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https://robotics.kawasaki.com/

✻ Materials and specifications are subject to change without notice.

Kawasaki Robot

CAUTIONS TO BE TAKEN TO ENSURE SAFETY

- For those persons involved with the operation / service of your system, including Kawasaki Robot, they must strictly observe all safety regulations at all times. They should carefully read the Manuals and other related safety documents.
- Products described in this catalogue are general industrial robots. Therefore, if a customer wishes to use the Robot for special purposes, which might endanger operators or if the Robot has any problems, please contact us. We will be pleased to help you.
- Be careful as Photographs illustrated in this catalogue are frequently taken after removing safety fences and other safety devices stipulated in the safety regulations from the Robot operation system.

ISO certified in Akashi Works.

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Printed in Japan

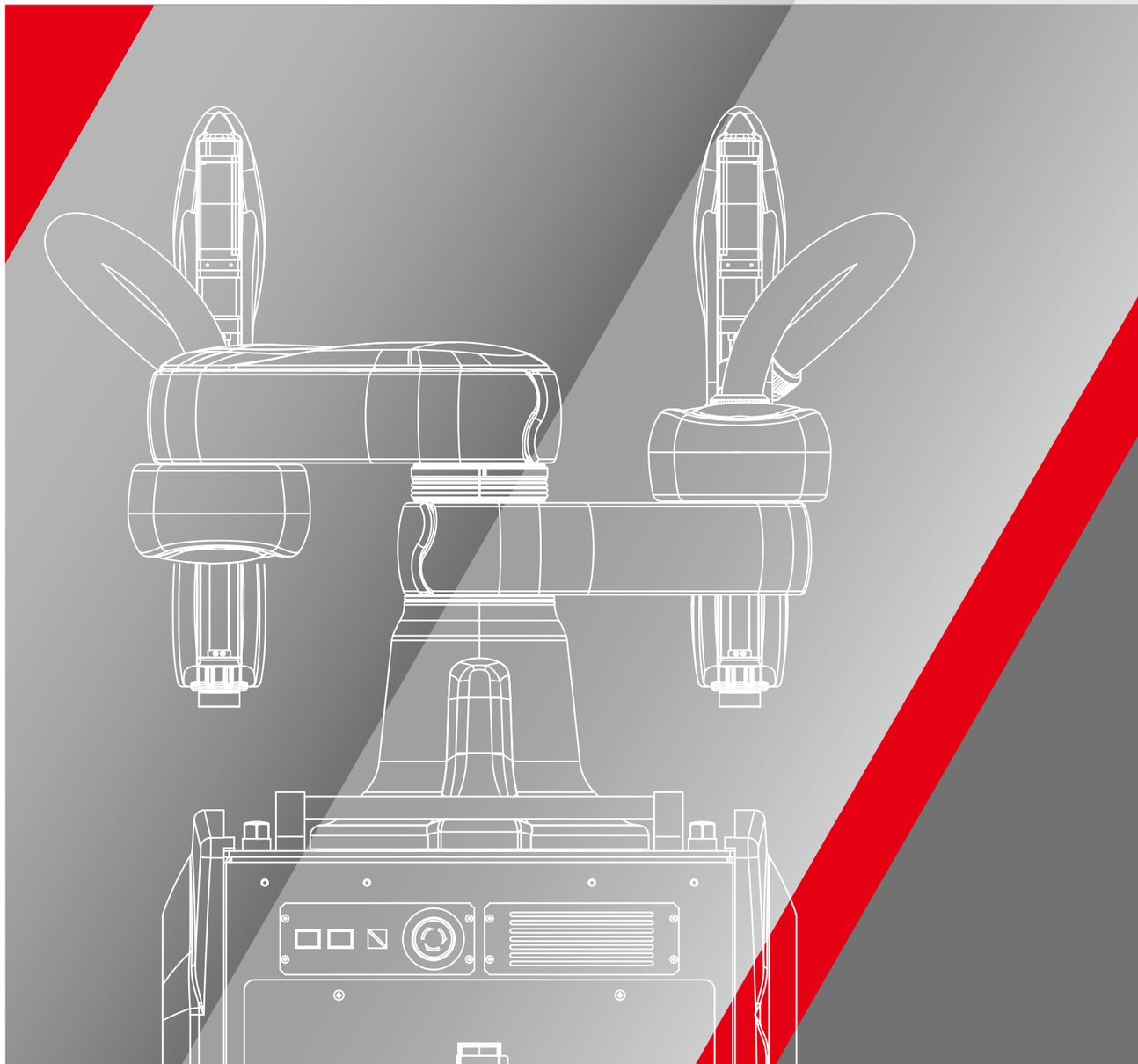
Kawasaki
Powering your potential

duAro

50th ANNIVERSARY
Kawasaki Robotics

Kawasaki Robot

duAro Dual-arm SCARA Robot "duAro"



The “duAro” Dual-arm SCARA Robot by Kawasaki Robotics:
A Brand-new Offering that Realizes the Concept of an Innovative Dual-arm SCARA Robot

Features:

Coexistent operations with people

Low-power motors and a speed-reducing function helps the duAro to coexist with people in customers’ work operations. Also, in the event of a collision with people and other object, the collision detection function will help to make the duAro’s movement stop.

✻ In order to reduce risk, customers shall, at their own responsibility, establish and implement a risk assessment to coexist with people in customers’ work operations before and during use of the duAro.

