



THE GLOBAL STANDARD FOR VISION-GUIDED ROBOTICS

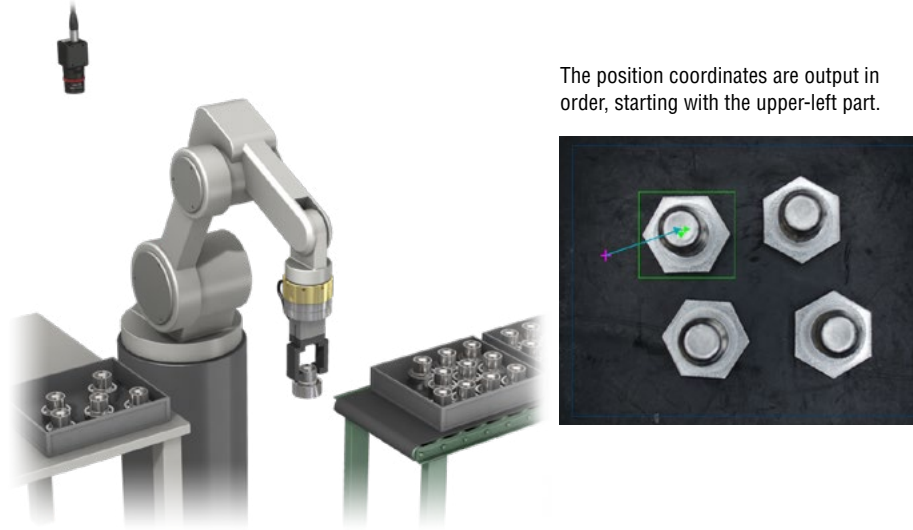


- **SIMPLE INTERFACE** ————— Equipped with step-by-step interface for vision-guided robotics
- **DIRECT CONNECTIONS** ————— Easily establish connections by selecting the robot manufacturer
- **AUTO-CALIBRATION** ————— Calibration performed with a single click
- **POWERFUL SEARCH TOOL** ——— Highly stable detection

