

iVY System

Product Lineup

ROBOT VISION iVY RCX240

Easy to use and reduction of work steps.

"Finds and Picks up" and "Pursues and Picks up" without teaching.

Many robot users might think, "We tried vision recognition, but it seemed to take a lot of work" or "we tried it before, but making adjustments was a tough job".

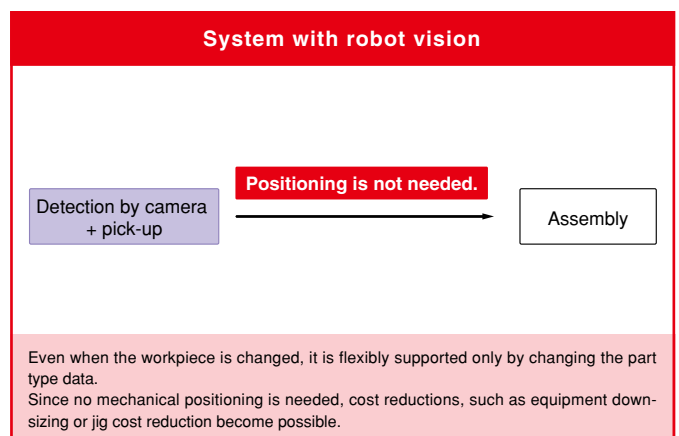
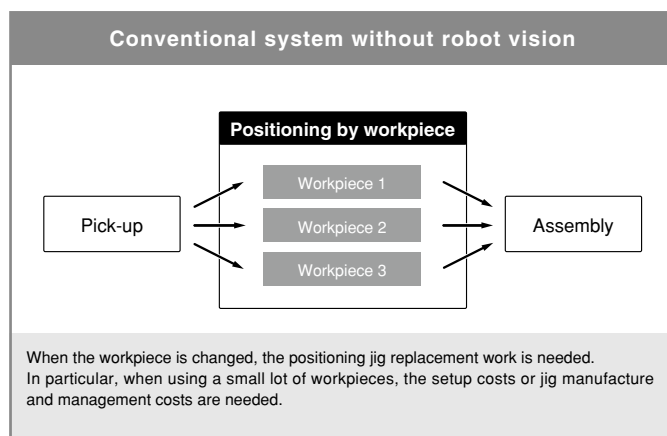
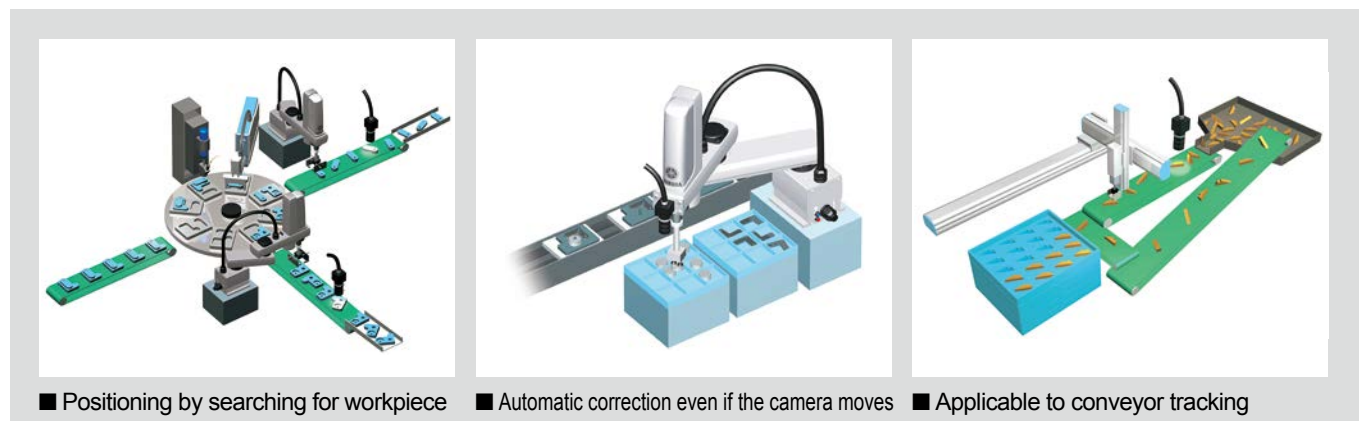
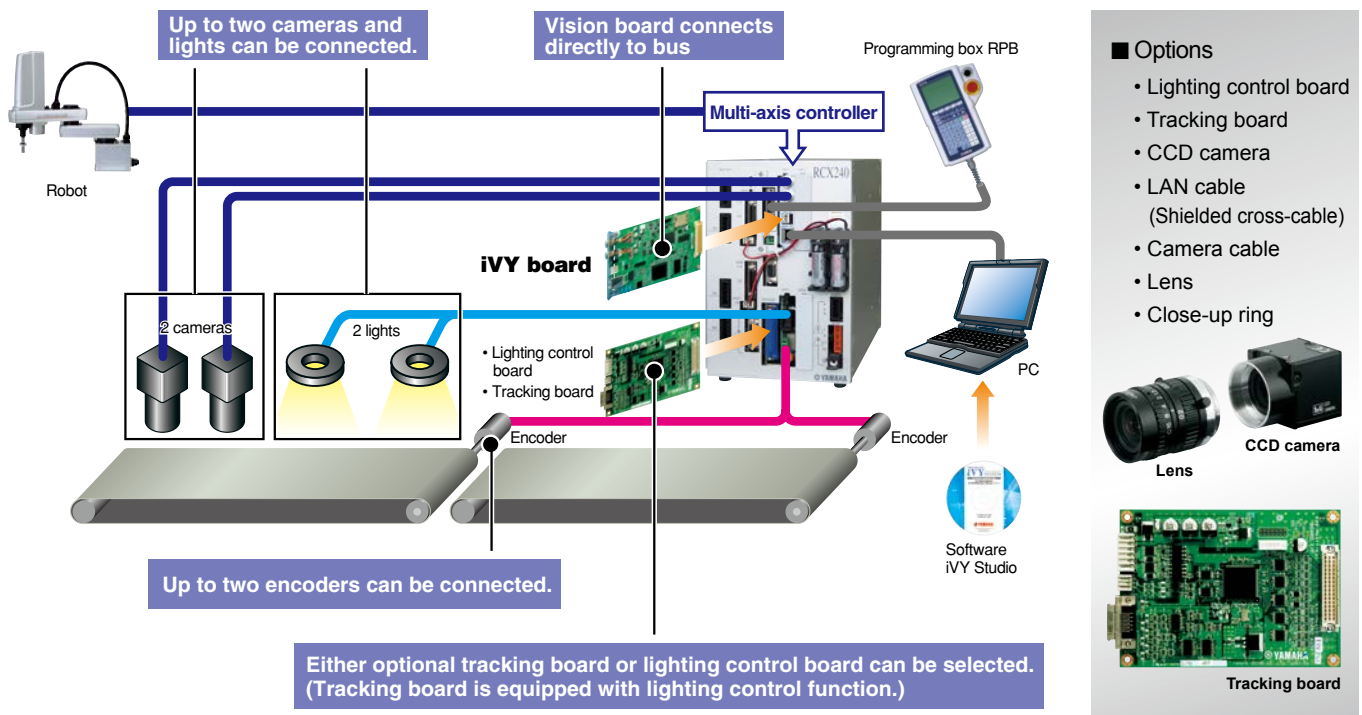
But YAMAHA iVY system solves these problems.

