Technology Development

Akira Kumagae
Director, Managing Executive Officer
General Manager, Corporate Technology Div.

Technology integration by YASKAWA Technology Center

We opened a new R&D center, YASKAWA Technology Center (YTC), to build a system that can respond quickly to the diverse needs of our customers.

YTC is based on the three key concepts of integrated development processes, aggregation and creation of intelligence, and creation of innovative technology. The concept is to become a technology-intensive base where we develop products that will lead customers' businesses to success in a timely manner through all of the Yaskawa Group technologies and open innovation.

By consolidating the development systems that were dispersed in each division and corporate development division, we have created an environment in which we can work consistently on planning, development, production, and quality control.

We have also created an environment in which employees can be constantly exposed to the world's technological trends, as well as a system to promote information sharing and communication.

In addition to promoting joint research that accelerates industry-academia-government collaboration, we will strengthen technological development that takes full advantage of our strengths both within and outside of the company, and is particular about being the world's best and the world's first through dramatic technological advances.

Changes in the development system

YASKAWA Technology Center

September 1, 2021 Full-scale operation started!

Up to FY2020

Business Division (Location of development base)

Product development and product maintenance development

- Finishing of product application technology
- Technology development for product application

R&D Center

Elemental technology development

Mainly for existing businesses

- Basic technology development
- Technology development for product application
- Technology development for new businesses

(Kitakyushu, Fukuoka)

Integration

From FY2021

YASKAWA Technology Center

Development of new products and product technologies

- Finishing of product application technology
- Technology development for product application

Motion Control, AC drive, Robot, and environmental and social system

Basic technology development

Reinforce technology development for new businesses

- Basic technology development
- Technology development for new businesses

Factory — Development for product maintenance

Promotion of industry-academia-government collaboration

YTC is accelerating the industry-academia-government collaboration by taking advantage of the environment such as the Collaborative Development Office. In FY2021, there were 27 collaborative projects in Japan. We are also promoting comprehensive collaboration with Kyushu Institute of Technology, Kyushu University, and Tokyo Institute of Technology, with a view to creating synergies in a wide range of areas and fostering engineers and researchers. In collaboration with JA Zen-Noh (National Federation of Agricultural Cooperative Associations of Japan), we are accelerating our efforts for automation in the agricultural sector, and are implementing initiatives aimed at realizing smart agriculture, such as the automated demonstration of cucumber leaf clearing operations and the automation of strawberry fruit selection operations at YTC. In addition, using the local 5G wireless station license that we acquired for the first time in the Kyushu area, we are working to develop technologies to improve real-time performance and realize smart factories that utilize wireless connections.

Cucumber leaf scraping

Selecting strawberries

Examples of Smart Agriculture Initiatives

Yaskawa Mechatronic Lab at Ho Chi Minh City University of Technology

Overseas subsidiaries have also promoted more than 14 collaborative activities. In particular, Ho Chi Minh City University of Technology in Vietnam established the Yaskawa Mechatronics Lab to learn about Yaskawa's FA equipment and train engineers to become key persons in the Vietnamese industry.

Expanding venture investment and generating synergies

With YIP*1, a new business creation scheme that combines CVC*2 functions, we are promoting open innovation through investment in startup companies and business alliances where business synergies are expected, in order to evolve our core businesses and expand new fields by applying mechatronics technology.

Since the start of the program in FY2016, a total of 17 investments have been made in 13 domestic and overseas startup companies up to FY2021, and 2 investments were made in FY2021.

Yaskawa undertook a corporate bond with stock acquisition rights issued by VC Cell Therapy, Inc. (Headquarters: Hyogo, Japan), which is a venture company engaged in the development of technologies for the practical application of regenerative medicine utilizing iPS cell-derived pigment epithelium (iPS-RPE) cells. Yaskawa contributes to automation of the cell culture process using its dual-armed robot, Mahoro. In addition, Yaskawa has made an additional investment in Novel Crystal Technology Inc. (Headquarters: Saitama, Japan), which is a venture company engaged in the development, manufacturing, sales and device development of gallium oxide wafers, attracting attention as a next-generation power semiconductor material. Funding is expected to accelerate product development and commercialization.