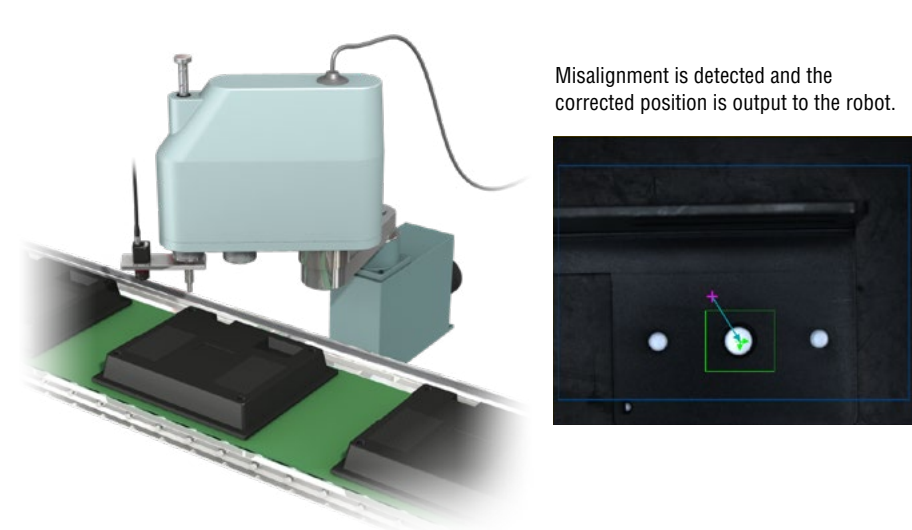


KEYENCE ROBOT VISION APPLICATIONS

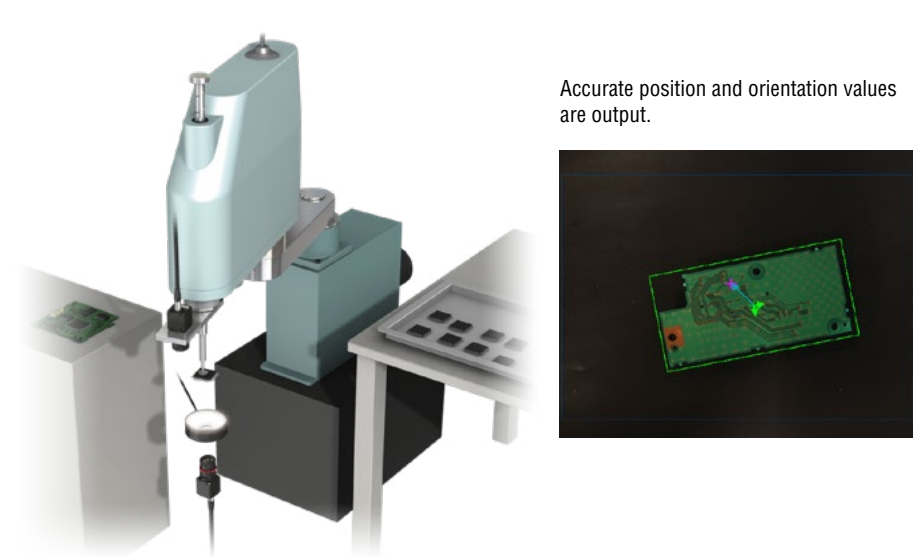
Packaging machined parts



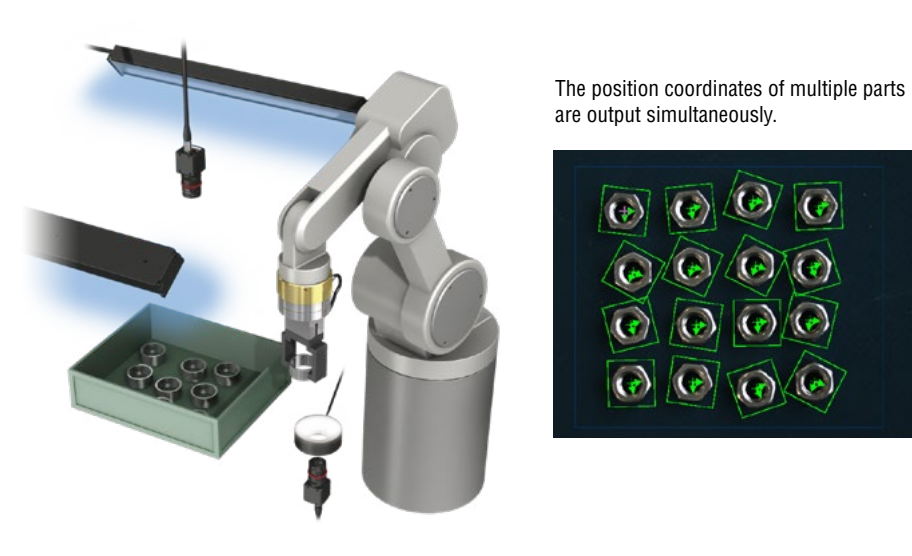
Position detection for screw tightening



Grip correction during circuit board loading



Positioning during quality inspection

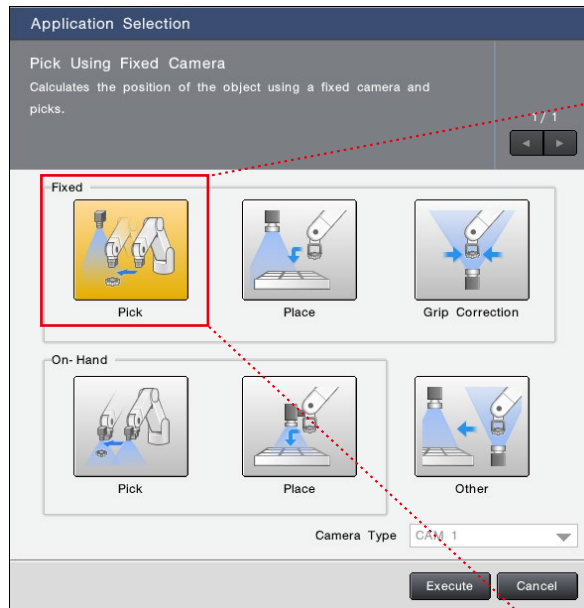


■ SIMPLE INTERFACE

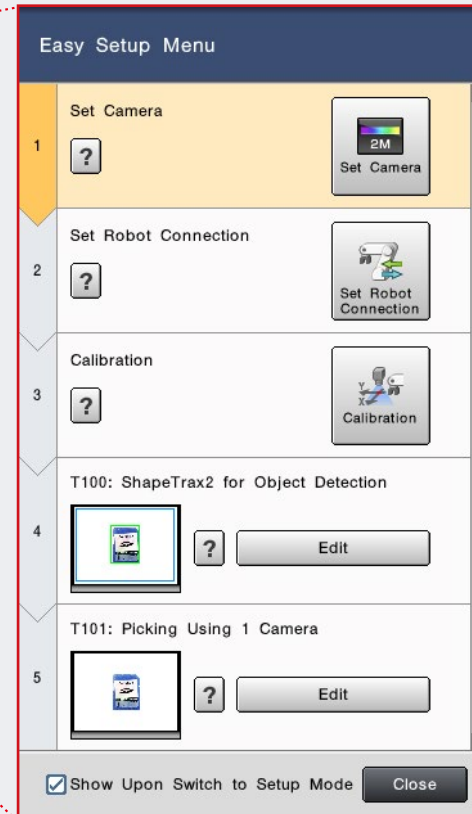
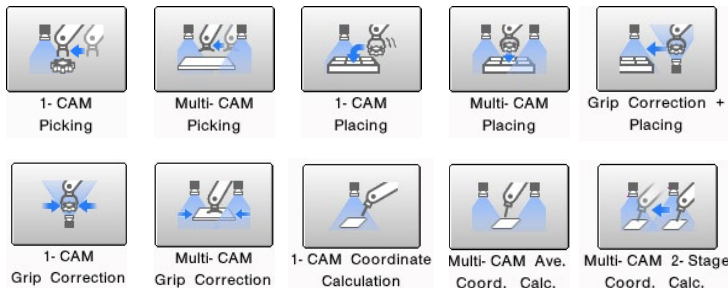
EXTREMELY SIMPLE INTERFACE FOR VISION-GUIDED ROBOTICS



Select the application.



A variety of operations are supported in addition to the standard picking, placing, and grip misalignment correction.



Adjust camera settings such as the shutter speed and camera sensitivity.

Select the manufacturer of the robot to connect with.

Perform auto-calibration.

Configure the search settings.

Teach pick position.

Setup complete

■ Easy Setup Menu

There's no need to perform the bothersome manual calibration or calculations that are characteristic of conventional robot vision setup. Quickly configure the optimum settings by simply selecting the application matching the desired robot operation.

DIRECT CONNECTIONS

OUTSTANDING COMPATIBILITY WITH A WIDE VARIETY OF ROBOT MANUFACTURERS

Robot Connection Settings (Global Settings)

Robot Connection Settings

Maker: Custom

Comm. Mode: Ethernet (Non-Proce...)

