

# Discovering unparalleled values

## Using robots to meet diverse automation needs

In 1969, Kawasaki was the first in Japan to start making and selling industrial robots. Since then, we have developed many robots as a domestic pioneer in this field, and we have contributed to progress in industries through automation and labor-saving systems. Today, Kawasaki robots represent a top brand in the market for robots used on automobile production lines and have also captured a leading share of the global market for robots used in semiconductor fabrication. Looking to the future, there is huge potential for wider application of robots that coexist with humans in a harmonized environment, and we will pursue this approach as well as new initiatives for robotics in medical and healthcare and other applications. With our 50th year in the robot business just around the corner, we can expect demand for Kawasaki robots to accelerate and the business to grow.



### duAro and Humans

In 2015, Kawasaki began sales of *duAro*, an innovative, dual-arm SCARA robot that can work alongside humans. This robot has the ability to execute a range of motions similar to that of human arms and can be easily positioned into a one-person area to perform the tasks of a human. Meticulously focused on being easy to use, our engineers raised the bar with a robot that is both easy to teach and very practical. To date, issues of preparation time and cost versus effect were obstacles to automation in the electric/electronic and food industries, but *duAro* clears these hurdles and will certainly contribute to automation in these and other sectors.

### Robot Market Primed for Growth

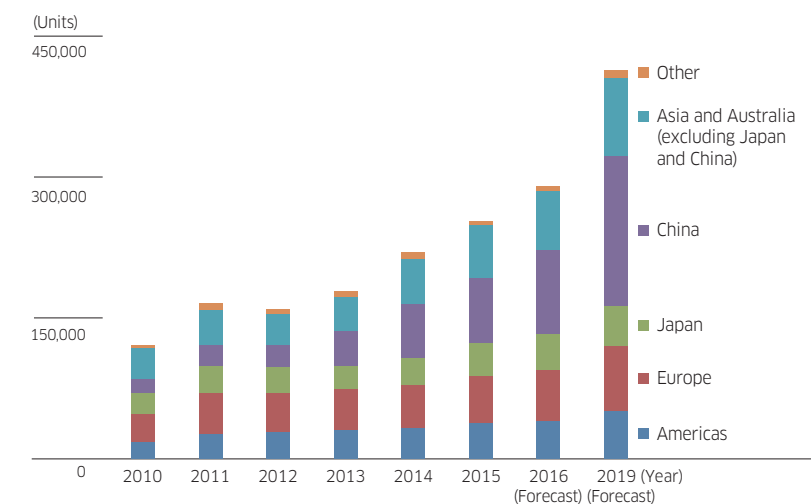
Industrial robot markets around the world are characterized by sustained high growth. In China, particularly, the market is expanding at a rapid rate, fueled by a labor shortage and skyrocketing labor costs. This situation is likely to continue, with demand for robots in Asia, centering on China, remaining high.

The range of applications for robots is also expanding, paralleling greater need for automation at customer sites in more industries, beyond automobiles to semiconductors, electronics and food and even further to pharmaceuticals and medical care. Of these industries, it is pharmaceuticals and medical care that presents a very promising market for robots, since the graying of society in developed countries, including Japan, will heighten demand for prescription drug production, nursing and medical care, and treatment methods that reduce the physical burden placed on patients.

In addition, international regulations on the safety of robots have been revised in recent years, prompting proposals for robots compliant with such regulations to be used as robots that coexist with humans in a harmonized environment.

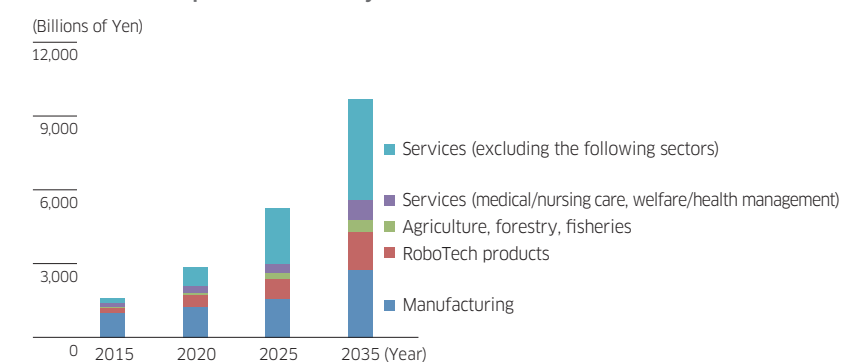
Because of this, fields where robots play an active role are likely to expand still further, and expectations for companies like Kawasaki to

Estimated Annual Shipments of Multipurpose Industrial Robots by Region



Sources: UNECE, IFR, national robot associations

Market Scale of Japan's Robot Industry



Source: FY2010 Survey of Future Robot Industry Market (Ministry of Economy, Trade and Industry, and New Energy and Industrial Technology Development Organization)

deliver robots and associated technology as solutions to diverse automation needs will reach unprecedented heights.

### Business Expansion for Kawasaki

Kawasaki is pursuing business with an emphasis on the following three points.

#### New market creation for industrial robots

We will extend the boundaries of the market for industrial robots by reinforcing core technologies, such as those for welding and painting, and enriching the spectrum of applications. We will also push ahead with robots that coexist with humans in harmonized environments, showcasing *duAro*, and cultivate new automation needs at manufacturing sites.