Anyone can make the setup easily to contribute to reduction of work steps.



iVY system layout

A robot controller with an image processing function is completed only by setting the iVY board in the 4-axis controller RCX240 or RCX240S. As "eye" is put in the robot, the robot finds and takes workpiece, checks deviations in workpiece position, and makes correction if the workpiece deviates largely. This expands the range of applications.



POINT 1

Easy for anyone to use, applicable to a wide variety of applications

When the system was upgraded by combining the robot with a generally available image processing unit, it took a long time conventionally to adjust the robot controller and image processing unit, and perform the correction calculation. In YAMAHA "iVY system", the vision board is integrated into the robot controller and the functions are limited to the positioning and position correction so as to greatly simplify the operability. This makes the system incredibly easy to use when compared to conventional vision systems. YAMAHA aimed at "a vision system that anyone can easily use". Please try to use YAMAHA's new robot vision.

Conventional robot vision

- ① Alignment with robot coordinates is difficult.
- ② Correction calculation is needed when the camera moves.
- ③ Operation deviation between the camera and robot due to communication time.
- ④ Adjustment of communication format is needed.

- Difficult to handle.
- Hard to actually operate.
- Installation and setup costs are high.
- Difficult to know emergency contact address.

Special skills are required and many work steps are needed.
Connecting an external camera to the robot controller requires tasks such as coordinate alignment (calibration), and correction programs are needed, so the startup work is difficult. When using for simple applications, many work steps are needed. So, possible applications are limited.

iVY system

- ① Simple calibration function is incorporated.
- ② Coordinates are corrected automatically even when the camera moves.
- ③ High-speed connections through dedicated bus line.
- ④ Controller is incorporated to provide the central operation.
- ⑤ Applicable to all models of YAMAHA robot lineup.

Point

- Easy to use
- Various applications are supported using easy operation.
- Cost reduction by reducing work steps.
- YAMAHA gives you total support.

Easy operation extends applications
YAMAHA iVY system can be calibrated very simply. Furthermore, the coordinates are corrected automatically when a camera is installed on the robot. As iVY system can be used, it can be applied to various applications.

POINT 2

Easy workpiece registration only with 3 steps

YAMAHA aimed at "a vision system that anyone can easily use". But, image recognition itself has been around for a long time. However, conventional image recognition required complex tasks such as coordinate matching (calibration) or coordinate correction during camera movement, and it never became very popular. YAMAHA vision iVY System can be operated by anyone including machine designers or actual machine operators.

STEP. 1

Capture images.

Put the workpiece within the camera field-of-view and specify an image capturing range.

STEP. 2

Set the contour.

Contour is automatically extracted. Paint the necessary contour with a pen tool.

STEP. 3

Register the detection position.

Specify the detection position with the mouse. Desired positions can be set.


Search results

POINT 3

Dedicated software "iVY Studio" included

The iVY system includes dedicated software "iVY Studio". All operations related to the vision, such as registration of fiducial marks used for the calibration or workpieces (edge setting, various parameter setting, and image capturing range setting, etc.), backup, restore, and operation monitor can be performed only with this software.

Support software iVY Studio

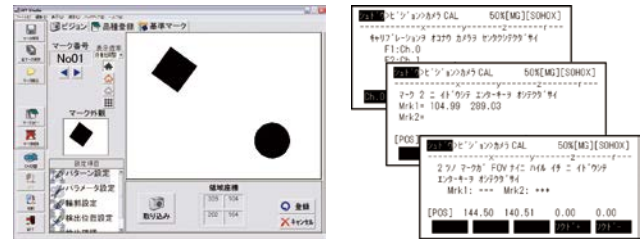


- Search trial-run, part type registration
- Reference mark registration (for calibration)
- Up to 40 workpiece types can be registered.
- Workpiece can also be added easily.
- Up to 40 workpieces can be detected at once.
- Data backup
- This software functions as a monitor during program operation.

POINT 4

Simple calibration function (coordinate matching alignment work) incorporated

Conventional equipment combining "image processing unit + robot" requires many steps in "calibration" that aligns the camera coordinates with the robot coordinates. In the iVY system, the operation is completed easily in a short time only by following interactive instructions using the programming box. Additionally, the coordinate values are corrected automatically even when the robot installation position is changed, such as upward clamping, downward clamping, robot Z-axis clamping, or SCARA robot Y-arm clamping.



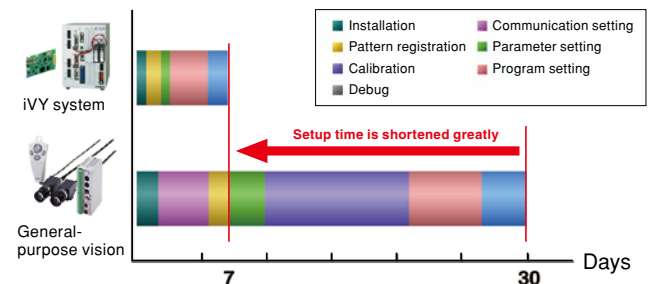
Just follow instructions on Wizards

POINT 5

Setup time reduced greatly

When using a general vision, a coordinate conversion program needs to be created in the robot controller since the robot coordinate data differs from the vision format. Since the robot controller is integrated into the iVY system, the robot coordinate data can be stored into the robot point data using single process. This ensures very simple operation. Additionally, the unified control of the camera control and light control can be performed using the robot program. The control becomes easy and the number of start-up steps can also be reduced.