Robot Communication Setting ?

CV- X Communication Setting

Network

Check Connection

Robot Operation Setting

Enable Robot Operation from CV- X

Check Robot Operation Validity

Select the robot manufacturer.

ABB	KUKA
DAIHEN	MITSUBISHI
DENSO	NACHI
EPSON	STAUBLI
FANUC	SHIBAURA MACHINE
HIRATA	UNIVERSAL ROBOTS
IAI	YAMAHA
JANOME	YASKAWA MOTOMAN
KAWASAKI	Custom

Robot connection settings

Connection Verification

Enter the robot's IP address and press the "Ping" button.

Robot IP Address

172 021 004 138

Ping

Close

Connect to standard robot controllers by selecting from a list of common manufacturers, or select custom for connecting with specialised robot controllers.

Easily verify connection

Notice

Succeeded in verifying connection with the robot.

Close

ROBOT JOGGING CAN BE CONTROLLED FROM THE VISION SYSTEM

Jog Value Spec. Pos. Data

Limit to Planar Operation

Mode: Orthogonal Jog

X 0.000 mm X- X+

Y 0.000 mm Y- Y+

Z 0.000 mm Z- Z+

Rx 0.0 ° RX- RX+

Ry 0.0 ° RY- RY+

Rz 0.0 ° RZ- RZ+

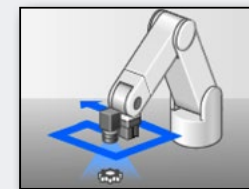
Jog Value Spec. Pos. Data

Specify

	Current Position	Target Position
X	0.000 mm	0000.000 mm
Y	0.000 mm	0000.000 mm
Z	0.000 mm	0000.000 mm
Rx	0.0 °	000.0 °
Ry	0.0 °	000.0 °
Rz	0.0 °	000.0 °

Input Current Position

Move



This is useful when making fine adjustments to the image capture position and specifying the start point for calibration.