Saves space

The “duAro” dual-arm robot, with its two coaxial arms controlled by a single controller, can fit into a single-person space. The coaxial dual-arm configuration makes it possible to perform coordinated movement, which has been impossible for even two SCARA robots, in addition to dual-arm operations.

Ease of introduction

The wheeled base on which the arms are placed accommodates the controller. This enables the user to move the robot together with its base to any location desired.

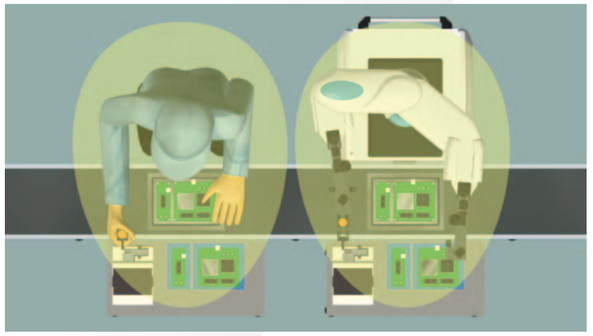
Ease in teaching operation

Direct teaching by holding the robot’s arms allows the user to easily teach the robot the movements required of them.

Various options

Teaching operations can be conveyed via tablet or teaching pendant, both of which can be connected to multiple robots. A vision system and standard gripper options are also available.

Occupying only a space equal to one person, the dual-arm SCARA robot works well with people.



Set up a working range to help to coexist with people.

The duAro’s arm is 76 cm long, similar to an average person’s working range.

No line changes required to introduce duAro

One duAro occupies only the space of a person, so no line changes are necessary for the robot.

Collision detection function

If the duAro detects contacts and collisions with people or other object, its collision detection function will help to make the duAro’s movement stop promptly.

✻ The collision detection function is designed to reduce the risk of accident. However, this function has its limitation and cannot prevent all accidents, and it is not a substitute for safe and attentive use. It is the customers’ responsibility to set up, use and operate the duAro, and please be careful at all times.