Comparison of setup time



POINT 6

Free selection from YAMAHA robot lineup

This robot vision is applicable to all YAMAHA robots that can be operated by the RCX controller. According to the applications, an appropriate robot can be selected from the single-axis robots FLIP-X series, linear single-axis robots PHASER series, Cartesian robots XY-X, and SCARA robots YK-XG. A low-cost and easy-to-use robot vision system can be constructed with an optimal model suitable for applications.

■ Cartesian robots XY-X

■ SCARA robots YK-XG

■ Linear motor single-axis robots PHASER

■ Single-axis robots FLIP-X



POINT 7

Workpiece handling without teaching

When the robot handles a workpiece, the teaching work to the correct position is absolutely required. If the workpiece position deviates, the correct handling cannot be performed.

Use of iVY system makes it possible to detect the correct position through the image recognition after coarse positioning. The workpiece can be transferred without teaching, so the start-up steps are reduced and workpiece can be changed or added flexibly.

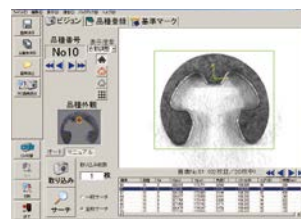


POINT 8

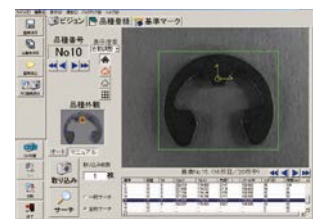
Edge search engine with excellent stability

The gray search (normalized correlation search) that was frequently used for conventional visions is vulnerable to adverse effects, such as lighting conditions, or workpiece chipping or contamination. The environments and applications are restricted.

The iVY system incorporates an "edge search engine" that performs the search process using information on contour shape. This contour search is resistant to effects on external environment and the range of applications is extended.



Search is made with good lighting.



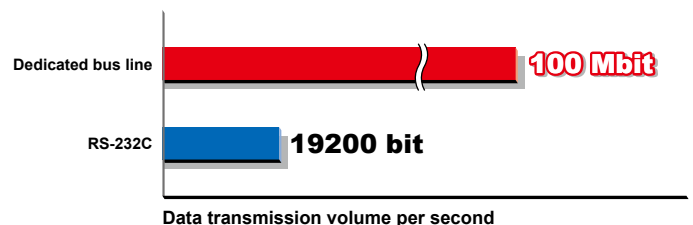
Search is correct even with insufficient lightning.

POINT 9

High-speed connections through dedicated bus line

By directly connecting the robot controller and CPU board through the bus, a data communication speed approximately 5,000 times higher than that of the serial communication speed with general vision is achieved.

Programming also becomes easy since the time lag due to communication does not need to be considered. Additionally, this robot vision supports the conveyor tracking that requires high-speed processing.

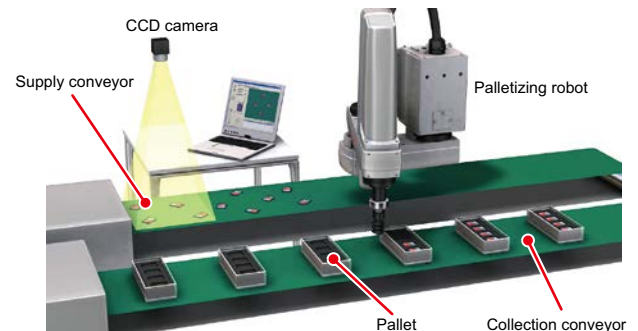


POINT 10

Applicable to conveyor tracking

The iVY system is applicable to the conveyor tracking only by adding the tracking board. As the pulses (AB-phase) are taken from the encoder installed on the conveyor, the workpiece that is flowing can be picked up without stopping the conveyor.

As up to two encoders for the camera, lighting, and conveyor can be connected, the iVY system is applicable to movement between the conveyors.