Robot vision setup program provided

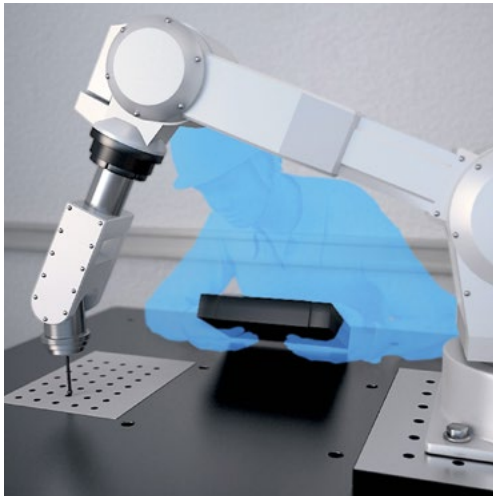
Robot programs for use in configuring vision system for Vision-Guided Robotics are available from KEYENCE. This enables seamless operations between vision systems and robots.

AUTO-CALIBRATION

EASILY CALIBRATE THE ROBOT AND VISION SYSTEM WITH THE CLICK OF A BUTTON

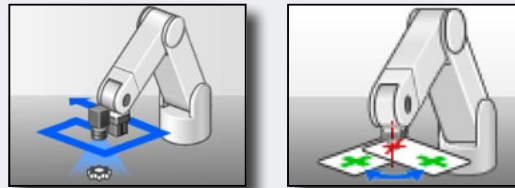
Common issues with conventional methods (manual methods)

- Manual calibration takes a long time
- Accuracy varies between operators
- Difficult to readjust for installation misalignment
- Difficult to reproduce the image in different installation locations due to variations in ambient conditions.



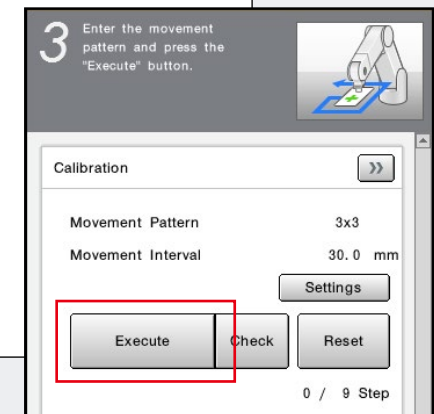
Solutions provided with KEYENCE Vision-Guided Robotics

- Easy operation with a single click jogging robot to all required locations.
- High accuracy regardless of operator
- Quick calibration to fix issues caused by misalignment.
- Fast and accurate duplication regardless of the location.



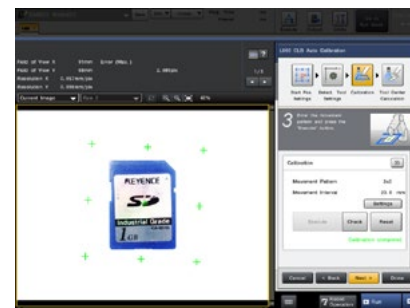
Auto-calibration

Settings are easy to configure: just select the movement pattern and press the button to execute calibration. Calibration is automatically performed while the robot is moving. This reduces calibration time by eliminating the need to manually control the robot while maintaining a high level of accuracy.



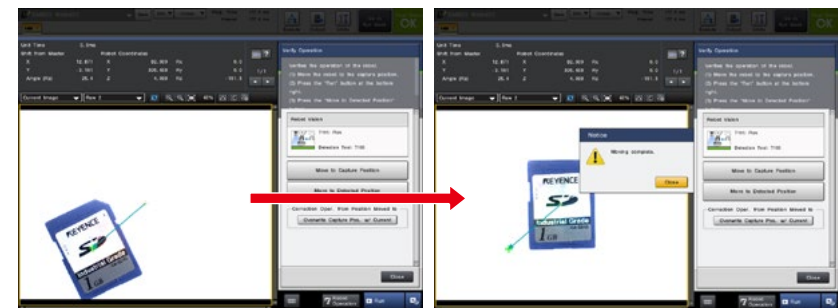
KEY POINT

The robot moves according to the set pattern.



KEY POINT

Verify Operation function confirms proper picking and makes debugging simple.