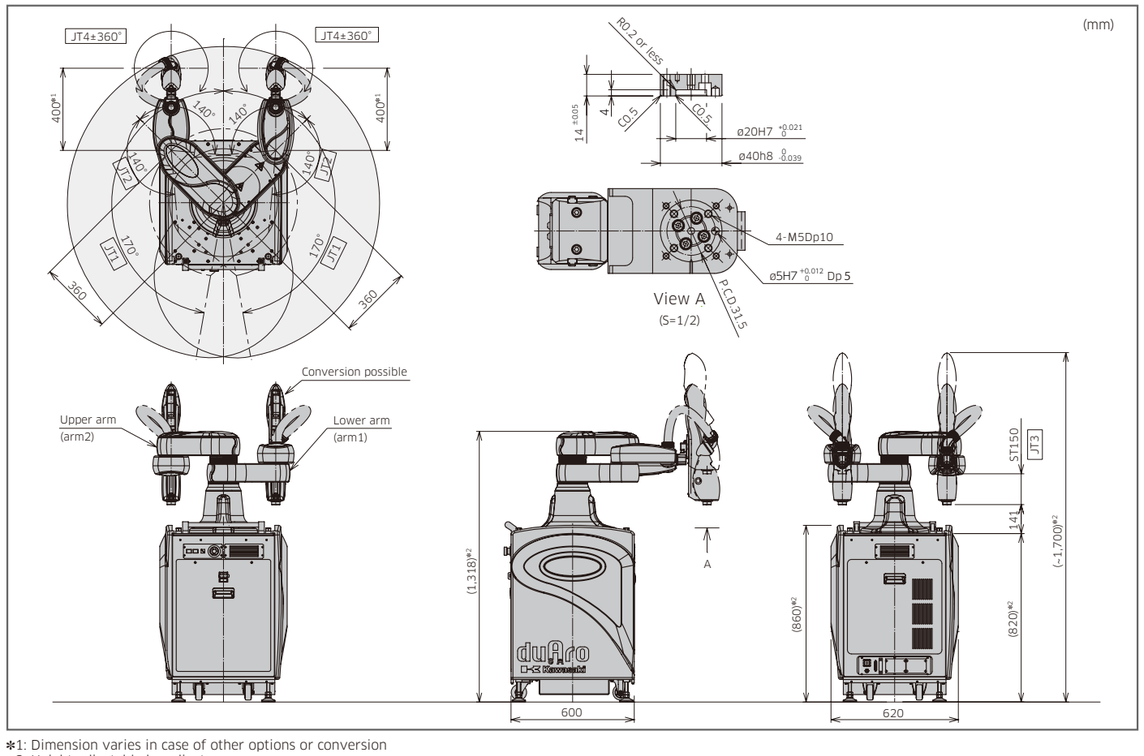
✻: “duAro” is a trademark of Kawasaki Heavy Industries, Ltd.

Specifications

		duAro 1	
Application		Assembly, Material handling, Machine tending, Dispensing	
Degree of freedom (axes)		4 × 2 arms	
Max. payload (kg)		2 (1 arm)	
Positional repeatability (mm)		±0.05	
Motion range (°)		Arm 1 (lower arm)	Arm 2 (upper arm)
	Arm rotation (°)	-170 - +170 (JT1)	-140 - +500 (JT1)
	Arm rotation (°)	-140 - +140 (JT2)	-140 - +140 (JT2)
	Arm up-down (mm)	0 - +150 (JT3)*1	0 - +150 (JT3)*1
	Wrist swivel (°)	-360 - +360 (JT4)*1	-360 - +360 (JT4)*1
Number of controlled axes		Max. 12	
Drive system		Full digital servo system	
Types of motion control	Manual mode	Coordinated movement of dual arms, Individual movement of one arm [Interpolation mode], Joint , Base, Tool	
	Auto mode	Coordinated movement of dual arms, Individual movement of one arm [Interpolation mode], Joint, Linear interpolated motion	
Programming		Direct teaching method, Simple teaching method through tablets	
Memory capacity (MB)		4	
I/O Signal	General input (Number of input)*2	NPN model: 12 (Max 28) / PNP model: 6 (Max 16) / Cubic-S model: 6 (Max 16)	
	General output (Number of output)*2	NPN model: 4 (Max 12) / PNP model: 10 (Max 24) / Cubic-S model: 0 (Max 14)	
Power requirements		AC200-230V ±10%, 50/60Hz±2%, 1ø, Max. 2.0kVA	
		Class-D earth connection(Earth connection dedicated to robots), leakage current: maximum 10mA	
Mass (kg)		about 200	
Installation		Floor	
Environmental condition	Temperature (°C)	5 - 40	
	Humidity (%)	35 - 85 (No dew, nor frost allowed)	

*1: Specification varies in case of other options or conversion
*2: Excluding the signal No. which is occupied by the dedicated signal. Indicated Max signal number is optional.