Industrial robots

#### Pursue opportunities in the field of medical robots

We positioned medical robots as a business that will support the eventual reality of a society with more seniors in the population, and we established a joint venture, Mediaroid Corporation, with Sysmex Corporation, to focus on medical robots. Mediaroid is working on development of applied robots, which utilize industrial robot technology for medical applications, as well as surgical support robots, with the goal to turn these products into a revenue-generating business.

#### Strengthen Kawasaki robot brand

We aim to cultivate a sense of security in Kawasaki robots not only through high quality but also through new services utilizing IoT. We will also strengthen the brand by presenting new concepts in the interaction of humans and robots through Kawasaki Robostage, our showroom in Tokyo.



Kawasaki Robostage



Kawasaki robots will create a new market that underpins our efforts to realize a society in which people and robots can coexist.



Yasuhiko Hashimoto  
Managing Executive Officer  
General Manager, Robot Division,  
Precision Machinery Company



### New Market Creation Through duAro that Coexists with Humans

The use of robots is expanding beyond the automobile industry to other production industries, such as semiconductors and electronics. But currently, the majority of installations are for mass-production industries populated by large companies worldwide. In fact, in small and medium-sized manufacturing industries, which actually employ the most workers, very few companies use robots in their operations. Reasons include short product cycles, lack of adequate space for safety fences, and the perception that robots are too difficult to deal with. *duAro* is a new kind of robot that coexists with humans and has potential in many different industries, including electric/electronics and food. But our goal was to address the underlying issues that have prevented small and medium-sized manufacturing

businesses from embracing robots. In this sense, *duAro* is revolutionary.

In creating *duAro*, the development team exclusively targeted simple work otherwise performed by humans. In addition, while it usually takes six months before conventional robots are fully installed, the required time for *duAro* can be shortened from three days to seven days. This is a feat of historic proportions in industry circles. At small and medium-sized factories, many products are manufactured in just one month and the installation of robots could cause a major bottleneck in operations. But with setup potentially in as little as three days and, if *duAro* can also be transferred to another production line, management and employees would surely be comfortable with the investment.

In the robot business, coexistence-type robots present the most growth potential. If we can create robots that coexist with humans, they might

be able to be used not only in the factory, but also in offices, shops, restaurants and other places where they do tasks alongside human colleagues. Our goal is to be a leader in this new market.

### Kawasaki Robots Presenting Solutions

We make robots. True. But our efforts are not focused solely on enhancing the features or performance of the unit itself or on cutting costs. Our customer base is diverse and includes automakers as well as members of the semiconductor, electric/electronics and food industries, and we constantly think about what these customers require in their operations to provide solutions tailored to each production site. The merits of this approach as well as the system for implementing projects are well regarded by customers, and this reputation has underpinned growth to date. Speedy proposals and development capabilities have also won high marks, but through collaboration with customers in the semiconductor industry, which operates on a quick product cycle, we have enhanced these qualities. The most striking aspect of our robot business is that it has grown along with our customers' businesses.

In recent years, with robots being used now in various applications, the advantage of having a robot business within the Kawasaki Group has taken on greater significance. Kawasaki is involved in many businesses, and nearly all manufacturing activities under the Group umbrella use the in-house brand of robots. Also, lately, there is increasing interest in-house to use robots to make products for which robots had not previously been used. We are pursuing joint activities with other divisions to develop new robots for such applications. Field tests are run in-house, and potential new robot business can be verified and nurtured in-house. For the Robot Division, which has a mandate to present robot-based solutions, the ability to conduct trials and test the business waters in-house is a tremendous advantage.

Kawasaki also has the Corporate Technology Division, which promotes R&D activities in tandem with all the Company's operating divisions. The Corporate Technology Division and the Robot Division jointly promote robot applications, giving us—the Robot Division—centralized access to the technological expertise of all operating divisions. This creates an environment conducive to new pursuits, such as difficult applications and different markets, and I believe such an environment is a strength in developing new and better robots.

### Robots Supporting an Aging Society

Today, in developed countries, society is aging, and an inevitable decrease in the future working population is an issue of concern. Robots are the likely solution to fill that gap in labor and support the aging society, and much discussion is taking place on the future robot ideal. Some of the labor shortage will be offset by people from overseas, but work in areas where people lack the necessary skills or strengths will be left to robots. Robots that coexist with humans in a harmonized environment will fulfill even greater roles.

It will be possible, and perhaps even necessary in the graying society, for seniors who are willing and able to continue to work. But sight and physical strength diminish with age, and robots will be needed to compensate for the disparity between what a job requires and what an older person is capable of doing. People make decisions and determine how to get things done. If human knowledge and ingenuity are appropriately combined with robot-derived convenience, countries with large ratios of seniors in the population will realize a society in which even older people can work within their physical limitations. If robots assist people, not only the elderly but also the disabled will find it easier to remain active in society.

Robots will be necessary when a person's age or illness requires nursing care. In the future, nursing care service providers and doctors will be in extremely short supply. IoT and robotics will significantly help to offset these shortages. Inevitably, robots will have a huge duty to fulfill.

To us, in the robot business, we see responses to the new needs of society as an aspect of social contribution. At the same time, such responses create new markets and present new business opportunities. Through this business, we will realize a society in which people and robots coexist. We will strive to present solutions to the various issues that characterize an aging society, while taking the lead in new markets to grow the business.



SOT-100 Vercia, an operating table to move patients into a number of positions, from Medcaroid Corporation

