

Kawasaki's distinctive lineup of robot products



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Preface

Kawasaki sells a wide variety of robots to industries such as automotive, general machinery and semiconductor. From an application point of view, we provide robots for spot welding, painting, assembly, handling, and arc welding etc. In addition to industrial robots, we also provide automation cells including peripheral equipment. In this paper, we would like to introduce Kawasaki's latest robot and automation cell lineups.

1 Robots for automotive and general machinery industries

In 2011, we launched the BX series robots for spot welding application (Fig. 1). This new BX series features a more

compact and slimmer arm which realizes higher motion speed compared with our existing ZX series. In addition to these features, a new structure is employed that enables external cables to be housed inside the robot arm and wrist, realizing a neat and slim design. We also launched the NC locator robot designed for flexible part (workpiece) positioning previously conducted by dedicated jig tools. By combining the BX series robot and the NC locator robots, we can provide very compact and flexible car body assembly lines to customers.

For the general machinery industries, we offer the RS series robots (Fig. 2). The RS series robots feature a slimmer arm structure that enables robot motion within a narrow working space and has a wider motion area and higher speed compared with our former robot model the FS series. The RS series lineup covers a wider range of



Fig. 1 BX series




Reach (mm)									
3,150					RS15X				
2,100							RS30N	RS50N	RS80N
1,925				RS10L					
1,725						RS20N			
1,650		RS06L							
1,450				RS10N					
903		RS05L							
705		RS05N							
620	RS03N								
	3	5	6	10	15	20	30	50	80
	Maximum payload (kg)								

Fig. 2 RS series (representative example)

payload from 3 kg (RS03N) up to 80 kg (RS80N). We also launched RS series robots for dedicated purposes, such as palletizing (RD80N) and sealing (RS15X). Thus, the RS series covers a wider range of application—handling, assembling, transferring, and sealing etc.

2 High-speed pick and place robot

For high-speed pick and place application, we developed the picKstar robot with a parallel link mechanism (Fig. 3). This robot is used for parts aligning and box packing of small parts in food, pharmaceutical, and cosmetics industries. Our picKstar demonstrates an extremely high speed and a wider motion range.

In many picKstar applications, we use vision systems. Because picking parts are delivered by the infeed conveyor in random orientations, we use a vision system to detect the orientation, and based on this information, the robot can pick the parts accurately, and then execute the box packing action. Kawasaki already developed a vision system named K-VFinder for 2D application and LSC (Laser Slit-scan Camera) for 3D application. In the case of picKstar, we use the vision system K-VFinder for 2D, and realize high-speed and accurate pick and place action.



Fig. 3 picKstar

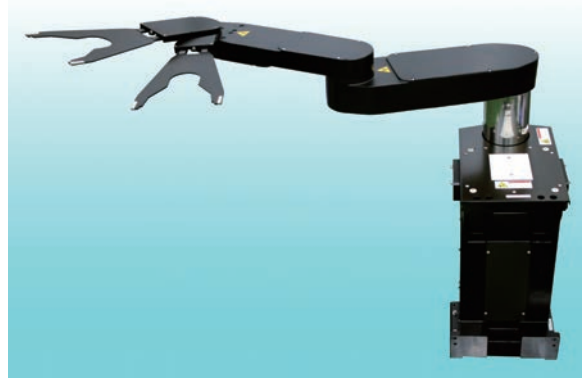


Fig. 4 NT series

3 Semiconductor Robot

Our lineup for the semiconductor industries includes the NS series, NX series, and NT series (Fig. 4) as semiconductor wafer handling robots. The newly launched NT series provides a common platform solution from 2 FOUP up to 4 FOUP applications without a track. Kawasaki wafer handling robots demonstrate minimal vibration and high accuracy in high-speed motion because of the high-stiffness arm and high-performance controller. These robots are highly evaluated by high-demand customers and shipped to many semiconductor equipment customers and end-users. Recently, we are proceeding with development activities for the coming new standard 450 mm wafer.

*FOUP (Stands for Front Open Unified Pod. A type of closed wafer cassette.)

4 Automation Cell

To cover a wider range of customer requests, Kawasaki also offers robot automation cells in addition to a lineup of industrial robots. In this section, we would like to introduce our representative automation cells.

(i) DANBOT

DANBOT is an automation cell that is specially designed for cardboard manufacturing customers, and consists of not only a robot, but also an end-effector, a conveyor, a stacking device, and slip sheet extraction devices etc. By applying the DANBOT cell, automated cardboard palletizing lines can be very easily set up. No dedicated slip sheet machine is required, which enables space-saving installation for the customers.

