

# Technology Development / Intellectual Property

## Technology Development

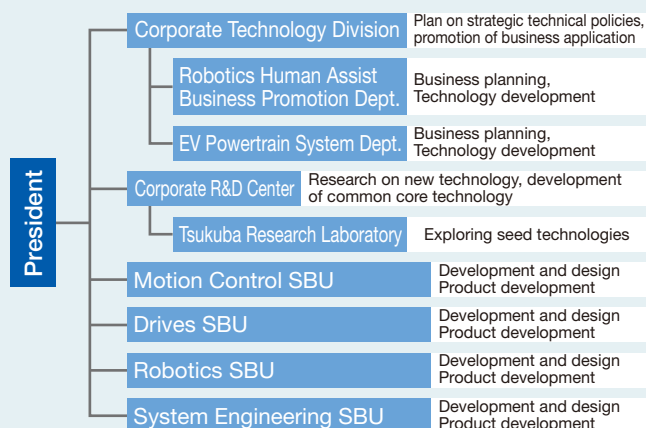
### ● Research and Development Policy

We are working to strengthen our ability to execute global businesses in such existing business fields as motion control and robotics and to turn success into further product development. In addition, we are pursuing research and development that will contribute to society well into the future, including the development of technologies and 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.

\* Humatronics: Term coined to denote a cross of Human and Mechatronics.

### ● Research and Development Structure

It is made up of the Corporate Technology Division that plans strategic technical policies and promotes business application, the Corporate R&D Center that develops new technology, and design departments in charge of product development in the respective Strategic Business Units (SBUs).



### ● Results and Challenges of Realize 100

We established a quadrupole development system for AC servos and AC drives as well as created local development structures in China and India.

Furthermore, we enhanced our resource for development of ASICs (application specific integrated circuits), electrical products for large-scale wind turbines, PV inverters and other products by means of acquisition of VIPA, The Switch and Solectria Renewables.

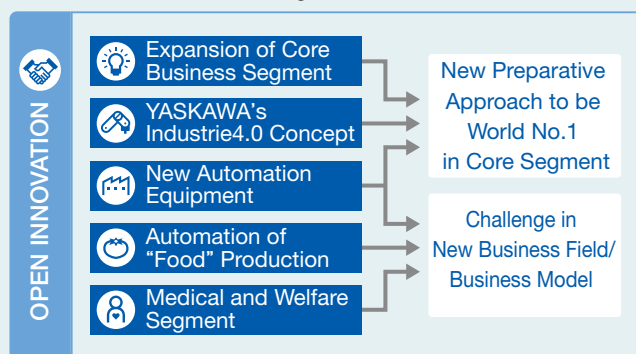
Under such conditions, we identified as issues the continued advancement of our ability to develop and to accelerate deployments of new businesses. There is a need to leverage AI technology, develop new products that are compatible with IoT, and accelerate initiatives for realizing Yaskawa Industrie 4.0.

### ● Policies under Dash 25

In the mid-term business plan Dash 25, the company will enhance the lineup for the AC servo  $\Sigma$ -7 series, advance its product deployment of "Zero series" AC drives and new types of robots, and expand the areas of its core businesses.

It will develop components and new automation equipment compatible with Build to Order (BTO) for motion control and robotics and accelerate the realization of Yaskawa Industrie 4.0.

#### ▽ Build foundation for realizing Vision 2025



In its Clean Power business, Yaskawa will further continue to advance its development of products with consideration for the creation of energy, the use of energy, and the storage of energy.

