

Intellectual Capital



Ratio of
R&D investment
to net sales
4.3%

Selected "Top 100
Global Innovator"
by Clarivate Analytics
for the
3rd
successive year



Portfolio of
venture investment
9
companies

*As of June, 2018

Technology Development

We conduct technology development globally to support permanent business growth.

Research and Development Policy

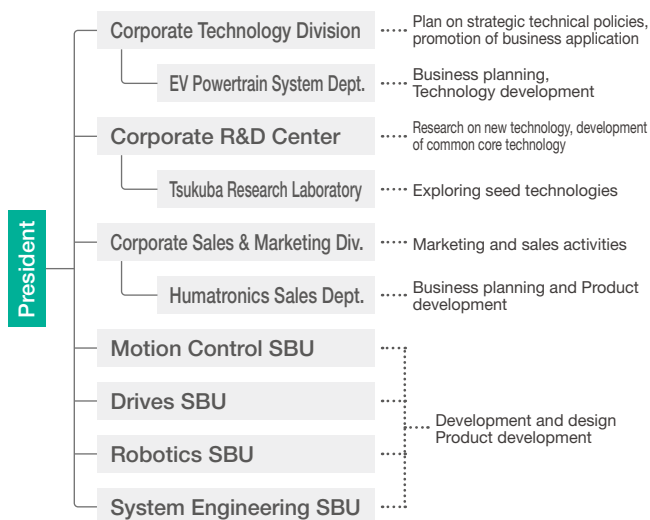
We are working to strengthen our ability to execute global businesses in such existing business fields as motion control and robotics and to turn its success into further product development. In addition, we are pursuing research and development that will contribute to society well into the future, including products in the energy creation/storage/application business domain, which is related to renewable energy systems, electrical drive systems for automobiles, etc., and in the Humatronics* business domain for creation of new markets in the medical and welfare sectors.

And Yaskawa has also launched i³-Mechatronics*², its new solution concept as it aims to “realize a new industrial automation revolution” as indicated in its 2025 Vision, the company’s long-term business plan. Yaskawa will offer solutions that merge competitive hardware with software and create new value for its customers.

* 1 Humatronics: Term coined to denote a cross of Human and Mechatronics.
 * 2 Yaskawa Electric Corporation registered “i³-Mechatronics” as a trademark in June 2014.

Research and Development Structure

The research and development structure at Yaskawa consists of Corporate Technology Div. that establishes strategic technology policies and promotes them as businesses, Corporate Research & Development Center that develops and investigates new technologies, and a



development and design division that is responsible for product development in each of the company’s SBUs (Strategic Business Units), which collaborate with Corporate Sales & Marketing Div. as they push forward research and development. Both EV Powertrain System Dept., which develops electric drive systems, and the Humatronics Sales Dept., which develops healthcare and assistive products, promote business in the areas of clean power and Humatronics respectively.

Global Development

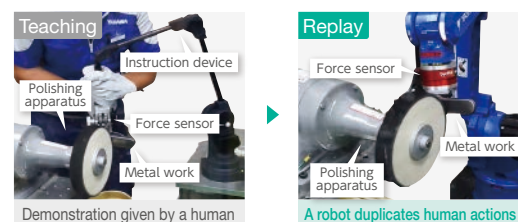
In order to realize i³-Mechatronics concept, global development is underway for the development of new products which are compatible with IoT (the Internet of Things) and for the use of AI (artificial intelligence) through a four-pole development structure that consists of Japan, the Americas, Europe, and China, and local development is being pushed at each base location to match the usage methods of products at each individual area.

In 2018, Yaskawa plans to build more factories: a third plant in Shenyang, China (a base for manufacturing AC servos), a third factory in Changzhou (for the production of robots), and a new robot plant in Europe (Slovenia). Through these measures, production capacity will be boosted and the development structure bolstered.

R&D Results & Topics for FY2017

In FY2017, Yaskawa progressed its development of technology and products by realizing its new i³-Mechatronics solution concept in aiming to realize its 2025 Vision. It developed MECHATROLINK-4, an industrial network that realizes more effective and advanced control, and also Σ-LINK II, which enables I/O devices such as sensors to be connected and synchronized. The use of these items not only improves the efficiency of trans-

Concept for instruction and demonstration feature (teaching polishing work)



missions concerning motion control; they also make it possible to synchronize and acquire data from various sensors in a simple manner. Furthermore, through open innovation, Yaskawa has also focused on developing technology leveraging AI, for example an AI picking feature including autonomous learning of various gripping attempts.

In addition, the company has also developed an instruction and demonstration feature where a human shows (demonstrates) examples to teach robots intuitively in order to promote the use of robots for delicate contact tasks like polishing that require skills. This feature reduces the burden on users with regard to teaching tasks and also significantly reduces the startup time for robot systems.

Yaskawa will contribute to productivity improvement along with new manufacturing initiatives by customers,

leveraging IoT and AI.

As for the area of humatronics, Yaskawa has been selling CoCoroe AR², a device for the rehabilitation of the upper limb, since September 2017 in its efforts to support rehabilitation.

CoCoroe AR² makes it possible to frequently conduct rehabilitation training for long periods of time and reduces the burden on therapists. CoCoroe AAD, introduced to the market in January 2018, is a device that provides assistance for the ankle and supports the joints during walking practice by people who have difficulty walking.