■ SAMPLE PROGRAM CREATION FUNCTION

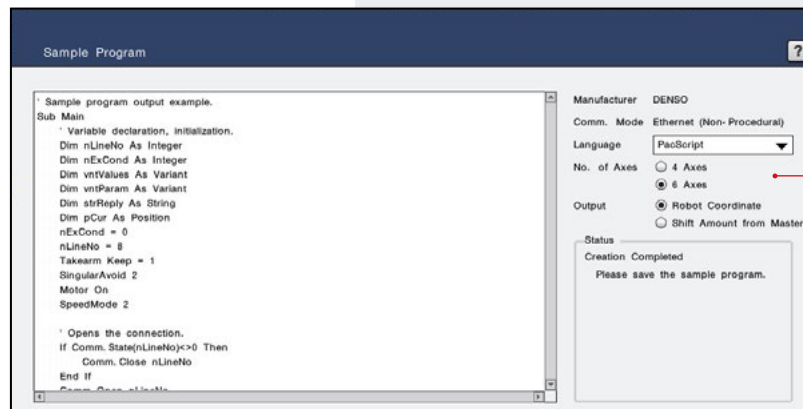
SIMPLIFIED SUPPORT FOR VISION-GUIDED ROBOT OPERATIONS

Challenges with conventional models

- Creating a robot program that works together with a vision system is difficult.
- Programs need to be recreated whenever robots from a different manufacturer are used.
- Operation verification for a combined vision system and robot is difficult.

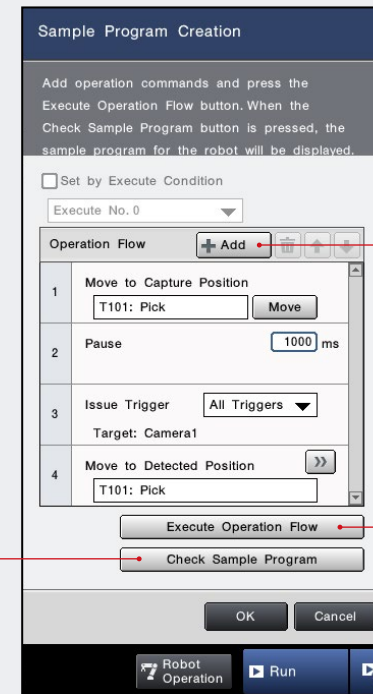
KEYENCE vision-guided robots solve these problems

- Robot programs can be created automatically and easily by specifying the operation flow.
- Create programs catered to any manufacturer simply by specifying the robot manufacturer.
- Operation verification for a combined vision system and robot is possible with just one button press.



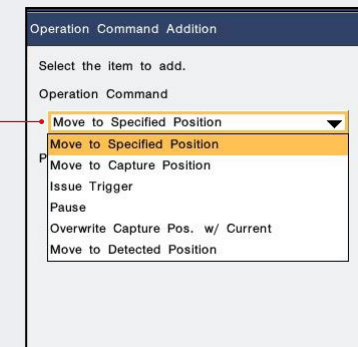
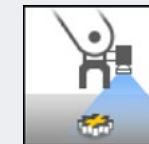
Sample program verification

The specified operations can be checked and exported in the robot language of each robot manufacturer.



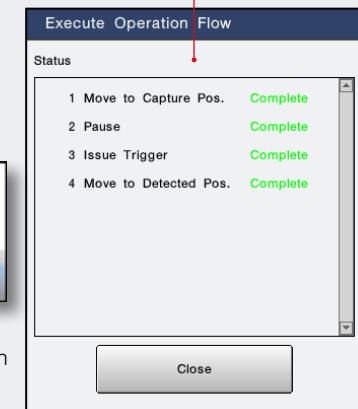
Operation flow implementation

The specified operations can be easily verified on the spot. Operation verification for vision-guided robots—a difficult task with conventional methods—can be carried out with just one button press.



Operation commands

Configuration is as easy as simply choosing the expected vision system and robot operations for vision-guided robots.



POWERFUL SEARCH TOOL

HIGHLY EVOLVED SEARCH PROVIDES EXCELLENT PERFORMANCE AND STABLE OPERATION

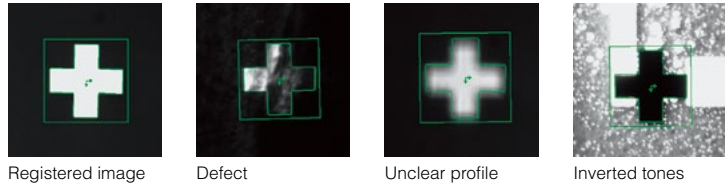
ShapeTrax™3

Search tool with ultimate performance, speed, and accuracy under poor conditions

This tool uses profile information extracted from the target during search. The target can be searched stably even if changes occur such as chips, contrast reduction and size changes. This tool offers high search performance also as a position adjustment reference for other tools.