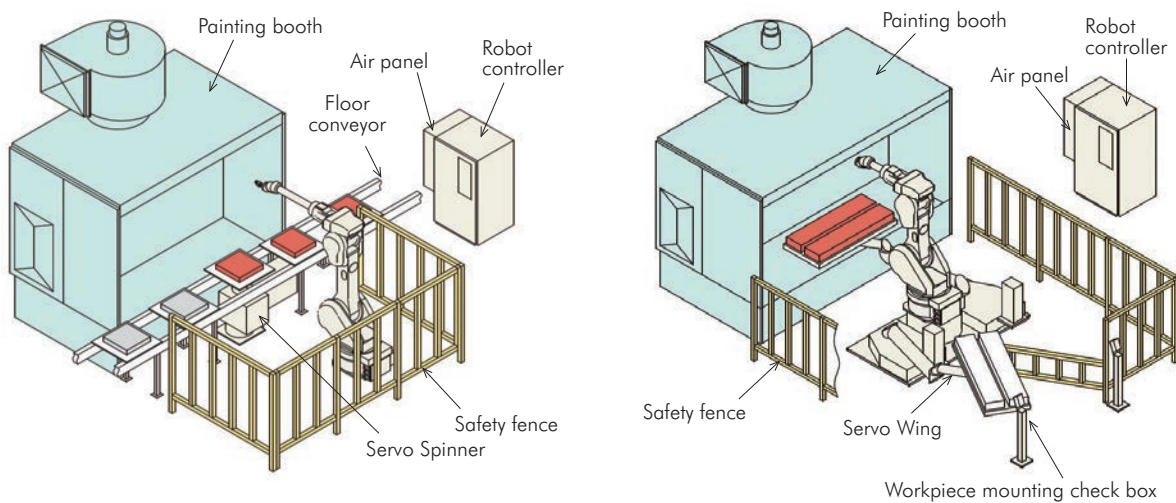


Fig. 5 Example of painting automation cell

(ii) Painting Automation Cell

Kawasaki prepared six types of painting automation cells that can be selected according to the size and shape of the painting parts (Fig. 5). Because we can provide these cells as an integrated set, these can contribute to shortening the startup time for the customers.

5 Controller

The controller is a very important unit for a robot to perform high-speed and high-accuracy motion stably. Our newly launched controller is the E series, and it is now already applied to the BX series, RS series, and pickStar robots. According to the global region, we prepared Asian and Japanese version, North America version, and EU version E controllers. We also prepared small size E series controllers E7X/9X for small robot application.

In the case of the Asian and Japanese version E series

controller, we realized a 40 percent volume downsizing, and 25 percent footprint downsizing compared to our former D series controller (Fig. 6). As for the Teach Pendant, the operation method has not been changed from the current model, but a new GUI delivers a more user-friendly operation. A USB port—now a global standard—is incorporated. And the main CPU processing capacity has been greatly improved, thus enabling advanced control.

Closing

Kawasaki is now developing peripheral equipment, support tools, vision systems, and end-effectors as well as industrial robots and automation cells. We are also developing the offline teaching software K-ROSET, which makes simulation on PCs very easy. From now on, we would like to promote these developments and also provide user-friendly and productivity-boosting products.

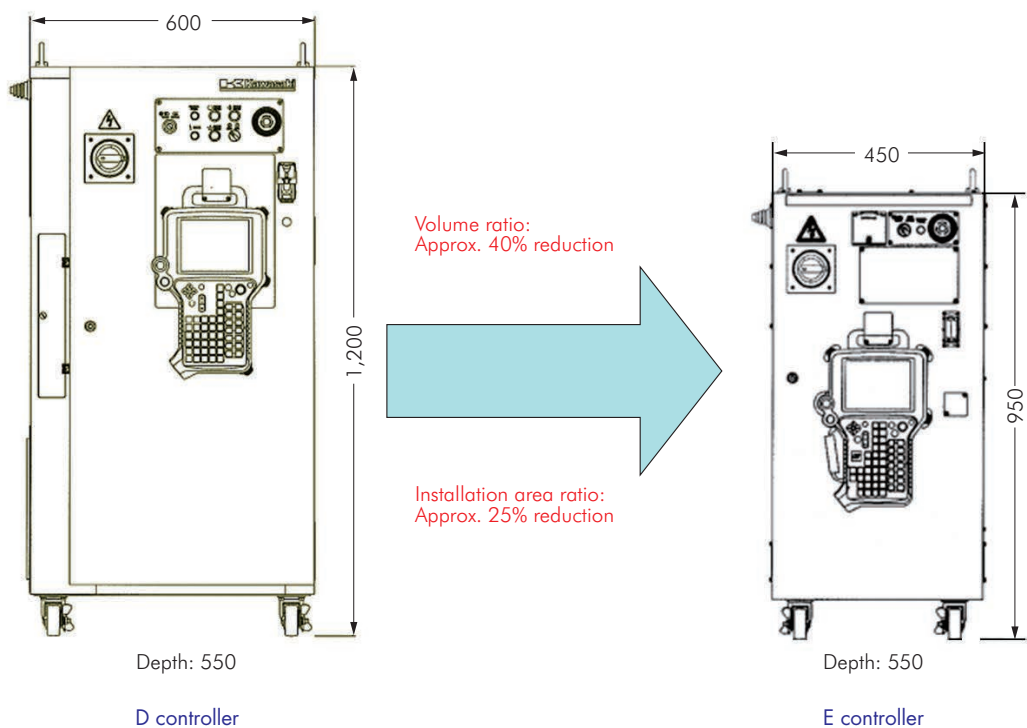


Fig. 6 Major downsizing achieved with E controller (Example of Asian and Japanese version)