Promotion of Creation and Co-creation of Innovation with Vacuum Technology as the Core

Development Strategy with Vacuum Technology as the Core

The ULVAC Group is advancing research and development aimed at exploitation and exploration of its core vacuum technology in pursuit of a sustainable society. As vacuum technology has come to play an increasingly critical role in the manufacture of advanced semiconductor and electronic devices, we are placing special emphasis on research and development aimed at accelerating the growth of the semiconductor and electronics business. At the same time, we recognize the importance of a wide range of research and development initiatives across semiconductor and electronics-related and vacuum-related fields. In this regard, we believe that co-creation with our customers is of paramount importance, with the Research & Development HQ at the heart of this endeavor. The Research & Development HQ consists of two organizations: the Institute of Advanced Technology and the Future Technology Research Laboratory. The Institute of Advanced Technology is responsible for research and development to further deepen vacuum technology in order to accomplish our growth strategy under the Value Up Plan. The Future Technology Research Laboratory is exploring themes that are expected to become next-generation technologies and new fields where vacuum technology can contribute. By collaborating with relevant divisions and Group companies to plan and formulate development strategies, we promote research and development across the ULVAC Group and aim to maximize returns on our investments in research and development.

To accelerate growth of the semiconductor and electronics business, we are focusing our research and development on strengthening capabilities in logic, memory, and advanced packaging. In the logic and memory fields, building on our track record in metal hard mask processes for cutting-edge logic, we are developing equipment to enable entry into additional process steps while also enhancing deposition process performance. In the memory field, in line with the progress of miniaturization and high-level stacking, we are developing equipment and deposition processes with the aim of entering other process steps for DRAM and 3D NAND flash memory. Furthermore, we have developed a new semiconductor production system, the ENTRON-EXX, and have begun accepting orders. The ENTRON-EXX features enhanced data collection and analytics capabilities to meet the increasingly sophisticated and complex requirements of semiconductor production. In addition, its highly scalable design enables more efficient use of factory floor space.

For details Website >> News > ULVAC Launches New Deposition System for Semiconductor Applications: Model "ENTRON-EXX" Supporting Enhanced Productivity and Accelerated Development Speed with Advanced Data Collection, Analysis Capabilities, and Expandability

In the advanced packaging field, we are advancing development of ashing, sputtering, and etching technologies. In the logic and memory fields, the complexity of manufacturing technology is rapidly increasing. Therefore, in order to succeed in the market, it is essential to collaborate ever-more closely with manufacturers of advanced semiconductors. Against this backdrop, we invited South Korean semiconductor customers and local government officials to the opening ceremony of Technology Center PYEONGTAEK in South Korea held in October 2024.

We are also participating in the research and development program of the Interuniversity Microelectronics Centre (imec), one of the world's leading institutions for advanced semiconductor development based in Belgium, which is an opportunity to develop next-generation cutting-edge semiconductor production technology.

Regarding semiconductor and electronics-related technologies, research and development of surface analysis and inspection equipment and materials is also underway, with the aim of creating synergies with the semiconductor and electronics business. In the vacuum-related field, in addition to components such as vacuum pumps, measuring instruments, and power supplies, we are also promoting development aimed at creating new value by maximizing the potential of vacuum technology, including heat treatment furnaces, vacuum Roll-to-Roll equipment, and leak testers.

ENTRON-EXX, a new model of semiconductor production equipment

Setsuo Iwashita, President and CEO of ULVAC, Inc., delivers remarks at the opening ceremony of Technology Center PYEONGTAEK

Creation and Co-creation of Innovation

In addition to state-of-the-art logic, memory, advanced packaging, and other semiconductor and electronics technologies, the Institute of Advanced Technology is developing thin-film deposition and thin-film processing technologies that utilize vacuum technology essential for production of these devices, alongside vacuum-related technologies primarily focused on batteries. One of the cutting-edge key technologies is plasma technology, and as devices become more sophisticated, plasma diagnostics is becoming increasingly important. ULVAC, Inc. and Tokyo Institute of Technology (currently "Institute of Science Tokyo") established the ULVAC Advanced Technology Collaborative Research Cluster on its Ookayama Campus. Here, we are advancing joint research to enhance the performance of our plasma equipment by utilizing plasma diagnostics and AI technology developed at the Institute of Science Tokyo. In addition, ULVAC jointly presented plasma etching technology—regarding chiplet integration technology currently under joint development with the Institute of Science Tokyo—at the 2025 IEEE 75th Electronic Components and Technology Conference, the world's largest international conference in the field of advanced packaging. Leveraging this inter-organization collaboration, we will strengthen a wide range of relationships extending beyond joint research to include human resource development, thereby contributing to the future growth and technological innovation of both ULVAC and the Institute of Science Tokyo.