HIGH ROBUSTNESS

Enables accurate search even if capture conditions change from those of the registered image.



Newly developed automatic feature extraction algorithm

The set-up to extract the profile of workpieces that conventionally required experience can now be optimised automatically, allowing a simple, easy-to-use menu. Anyone can make use of the maximum potential of ShapeTrax3 for any workpiece.

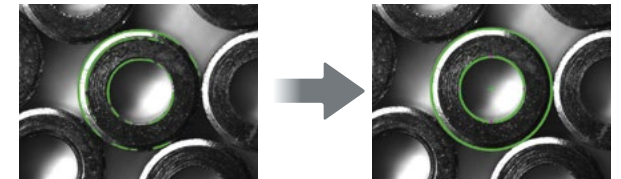
CONVENTIONAL	ShapeTrax™3
<p>In case of noisy marks, the user needed to understand complicated parameters to extract the appropriate profiles.</p>	<p>ShapeTrax3 automatically analyses noise in images and appropriately extracts profiles as humans visualise them. Anyone can create settings to take advantage of search and use its full performance potential.</p>

CONVENTIONAL PROBLEMS

- It isn't possible to prepare a clean master workpiece.
- It is difficult to extract the ideal profile due to unstable lighting

CHARACTERISTIC DRAWING TOOLS

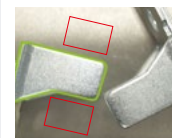
The features can be drawn to match the workpiece shape.



CONVENTIONAL PROBLEMS

- Only the workpieces that can be picked should be identified.

DETECTION TARGET SELECTION CONDITIONS



Analysis for the presence of space for chucking workpieces is performed at the same time as the search. In addition, looking at slight differences in features makes it possible to differentiate between the front and back.

OVERLAPPING EXCLUSION

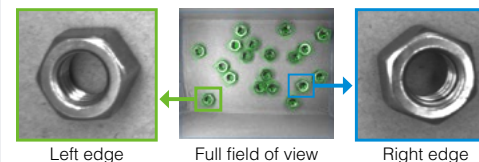


Overlapping workpieces can be recognised and excluded from the search targets. This also makes it possible to exclude only the hidden workpieces.

CONVENTIONAL PROBLEMS

- It is difficult to ensure stable detection of workpieces at the edges of the field of view.

ACCEPTABLE DISTORTION RANGE



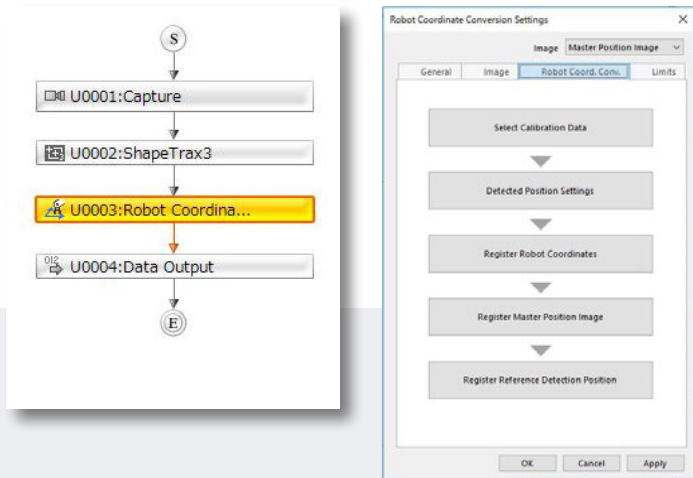
Configuring the distortion tolerance helps improve detection stability even if distortion is caused by the lens characteristics or tilting of the workpieces being searched.

■ XG-X/XG SERIES ENABLES ADVANCED AND CUSTOMISED VISION-GUIDED ROBOTICS

ENABLING UNPRECEDENTED VISION-GUIDED ROBOTICS PROGRAMS WITH THE SIMPLICITY AND FLEXIBILITY OF THE XG-X/XG SERIES

■ Robot coordinate conversion unit

Utilise a single unit for all vision-guided robotics functions.