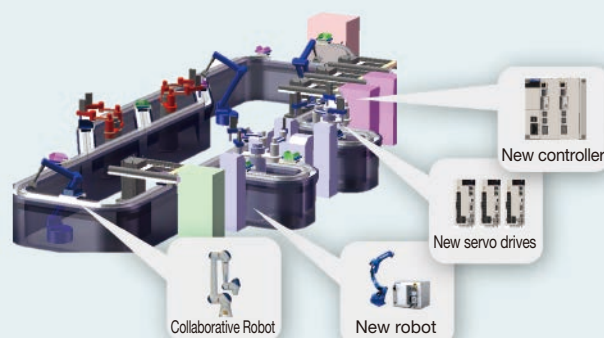
As for the medical and welfare domain, Yaskawa will apply mechatronics technology to leverage human capacities and develop products that will enable qualitative improvements for everyday living. And furthermore, it will realize safe, stable supplies in the automation of food production and also leverage its expertise to aim for boosted efficiency and productivity.

### ● R&D Results & Topics for FY2016

In aiming to conduct in-house validation of next-generation production systems, Yaskawa decided to set up a Solution Factory, a state-of-the-art, next-generation production plant in Iruma that will realize the company's concepts for IoT and AI. (Operations planned to start in June 2018.)

There are expectations of demand for big data and high-speed processing in Industrie 4.0, a focus of attention as a next-generation production system. Yaskawa is pushing forward the development of various components as it looks toward such future demands. The MP3110 machine con-

#### ▽ Concept of advanced components and a next-generation production system

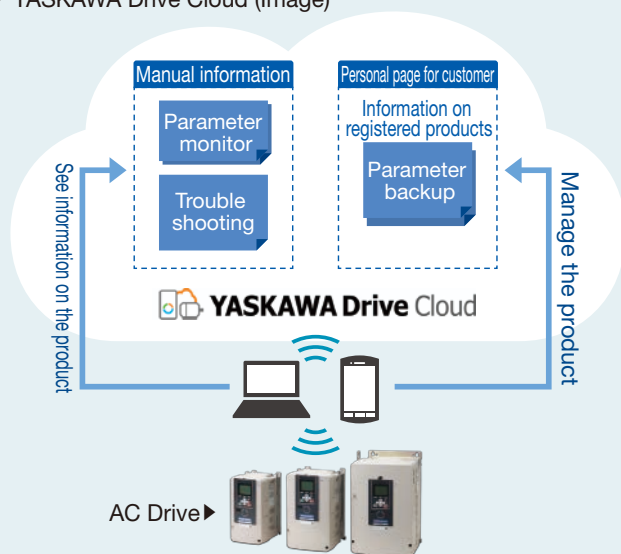


troller, which has become available during this period, is a product that offers excellent high-speed performance and is compatible with real-time operating systems.

The company expanded cloud services by releasing YASKAWA Drive Cloud for the GA700 AC drive series for industrial and general-purpose, in addition to the cloud services already released for AC servos, controllers and robots.

With cloud services, its parameters may be set and its status of operation checked remotely through a smartphone or a tablet using a wireless connection, and it has been enabled for quick access to information on product support, decreasing the downtime that occurs in the event of a problem.

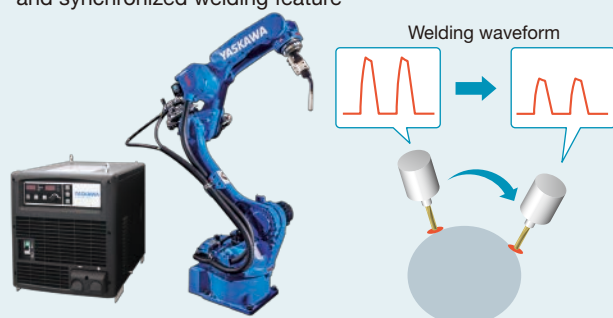
#### ▽ YASKAWA Drive Cloud (Image)



As for robots, Yaskawa developed a new type of robot directed for existing areas where global demand will increase and also for new areas. It has commercialized small robots that are optimal for painting small products and six-axis vertical articulated robots for biomedical use that requires high standards of hygiene control.

The company has also realized a synchronized welding feature that will improve the quality and efficiency of thin plate welding by combining the power source for arc welding compatible with AI features and the new YRC1000 robot controller.

#### ▽ Power source for welding that is compatible with AI features and synchronized welding feature



## Intellectual Property

### ● 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