Mahoro, double-arm robot for biomedical applications

*1 YASKAWA Innovation Program
*2 Corporate Venture Capital. Venture investment activities conducted by companies

Intellectual property activities

The Intellectual Property Division, which had been distributed to each business division, is now centrally located within YTC, which is a center for technology development, and is promoting intellectual property activities in close contact with the Technology Development Division of the entire company. Leveraging the strength of having the entire company's technology development and intellectual property divisions in one place, Yaskawa is working to create inventions that transcend the boundaries of its business divisions in the areas of mechatronics technology, which is our core competence, and i³-Mechatronics technology, which can be applied in a wide range of applications. Furthermore, the Intellectual Property Department within YTC plays a central role in promoting global intellectual property protection activities for sold products, locally developed products, and manufacturing know-how in cooperation with the intellectual property departments of the Yaskawa Group's overseas affiliates. In addition to intellectual property education by rank and technology field, we also provide literacy education on technology contracts as the importance of technology contracts increases.

Production

Yoshikatsu Minami
Director, Managing Executive Officer,
General Manager, Production Management & Operations Div.;
General Manager, Export & Import Administration Div.

Production innovation by i³-Mechatrancis

In the past, each division (plant) had its own business process for indirect operations related to production (procurement and production planning). Based on the i³-Mechatronics concept, we have developed and introduced a production system that is common throughout the company. By integrating business processes and optimizing overall operations, we have achieved more efficient production operations. This common production system has been applied not only to domestic plants but also to overseas plants. By visualizing production information such as global production status, parts procurement status, and inventory status in real time, indirect man-hours are reduced.

The development of production facilities had also been assigned to each division (plant). By consolidating these, we are upgrading the skills and know-how of production engineers and shortening the time required to build new facilities. By installing more productive production facilities at our plants in Japan and overseas, we are working to reduce the number of direct man-hours, promote the standardization of facilities, and respond quickly and centrally to problems.

By radically overhauling the way production is organized and conducted, we will work on the materiality of "improving production efficiency at our own plants," and reduce production costs from both direct and indirect man-hours, leading to the achievement of the goals of our long-term management plan, Vision 2025.

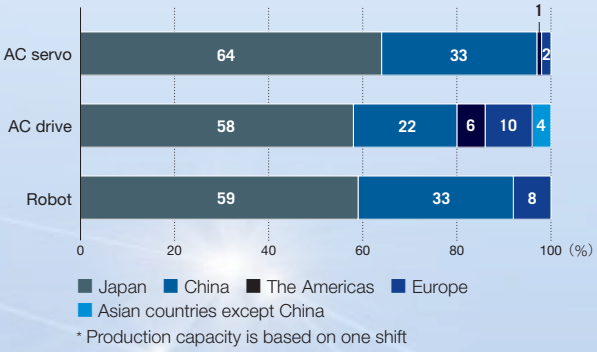
Changes in the development system for production facilities

Global production system

Demand for mechatronics products such as AC servos and robots is expanding amid global acceleration of automation initiatives aimed at reducing labor and improving productivity amid labor shortages and rising labor costs. In addition, there is a growing trend toward the use of IoT and AI to realize highly efficient and high-quality manufacturing, which is driving this demand even higher.

In response to these market trends, Yaskawa is conducting optimum production at 29 sites in 13 countries around the world under its policy of "production in demand areas." By taking advantage of the proximity of production to our customers in terms of delivery times and relationship building, we aim to reduce risks associated with foreign exchange, natural disasters, and geopolitical issues, and we will surely meet demand that is expected to grow in the future.