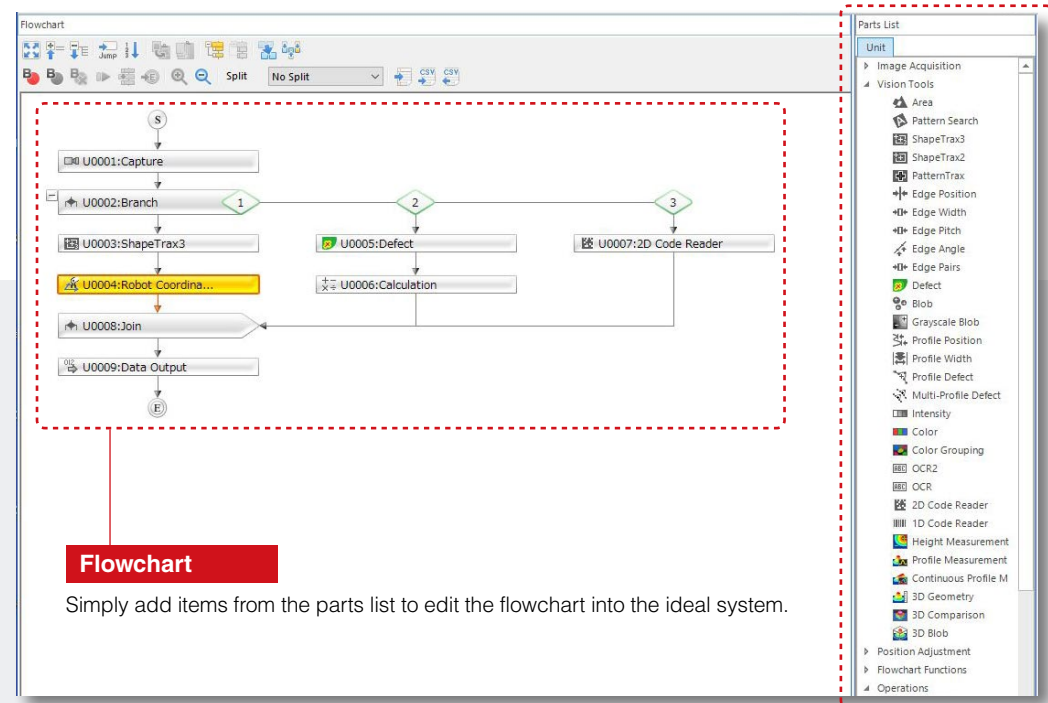


■ Sample software available

Sample software is provided for various expected applications. Easily configure settings by following the step-by-step procedure. The software can also be easily customised. For example, create custom dialogue boxes to suit your needs.

■ Construction of vision-guided robotics exactly as designed

The flowchart-based programming allows for additional inspections or operations to be performed along with the robot guidance.



Flowchart

Simply add items from the parts list to edit the flowchart into the ideal system.

Parts list

Simply drag items from the list to add them to the flowchart.

LEADING CAMERA TECHNOLOGY TO ACHIEVE IDEAL IMAGE FOR EACH APPLICATION

HARDWARE CAPABILITIES ALLOW FOR SUPERIOR IMAGING EVEN IN DIFFICULT ENVIRONMENTS

Choose the right camera from extensive lineup (24 available models in monochrome or colour).

64 megapixels	21 megapixels	5 megapixels	2 megapixels	0.47 megapixels	0.31 megapixels
					
8192 x 7808 pixels	5104 x 4092 pixels	2432 x 2040 pixels	1600 x 1200 pixels	784 x 596 pixels	640 x 480 pixels

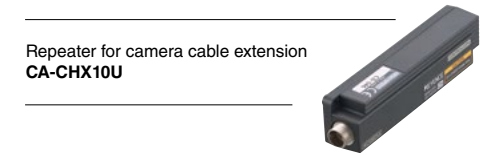
Choose from various hi-flex robotic cables suitable specifically for vision-guided robots



CA-CHxBP: High-flex, environmentally resistant camera cable (5 m / 10 m)

CA-CH5BPE: High-flex, environmentally resistant camera extension cable (5 m)

CA-CHxBX: High-flex, repeater-dedicated extension cable (3 m / 5 m / 10 m)



Repeater for camera cable extension
CA-CHX10U

Camera cable protector
OP-88208

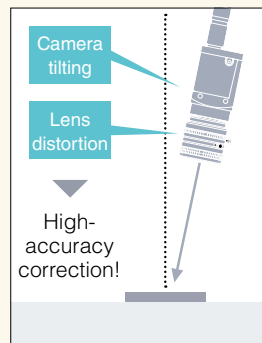


A dedicated extension cable is necessary to connect a repeater to a camera or between two repeaters. Contact KEYENCE for details.