CoCoroe AR²



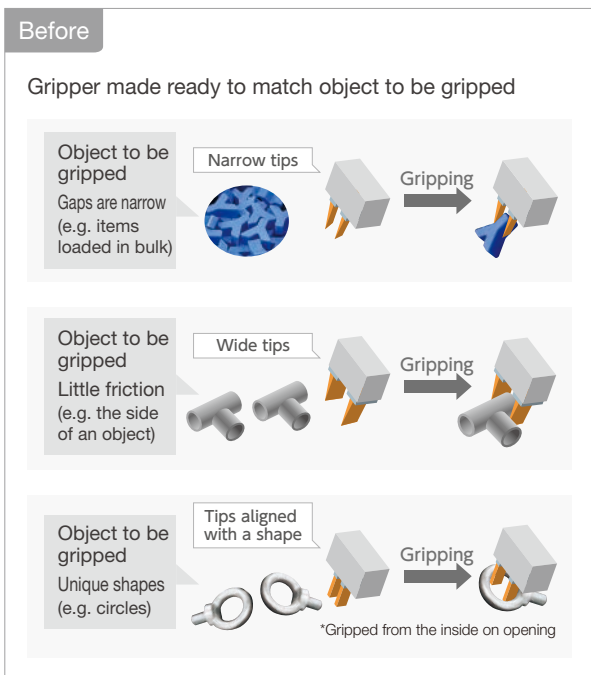
CoCoroe AAD

Status of Collaboration in Technical Development with Venture Investment

Yaskawa aims to realize i³-Mechatronics through fusion of core technology advancement and open innovation. As part of that, it initiated a capital tie-up in 2017 with XCompass, Ltd., a company that offers consultations on mechanical learning and data analysis services as well as development of AI platforms and new algorithms. And in 2018, Yaskawa established AI³ (AI Cube Inc.) for the purpose of developing AI solutions for manufacturing and industrial robots. This new company will take advantage of

Yaskawa's big data collection ability in the field of manufacturing, to accelerate the development of AI technology utilizing big data, accumulated mainly via the products from following businesses; AC Servo Drives, Drives, and Robotics. Forming a strategic alliance with XCompass, the company is developing autonomous AI picking features for robots, such as object recognition, self-formulation of gripping method and various gripping attempts, and it will continue its efforts for accuracy improvement.

AI picking features for robots



Intellectual Property

We aim at obtaining global patents of high quality that will contribute to business.

Basic Concept of Intellectual Property

Yaskawa Electric respects third-party intellectual property while using its own intellectual property to actively protect its products, giving them an edge on the market.

Positioning of Intellectual Property Activities in the Management

Our intellectual property activities are part of our business strategies as well as R&D strategies, and we are working globally on creation, protection and application of intellectual property.

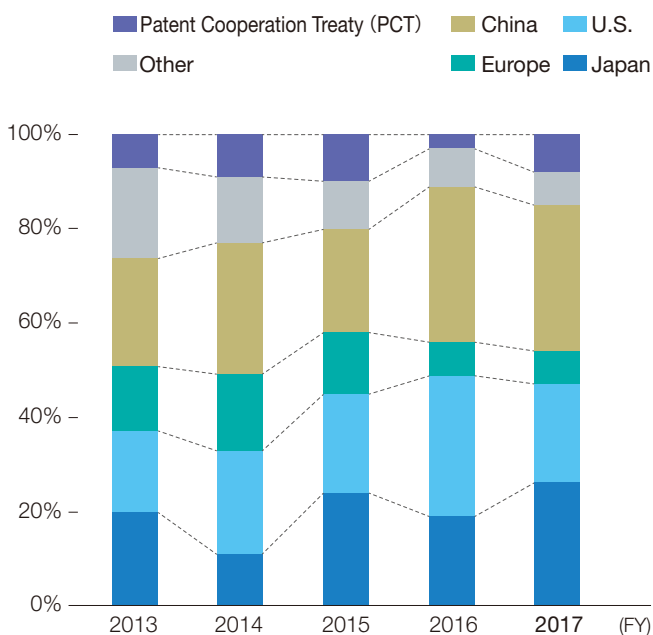
Intellectual Property Activities

The intellectual property division, which provides company-wide supervision, and staff positioned within the R&D division and business divisions promote activities that are tied closely to each department.

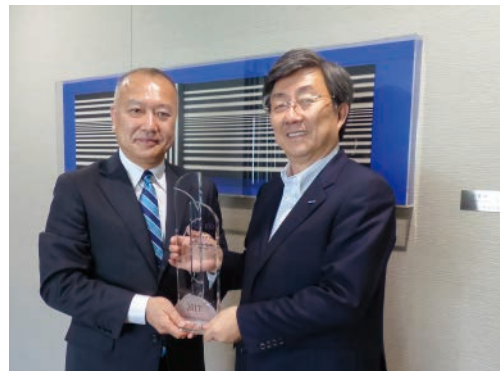
Status of Intellectual Property Rights

Each country promotes to secure intellectual properties as the graph below shows.

Application Ratio by Country



Yaskawa Received 2017 Top 100 Global Innovators Award



President Ogasawara (Right) receiving a commemorative plaque

Yaskawa was selected a "2017 Top 100 Global Innovator" by Clarivate Analytics (head office: Philadelphia, USA), a global company that offers information services, for the third consecutive year.

Top 100 Global Innovators is a selection of the 100 most innovative companies in the world based on an assessment of their number of patents, success rates, global nature, and impact patents made in quotes (assessment goes back five years; assessment made on the past three years solely for the global nature of a company) and an analysis of their trends for patents and intellectual property.

At Yaskawa, where we consider ourselves to be founded on technology, we push forward our research and development with partiality in being the first and the best in the world. The Top 100 Global Innovator that we have received for three years running is a great honor, and it serves as tremendous motivation in furthering our activities.

Yaskawa will continue to deploy initiatives combining its business division and research and development division in a united manner and aim to obtain global patents of high quality that will contribute to business.