Motion range & dimensions

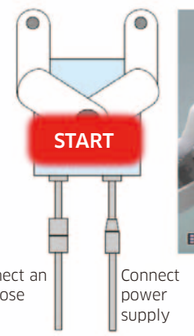


*1: Dimension varies in case of other options or conversion
*2: Height adjustable by adjustor

Features

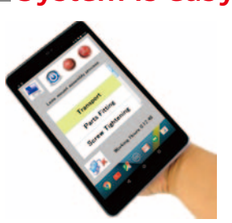
Easy to introduce

Easy to deploy



Using only a power line and an air hose, the robot can replace one worker within the space for a person.

System is easy to configure

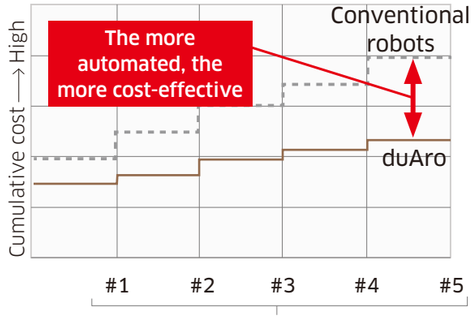


A tablet is available for teaching multiple robots.

Benefits of introduction

Lower total cost

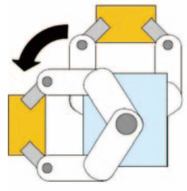
Cumulative cost image

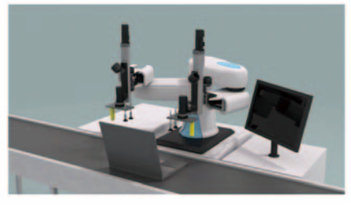


*The graph is a concept
Number of changing lines

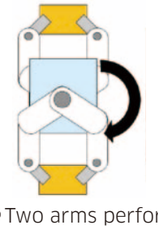
Cumulative costs are lower than those of conventional robots, thanks to lower costs for line changes.

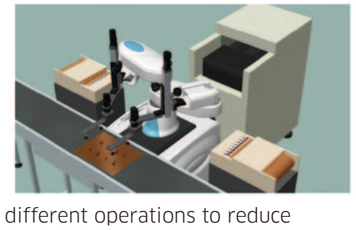
○Even simple hands are able to carry large workpieces by using both hands



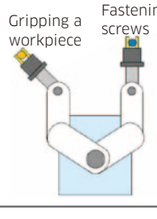


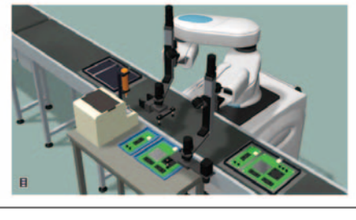
○The coaxial configuration enables the robot to reach equipment at its back





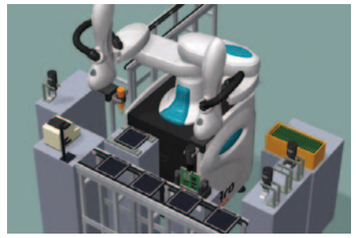
○Two arms perform different operations to reduce cycle time