Breakdown of production capacity by product



* Production capacity is based on one shift

Procurement policy and expansion of in-house production for stable supply

In the face of the recent global shortage in parts procurement, particularly for semiconductors, we are concentrating issues in the head office procurement department by strengthening cooperation with each business division and conducting intensive negotiations. Yaskawa Group is also promoting medium- to long-term initiatives aimed at ensuring stable procurement. At the development stage, we are thoroughly evaluating adopting parts to ensure stable procurement over the long term, and at the same time, we are building a multi-company purchasing system against contingencies. Next, we will consolidate procurement activities that had been conducted by each site to the head office procurement department. Starting with semiconductors and electronic components, we will ensure that parts inventories are secured through centralized purchasing, controlled safety stock management, and strengthened partnerships with suppliers. In addition, we will reduce procurement risks, improve technical capabilities, and incorporate added value by promoting in-house production of parts that previously depended on external procurement and increasing the rate of in-house production.

YASKAWA (Changzhou) Mechatronics System Co., Ltd
A production base for major components in China, which began mass production in June 2022

Building a sustainable supply chain

Yaskawa strives to continue its business while contributing to the resolution of social issues throughout the supply chain through communication with business partners.

Semi-annual procurement policy briefings are held for major suppliers with whom Yaskawa does business on a global basis to share and align Yaskawa's management policies, business strategies, and sustainable procurement policies (including environmental policies).

In addition, we have also exchanged opinions and reflected the opinions of suppliers in our purchasing policies to increase their effectiveness. Please refer to "To build a sustainable supply chain" on P.53 of "Dialogue and Co-creation with Stakeholders" for the results of our activities in FY2021 and the details of our initiatives in FY2022 in accordance with our sustainable procurement policy.

Sales and Service

Hiroshi Takata
Senior Executive Officer
General Manager, Corporate Sales & Marketing Div.

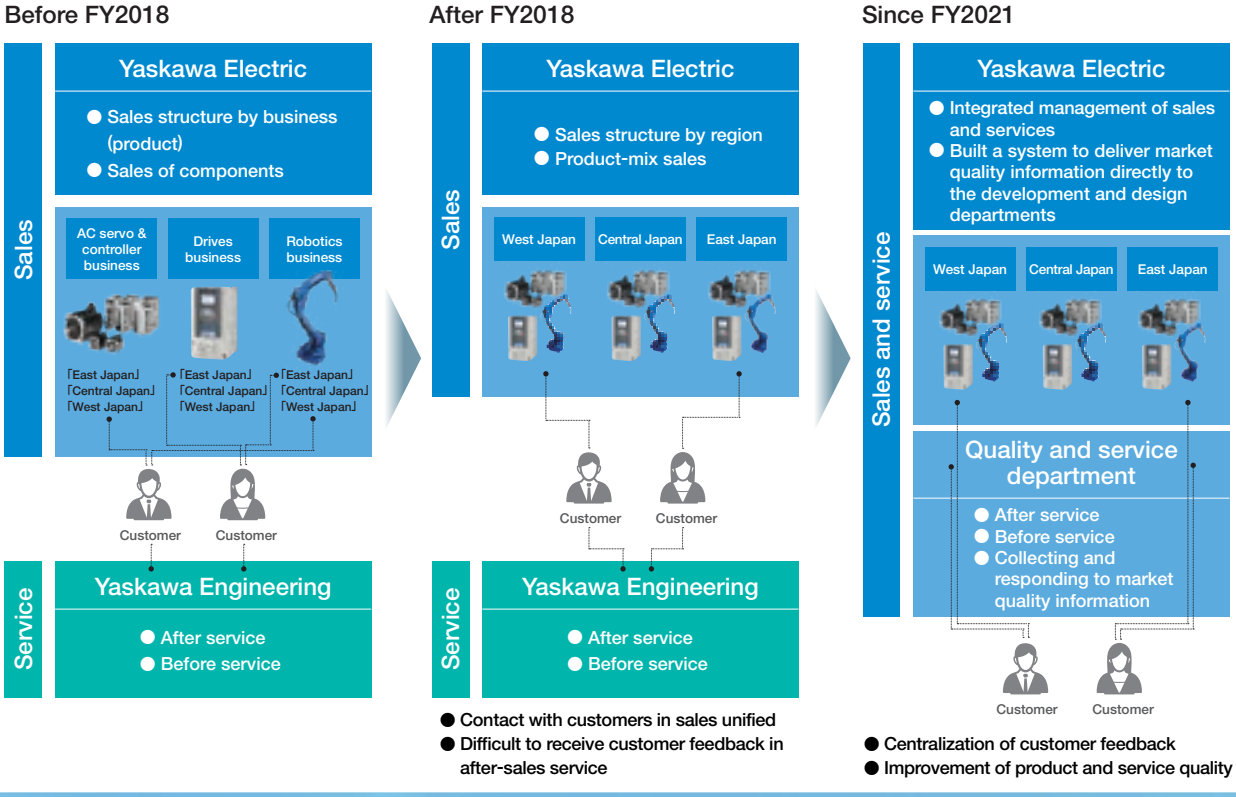
i³-Mechatronics business model reform and evolving sales and service structure