ULVAC, Inc. is also promoting the creation and co-creation of various innovations with the support of public subsidies. ULVAC is advancing research and development toward the social implementation of next-generation batteries in collaboration with multiple partners, supported by subsidies for its lithium metal anode production technology. This technology was selected under "Research and development of high-performance storage batteries and materials" R&D program for the Green Innovation Fund Project / Next-generation Storage Battery and Motor Development of the New Energy and Industrial Technology Development Organization (NEDO).

Moreover, ULVAC, Inc. and ULVAC CRYOGENICS INCORPORATED are developing a dilution refrigerator for quantum computing. This research is supported by the Japan Science and Technology Agency (JST) through the R&D project "Development of Integration Technologies for Superconducting Quantum Circuits" with the research theme "Development of Cryogenic Systems Specialized for Quantum Computing" under the Moonshot Research & Development Program "Realization of a fault-tolerant universal quantum computer that will revolutionize economy, industry, and security by 2050." The dilution refrigerator developed through this project has been adopted for the quantum computer produced by the University of Osaka, which uses only domestically developed core components. It was publicly demonstrated at the Expo 2025 Osaka, Kansai, Japan during the "entangle moment – [quantum, ocean, universe] × art" event.

Furthermore, at ULVAC-Osaka University Joint Research Laboratory for Future Technology established within the University of Osaka, we are promoting innovation through industry-academia co-creation. Medical applications of vacuum technology and next-generation semiconductor technology are being explored. The Graduate School of Engineering is ULVAC's partner for ULVAC-The University of Osaka Joint Research Laboratory for Future Technology. At the sixth regular press conference held by Osaka University Institute of Scientific and Industrial Research (SANKEN) and the Graduate School of Engineering, ULVAC made a presentation on industry-academia co-creation from a corporate perspective, covering future technologies in the field of medical engineering, as well as why we are committed to industry-academia co-creation and the development of doctoral talent.

In connection with the above activities, Junya Kiyota, Head of the Research & Development HQ, received a Special Award at the Nikkei XTECH CTO of the Year 2025. Highly recognized were his initiatives not only to improve the competitiveness of vacuum production equipment for semiconductor and electronic devices but also to explore new applications of vacuum technology in fields such as medical care and quantum computing, leveraging ULVAC's core strength in vacuum technology.

For details Website >> News > ULVAC, Inc. and Tokyo Institute of Technology Establish "ULVAC Advanced Technology Collaborative Research Cluster"

For details Website >> News > ULVAC Receives "Best Interactive Presentation Award" at The 2024 IEEE 74th Electronic Components and Technology Conference (ECTC)

For details Website >> News > Selected for the NEDO G.I. Fund Project "Development of Next-generation Storage Batteries and Next-generation Motors" Project ~Development of Li anode production technology using unique vacuum deposition technology with focus on all-solid-state batteries~

For details Website >> R&D > Research and Development Institutes > ULVAC-Osaka University Joint Research Laboratory for Future Technology

For details Website >> News > Managing Executive Officer Junya Kiyota of ULVAC, Inc. Receives Special Award at "Nikkei XTECH CTO of the Year 2025"

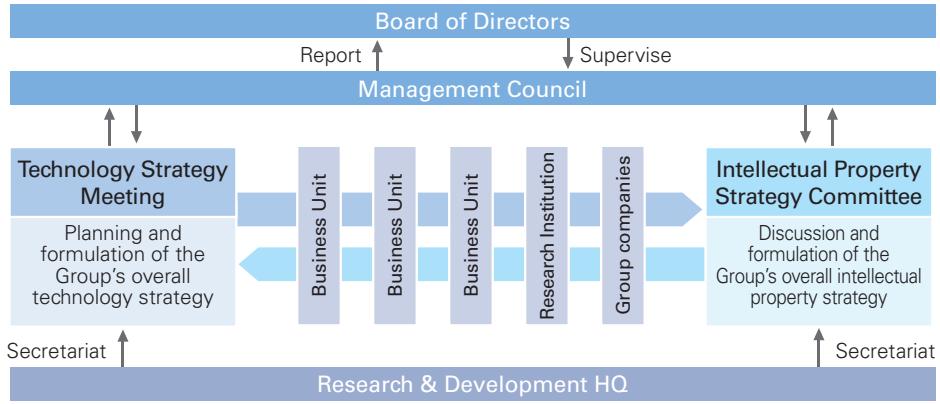
Research and Development / Intellectual Property Governance

We regularly hold two meetings that serve as cross-functional hubs within the ULVAC Group's overall research and development structure. The Technology Strategy Meeting handles the planning and formulation of overall technology strategy, while the Intellectual Property Strategy Committee discusses intellectual property strategy with the aim of integrating business, development, and intellectual property. At these meetings, discussions are conducted in accordance with management policies, and key items are reported to directors and executive officers and are subject to their oversight.