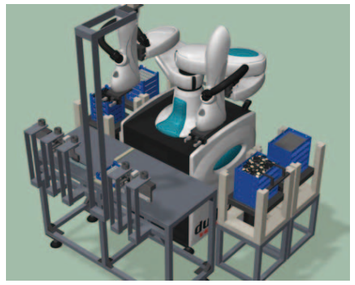


Available for a wide range of applications

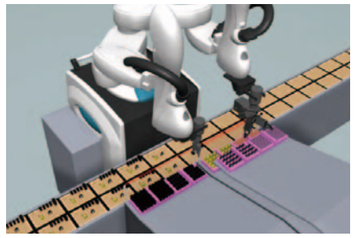
Fastening screws



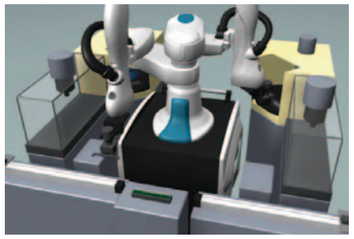
Arranging electronic parts in bulk



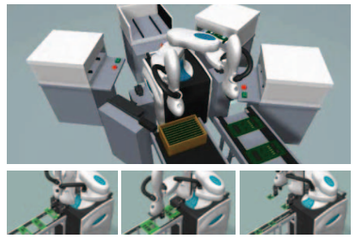
Part-mounting



Spray-coating / UV curing

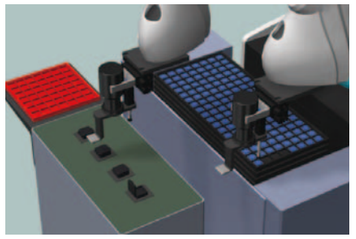


Loading onto and unloading off of a board inspection device



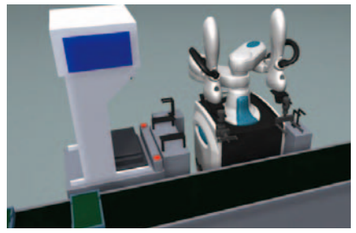
Device application examples with using board chucks

Inspecting electronic chips



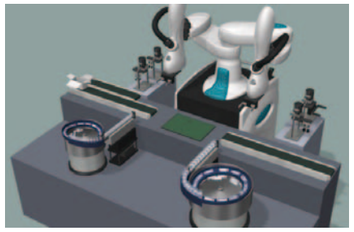
Bagging boards

Inspecting boards

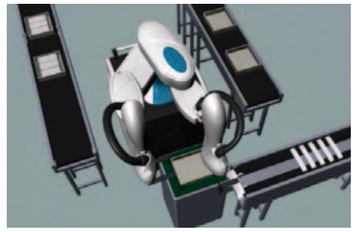


Dispensing

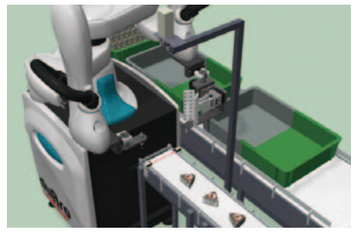
Packaging plastic bottles in boxes



Packaging confections

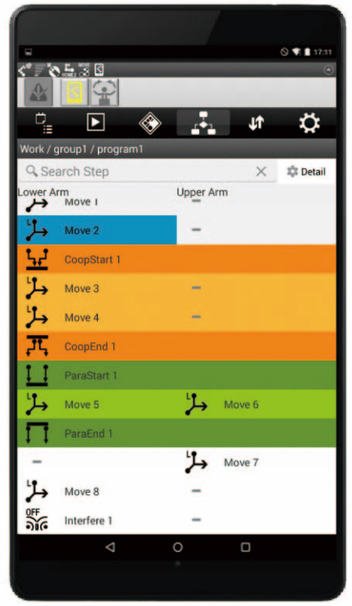


Loading rice balls onto trays



Tablet and software

Robot Teacher 2



Offers an easy-to-teach method with intuitive touch operations. Tablet software for duAro

You can use familiar touch operations on a visually simple display to operate and teach your robots. Wireless support eliminates the need for complicated wiring. User-friendliness even for those with little experience operating a robot helps reduce working hours.

System requirement for tablets

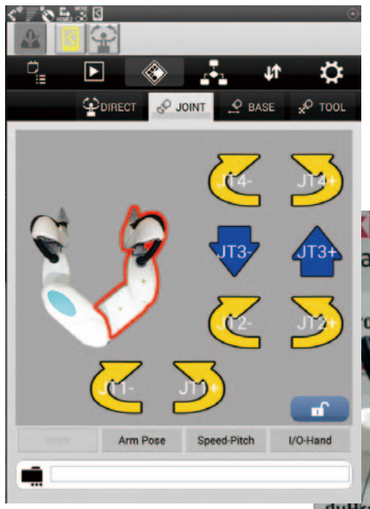
Item	Specification
OS	Android 4.3 or later*1
dp*2	Width of the smallest side of the Tablet in 600dp or greater*3.
Network	Wi-Fi
Processor	ARM(ARMv7)*4

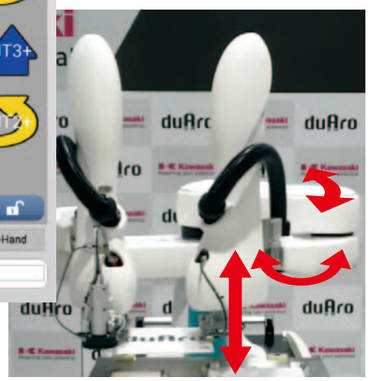
*1: From Android 5.0 to any version earlier than 7.0 shall be required for Cubic-S supported version.
*2: Refer to the Web site for the Google™ Android Developer for further information about dp (Density-independent pixel).
*3: Supports RobotTeacher2 Revision7 or later.
*4: Essential only for Cubic-S supported version.

