
The number of patents we hold has increased year by year (Fig. 3), and we obtain the necessary patents in Japan and overseas. These patents arise from our invention activities and include applications based on forecasting-driven thinking, starting from immediate issues, and backcasting-driven thinking, focused on future issues, with emphasis on both. Maintaining these patents entails costs, which we view as necessary investments to secure business freedom. We periodically review our portfolio, discontinuing obsolete patents and reallocating resources to filings that strengthen new technologies.

(Fig. 3) Number of patents held



Interview with the Head of Intellectual Property



Takeru Kojima
General Manager,
Intellectual Property
Department

Intellectual property as an “offensive” asset that strengthens competitiveness and brand value

For over 20 years I worked at other companies, including overseas assignments, on patent litigation and licensing negotiations, gaining experience in both intellectual property operations and strategy.

In 2024 I became head of our Intellectual Property Department, and my goal is to shift from “defense” to “offense.” “Defense” means activities that protect existing rights, such as patent maintenance and infringement response. “Offense” means strategic patent creation for future competitiveness and leveraging intellectual property to increase our negotiating power.

We have long used our strengths in materials and process technologies to develop distinctive technologies ahead of others, focusing on technologies with precedence, applicability, and necessity. Currently, we are concentrating our applications in priority areas, strengthening our analytical capabilities through AI tools, strengthening collaboration with our business divisions, and developing patents with an eye to the future. Going forward, we will make greater “offensive” use of intellectual property that underpins world-first and best-in-class products created through these efforts.

Intellectual property is a vital strategic resource directly tied to competitiveness and brand value. We will maximize its power to enhance our corporate value.