By unifying the Group's research and development structure, we aim to create differentiated products and new technologies, acquire intellectual property, and accelerate development. This will allow us to build and operate a system that continuously offers cutting-edge products and technologies that meet customer requirements in a timely manner.

Led by the Research & Development HQ, we will deliver advanced technologies that enable rapid responses to societal issues for the benefit of society.

Research and Development / Intellectual Property Governance Structure



Platform for Sharing Technology and Intellectual Property

The ULVAC Group holds the ULVAC R&D Conference as a forum for sharing research and development results and generating new ideas and synergies. Not only research and development divisions in Japan, but also those overseas, as well as business divisions and Group companies, participate in this conference to deepen understanding and discuss research and development linked to future business. Oral presentations serve as a platform for sharing the latest information and technologies in key growth fields across the ULVAC Group, including online participation. Additionally, in poster sessions, we provide an environment conducive to face-to-face discussions, facilitating lively exchanges of ideas across a wide range of technological fields.

By promoting the sharing of knowledge and technology, including market and customer information obtained by the participants, the technological issues they face, and possible solutions, ULVAC aims to "contribute to the development of industries and science by comprehensively utilizing its vacuum and peripheral technologies."

Research and development bases

Intellectual Property

The ULVAC Group's vacuum technology has contributed to the development of industry and science and technology in diverse fields. This quest for technological innovation has been sustained by our commitment to systematically strengthening intellectual property, which we recognize as the core of sustainable corporate growth and value creation. How can we leverage the intellectual property we have inherited, hand it on to the next generation, and shape the future? The answer lies in deepening and expanding partnerships to create new value through innovation.

Guided by the Basic Corporate Philosophy, the intellectual property division works with business divisions and research and development divisions to support an improved business environment and enhanced competitiveness. To establish a competitive edge in our priority semiconductor and electronics-related fields, we leverage the ULVAC Group's differentiating technologies to drive business results. To enhance the value of intellectual property, the intellectual property division creates growth opportunities and builds a foundation for business competitiveness through the systematic development of difficult-to-imitate technologies and the strategic acquisition of rights. Our efforts to tackle advanced technological challenges in the semiconductor and electronics-related fields are underpinned by the trust of our customers, based on the ULVAC Group's robust intellectual property protection framework. Building on this experience, we pursue intellectual property activities based on an open-close strategy, strengthening our intellectual property position in new processes and fields and thereby creating further value. To carry out these intellectual property initiatives, the intellectual property division works closely with business divisions and research and development divisions across the entire value chain, from product planning through post-market launch.

In the product planning phase, we utilize IP landscaping to visualize market trends and technological issues, analyzing ULVAC and competitors to support decision-making on research and development investment. In the subsequent development planning phase, the business, research and development, and intellectual property divisions work together to prepare an "intellectual property strategy blueprint" and design an intellectual property portfolio by backcasting from the envisioned future business model. In designing our intellectual property portfolio, we comprehensively consider perspectives such as the utilization of proprietary technologies, the value chain, business models, co-creation with external parties, potential for expansion into other fields, and addressing societal issues such as ESG. In the development execution phase, we proceed with strategic acquisition of rights based on the intellectual property strategy blueprint and conduct infringement investigations in line with the progress of development in order to respect third-party rights. After market launch, we strengthen, maintain, and utilize intellectual property rights in accordance with the business environment so that acquired intellectual property rights contribute to the long-term competitiveness of the product. In new application fields, unconstrained by the framework of our existing businesses, we will pursue acquisition of rights applicable to a wide range of technologies and industries and comprehensively utilize our intellectual assets, thereby meeting the expectations of society.

The intellectual property created through these activities have earned the trust of customers, partners, and other business stakeholders, expanding opportunities for growth while widening the circle of co-creation. The growing momentum for resolving societal issues and creating new value is driving the further expansion of vacuum technology application fields. To realize "Promotion of Creation and Co-creation of Innovation with Vacuum Technology as the Core," one of the ULVAC Group's materiality issues, we will leverage our intellectual property to drive sustainable corporate growth and contribute to social as well as scientific and technological progress.

Intellectual Property Activities Aligned with Management and Business Strategies