Tested Device

Device	Manufacturer
ZenPad3 8.0	ASUS
ZenPad 10	ASUS

An intuitive and user-friendly display allows even beginners to easily operate the robot.





While monitoring the robot's status, including its current state, you can easily stop or restart operation with the push of a button.

*: Google, Android is a trademark of Google Inc.

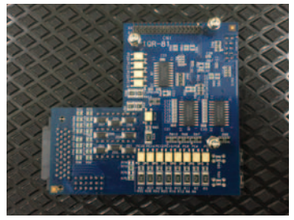
I/O Extension

External I/O signals are available for connecting external sensors, valves, switches and/or lamps.
If the number of standard I/O signals (12 inputs, 4 outputs) is not enough, you can add a board to increase the number of signals. (1) Extension I/O board and/or (2) CC-Link board are available.

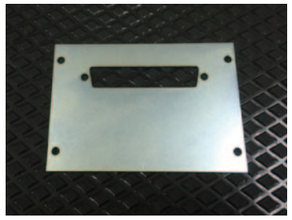
Additional Option = (A) Board + (B) Harness in the cart + (C) Connector panel

I/O extension board

This option provides an additional 16 inputs and 8 outputs for hardware signals
(up to 28 input and 12 output ports, together with the standard I/O).

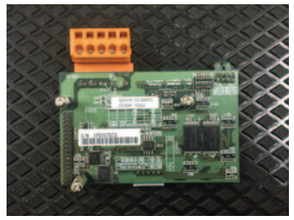

(A)


(B)

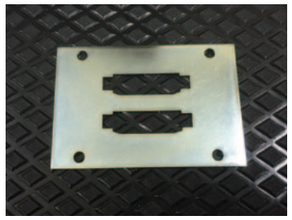

(C)

CC-Link board

This option enables you to connect the robot controller to a CC-Link fieldbus network
(as a remote device station).


(A)


(B)


(C)

Device type		Slave (remote I/O device)
Baud rate		Select one from 156 Kbit/s, 625 Kbit/s, 2.5 Mbit/s, 5 Mbit/s or 10 Mbit/s
I/O counts	Max. bit count	Input: 224, Output: 224 (the last 16/16 bits are for system)
	Max. word data	Input: 32, Output: 32
Version		Version 1.0 / 1.1 / 2.0
Communication service		Polling
Transmission medium		Cable exclusive for CC-Link
Configurable stations (address on CC-Link)		1-64

Power harness

A 5m-long harness for supplying primary electricity can be linked with the cart connector.

Programming tool

K-ROSET

Kawasaki Robot Solutions K-ROSET

Kawasaki Robot's offline programming tool enables a variety of production configurations

The application can build 3D models of robots, peripherals and products to verify various system configurations. Verification of operation time of robots and interference with surrounding objects ahead of introduction can reduce the risks associated with the initial system launch. The tool also has rich support functionality to create motions and programs for the robots, thereby contributing to a reduction in working hours.

Robot simulation technology

- The virtual robot controller technology that Kawasaki has developed over the years can estimate motion trajectories and cycle times as accurately as the hardware robot controllers.
- You can operate the same tablet as one used for the real machine.

Layout design

- Capture data from 3D-CAD to arrange the products. (STL format)
- Interference check function allows you to check if there is contact among models.
- (Interactive) Wizard ensures reliable operations even for those who are unfamiliar with layout design.