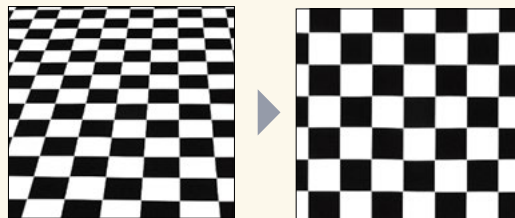
Designed to protect the camera cable where bending occurs and helps prevent damage that can be caused by cable ties used to secure the cable.

Removing the Effects of Lens Distortion and Camera Tilting

KEYENCE makes it possible to remove effects due to installation- and hardware-related factors such as camera tilting and lens distortion.



CORRECTION USING A CALIBRATION PATTERN



Calibration is performed using a chessboard/dot pattern. Tilting and lens distortion are corrected simultaneously.

Tilting Correction

KEYENCE cameras can correct camera tilting that may occur during installation.



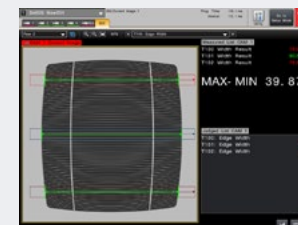
Original image



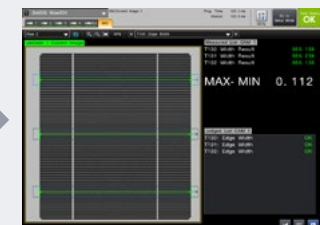
Corrected image

Lens Distortion Correction

Lens distortion correction addresses problems where measurement results differ between the centre of an image and the edges due to lens distortion.



Original image



Corrected image

PERIPHERAL EQUIPMENT OPTIMISED FOR VISION-GUIDED ROBOTS

CA-DBxH Series

Ensure sufficient brightness even for large targets and in locations where bringing the lighting close to the target is not possible.

High-intensity lighting over a wide area



Usable with working distances of 3000 mm thanks to conical reflectors

To make high-output LED lighting, high-intensity LEDs are first positioned in a highly dense, staggered arrangement. Employing conical reflectors also ensures usage of the entirety of the light generated from the LEDs. This makes high-brightness illumination possible at long working distances, which can be difficult with conventional LED lighting. Also, a mirror surface finish is applied to the entirety of the lighting area, which enables effective use even of illumination reflected to the inside of the light by a protective cover or diffusion plate. Illumination with sufficient brightness is also possible even at a working distance of 3000 mm* when no diffusion plate is used.

* Check in advance whether the light intensity is sufficient for the actual usage environment.



Conical reflectors

CA-LHxP Series

We have added environmentally resistant models to the CA-LH Series, which already has the lowest distortion in its class.

Environmentally resistant models



IP64 lenses designed for factory automation

This series can be used in areas prone to environmental problems such as powder, dust, and vibration. A fixed aperture resists vibrations at the factory site, while the IP64 rating ensures safe usage in various environments.



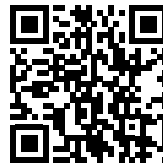
Locking the focus

After extending the lens to adjust focus, use the red ring to lock it. The construction of this locking section differs from the pin-point operation of a screw and performs fixing across a wide area, which makes it difficult for any loosening to occur. The sufficient focus adjustment width enables both a minimum working distance of 0.1 m and improved ease of use.

The focus ring (red ring) is used to fix the focus.



SCAN THIS CODE TO ACCESS THE WEB



www.keyence.com/machinevision



Please visit: www.keyence.com



SAFETY INFORMATION

Please read the instruction manual carefully in order to safely operate any KEYENCE product.

GLOBAL NETWORK

CONTACT YOUR NEAREST OFFICE FOR RELEASE STATUS

AUSTRIA	CANADA	FRANCE	HUNGARY	ITALY	MALAYSIA	PHILIPPINES	SINGAPORE	SWITZERLAND	UK & IRELAND
BELGIUM	CHINA	GERMANY	INDIA	JAPAN	MEXICO	POLAND	SLOVAKIA	TAIWAN	USA
BRAZIL	CZECH REPUBLIC	HONG KONG	INDONESIA	KOREA	NETHERLANDS	ROMANIA	SLOVENIA	THAILAND	VIETNAM