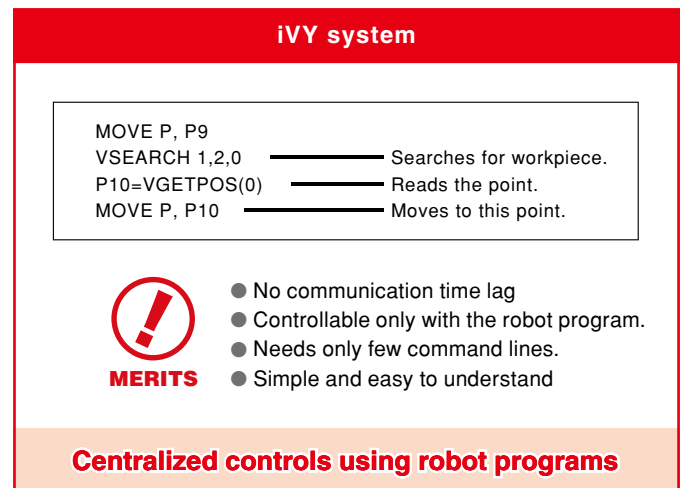
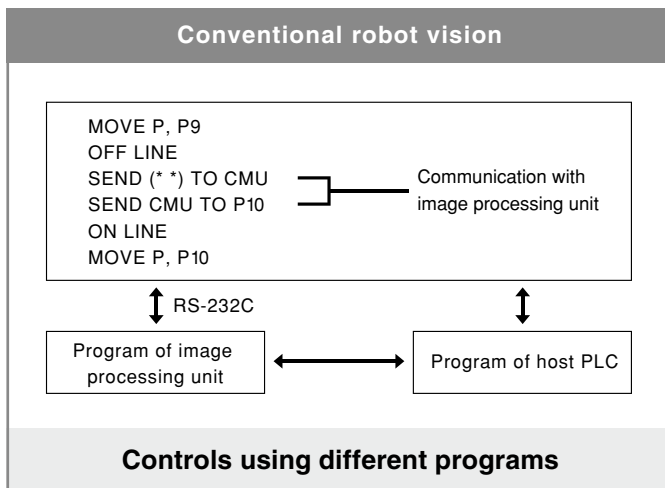


Vision is also controlled easily with robot programs.

The robot program executes all vision controls including camera switching, image capturing, and workpiece search. Program creation is simple when compared to general vision systems since the operations from the robot movement to the camera control are performed consistently. Furthermore, the debug work can be performed efficiently to greatly reduce the total number of work steps.

Example of robot vision language

Command name	Function
VCAPTURE	Captures images from the camera.
VSEARCH	Searches for the specified part type.
VMONITOR	Switches the monitor mode between on and off.
VGETCNT	Acquires the number of parts that were found.
VGETPOS	Acquires the position data.
VGETTIME	Acquires a period of time used for the search command that was executed.
VGETSCR	Acquires judgment values for the detected workpiece.
VSAVEIMG	Saves images in BMP format.



So, the iVY system can solve such problems.

Number of teaching steps needs to be reduced.

Robot teaching work requires a lot of labor and time. The iVY system acts as "robot eye". The final fine positioning can be automated to greatly reduce the teaching time that was required for the conventional models.

Positioning mechanism needs to be simplified.

In the current trend toward small-lot production of multiple models, a larger number of models means that positioning and other aspects of setup will require more time and trouble. Use of the iVY system makes it possible to greatly reduce costs necessary for manufacture, management, and replacement of positioning jigs.

Random workpieces need to be handled.

Use of a position detection function of the iVY system makes it possible to simply construct operations, such as "workpiece is directly placed from the parts feeder" and "workpiece in the pallet is gripped and transferred".

Workpiece flowing on the conveyor is picked up.

The iVY system is applicable to conveyor tracking. The position of the flowing workpiece is continuously recognized according to the signals from the encoder. The workpiece can be picked up without stopping the conveyor.

Consultation destination is not found if a trouble occurs.

When a generally available image processing unit is combined with the robot, various problems such as being unable to capture images, unable to write data, or position deviation occur. YAMAHA iVY system will solve such troubles. The iVY system delivers total support for tasks ranging from capturing of images from the camera to operating the robot.