Operation environment

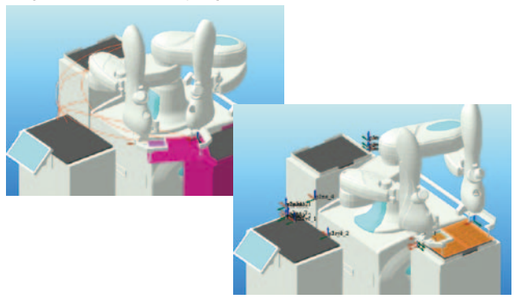
- Available in common Windows environments
  Supported OS: Windows® XP, 7 (x86, x64*)
  *On a 64-bit computer, it runs in the 32-bit compatible mode.
- Available in four languages.
  Japanese/English/Chinese/German

Teaching and programming

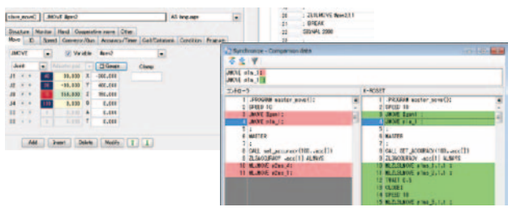
- Teach point modeling facilitates checks for working positions and moves robots to their working positions.
- Coordinated movement setting allows you to easily teach multiple arms.
- You can check the status of robot operations and I/O signals.

Linking with a tablet
The tool can link with a tablet for actual robots.

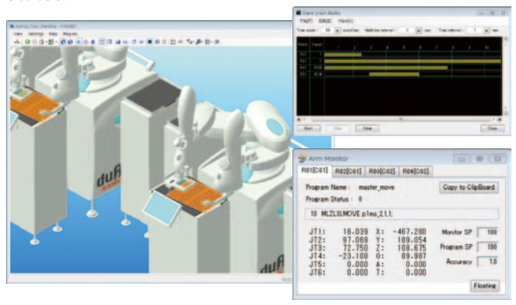
Drawing
Interfering models are highlighted and a robot's working position (teaching point model) and motion trajectories are displayed.



Program editing
Keeping those who are unfamiliar in mind, this tool allows you to add an item that offers instructions for editing a program.
Comparing the programs before and after modification, you can review modification details during a programming operation.



Monitoring
The states of I/O signals are shown in graphs.
You can monitor running program steps and robot status.



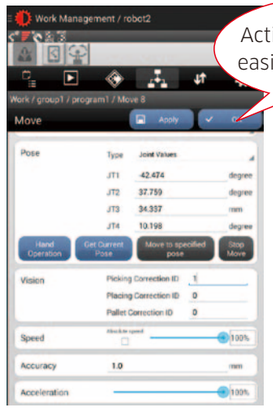
Kawasaki vision system

We've customized and introduced an advanced 2D-vision system that can flexibly and quickly support broad applications into duAro.

Features

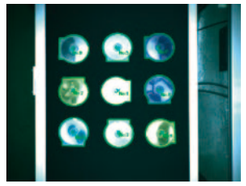
Pursuit for “Easy to Use”

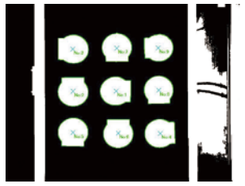
The easy operation menu customized for duAro enables those who handle industrial robots or vision devices for the first time to make full use of the functionality quickly (an advanced menu is also available according to customers' applications).
Also, you can use a tablet to make duAro conduct correction movements easily, with no need to edit any program.
(Sophisticated processing, such as variety discrimination or barcode recognition, requires AS programs.)

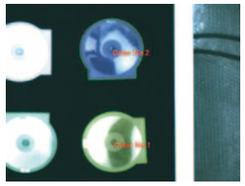


Sophisticated menu supports diversified applications

Kawasaki Robot Solutions
K-VFinder


Pattern-matching

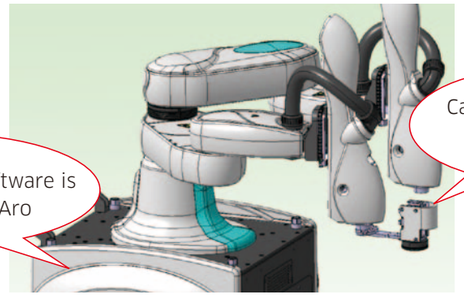

Binarization


Color processing

Examples of sophisticated menu
·Variety discrimination
·Defect inspection
·Barcode recognition, etc...