Since shifting business focus to mechatronics in the 1980s, Yaskawa has expanded globally through sales of "components" such as servos, AC drive and robots. In recent years, however, against the backdrop of changes in the market environment, such as the response to labor shortages and the acceleration of next-generation manufacturing initiatives through the use of IoT and AI, new needs for production efficiency and quality maintenance have rapidly increased.

Based on the i³-Mechatronics concept, Yaskawa proposes a solution to address this change. We worked to transform our sales force, which is steering us toward a "component + solution" sales. Providing "solution" is to solve management problems faced by customers and make proposals to realize management goals such as improving productivity. In FY2018, we reorganized our sales structure, which was previously divided by product, into a regional and product-mix sales structure.

In addition, Yaskawa Engineering has been in charge of service operations as a subsidiary of the Yaskawa Group for about 50 years, and has been expanding its business in response to customer needs. On the whole, however, there was an issue that customer feedbacks from the service operations were hard to reach Yaskawa Electric directly. Therefore, in FY2021, we established a structure that enables us to share the voice of our customers through integrated management of services with sales, and to deliver the raw voice of our customers and product quality issues directly to the development and design departments.

Changes in the sales and service system



Ryuta Matsutani
Executive Officer
General Manager, Quality & Service Div.

Through these changes, we will further strengthen our relationship with our customers and move into areas that were not captured by the previous component sales. We will achieve sustainable growth by expanding our business, improving the quality of our products and services, and providing thorough support to help our customers win in the market.

Enhancing sales and service activities with YDX

One of YDX's initiatives in sales activities is to standardize and centralize sales information using CRM/SFA*. In this way, information related to customers is shared among sales representatives, sales managers, administrative departments and management. We manage not only information on our daily activities and individual business meetings, but also business meetings related to our customers' supply chains, while offering proposals to solve problems. By providing extensive and long-term support to our customers, we engage in our daily sales activities with the aim of helping customers who use Yaskawa products to win in the market.

In addition, various market information is being shared by linking sales and service information. Based on this information, sales and service departments discuss and collaborate with each other to improve their activities, while we integrate separate systems to unify sales, service and customer information that make up Product Lifecycle Management (PLM) with YDX. We provide feedback to the development of products and new services, and thereby provide in a timely manner the products and services to help our customers win.

* IT tools to support sales activities

Penetration of the i³-Mecatronics concept

Under the previous sales structure, each business division had a sales representative, and proposals to customers were limited to the products of the business division to which they belonged, and different sales representatives worked for the same customer, and there were areas where sales representatives did not cooperate with each other. Since FY2018, the product-mix sales structure has been realized where sales representatives propose all products to the customers they serve, requiring them to understand Yaskawa products and technologies more broadly. We recognize that this was an essential initiative as a change in the sales department to realize the i³-Mechatronics solution proposal.

In addition to Yaskawa products, we are working with other companies from Yaskawa Group, such as i3 Digital, AI3 and FAMS to propose products and technologies to customers. All of us at Yaskawa Group will work together to resolve the issues facing our customers.

We have also exhibited at many exhibitions, including the International Robot Exhibition, to promote the i³-Mechatronics concept. We have received many consultations for production optimization in response to proposing cell controls that visualize data and convert it into movement using YRM controllers, and robot solutions that respond to high-mix variable volume production and process changes. In order for Yaskawa to become a partner in our efforts to improve productivity for our customers, we will work together in sales and technology to address customer issues.