Embedded in duAro’s compact body

All vision devices are embedded in or can be attached to duAro; without any need to rearrange wiring after moving duAro.



*No display, mouse or keyboard is included in the accessories. Prepare your own if necessary.

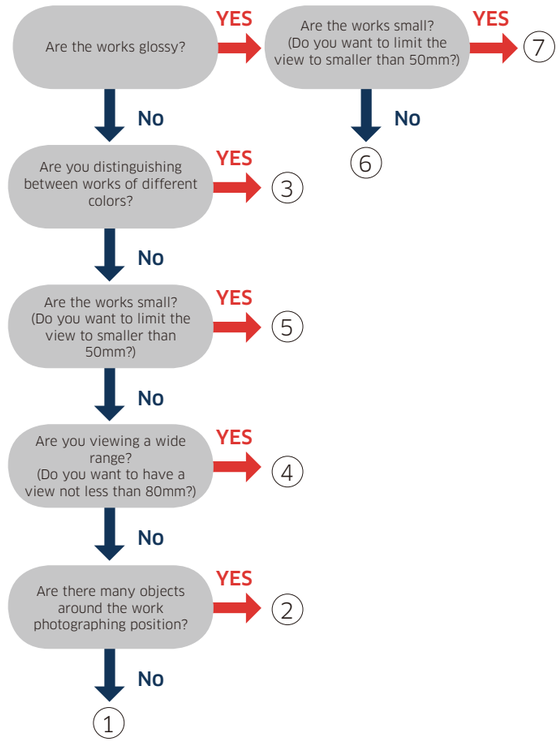
Minimize burden of reconfiguration after movement of duAro

Reconfiguration of a robot is usually required after moving it or moving equipment around it. However, with the vision system, the “device correction” corrects the position information to restart duAro swiftly.

Vision correction
Restart swiftly!

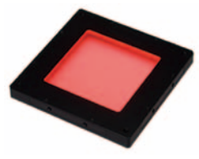
Device selection

According to the type of work and environment, select the combination of "camera," "lens" and "light" from the choices below. Use the flowchart if you are not clear about selection criteria.




Ring light


Bar light


Flat dome light

Mounted camera Option types

	Camera	Lens	Light
①	Monochrome	View 50mm	Ring light
②	Monochrome	View 50mm	Bar light
③	Color	View 50mm	Bar light
④	Monochrome	View 80mm	Ring light
⑤	Monochrome	View 30mm	Ring light
⑥	Monochrome	View 50mm	Flat dome light
⑦	Monochrome	View 30mm	Flat dome light

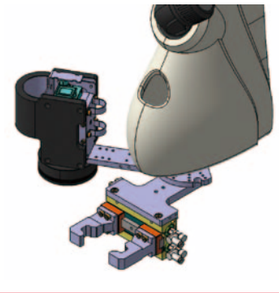
*The view is estimated with a distance of 100mm from an object.
*A view not less than 80mm is supported with a fixed camera. In this case, choose a suitable lens and suitable lights according to the view size.

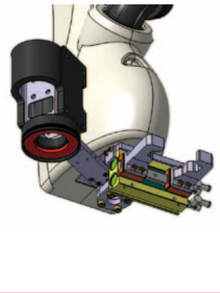
Specifications

		Weight	Feature
Camera	Monochrome / Color	66g	Pixel count: 1.3 million pixels
Lens	View 50mm	54g	Standard lens (resolution: 0.054mm/pix)
	View 80mm	56g	Lens suitable for a broader range
	View 30mm	51g	Lens suitable for a small object
Light	Ring light	130g	Standard light that can clearly discover irregularities
	Bar light	75g	Small, with configurable position and angle, available even at a position where ring light is unavailable
	Flat dome light	270g	Provides even irradiations, suitable for glossy works.

*Lens resolution is estimated with an object distance of 100mm and a 1.3million pixel camera.

Examples





Features

- A vision camera directly attached to duAro JT4 axis.
- Camera and fixture brackets set.
- The angle is configurable to ±30° or ±60°.
- Supports ring lights, dome lights and bar lights.
  *Depending on the height of Z axis (JT3), attention should be paid to interference with the second arm.