ROBOT STATION WITH ARTIFICIAL VISION SYSTEM
Mod. RV3/EV

The robot station RV3/EV is an innovative training equipment in the field of robotics with artificial vision systems.

The vision system is particularly useful as a robot control device since it can locate the geometric profile of an object within an area, providing the necessary coordinates to the robot for picking the object up.

The station simulates a robotic workcell consisting of:

- 6-axis industrial robot equipped with a electrical or pneumatic gripper
- Artificial vision system
- Conveyor belt
- Rotating table simulating a warehouse
- 5 pieces with different geometric shape
- Piece stack holder
- Control and interface units

A typical working cycle consist of the following steps:

The pieces are introduced by the operator inside the station from the entrance chute and are transported by the conveyor belt under the viewing area. The pieces are identified by a vision sensor which communicates to the robot their picking X-Y coordinates and the corresponding rotation angle.

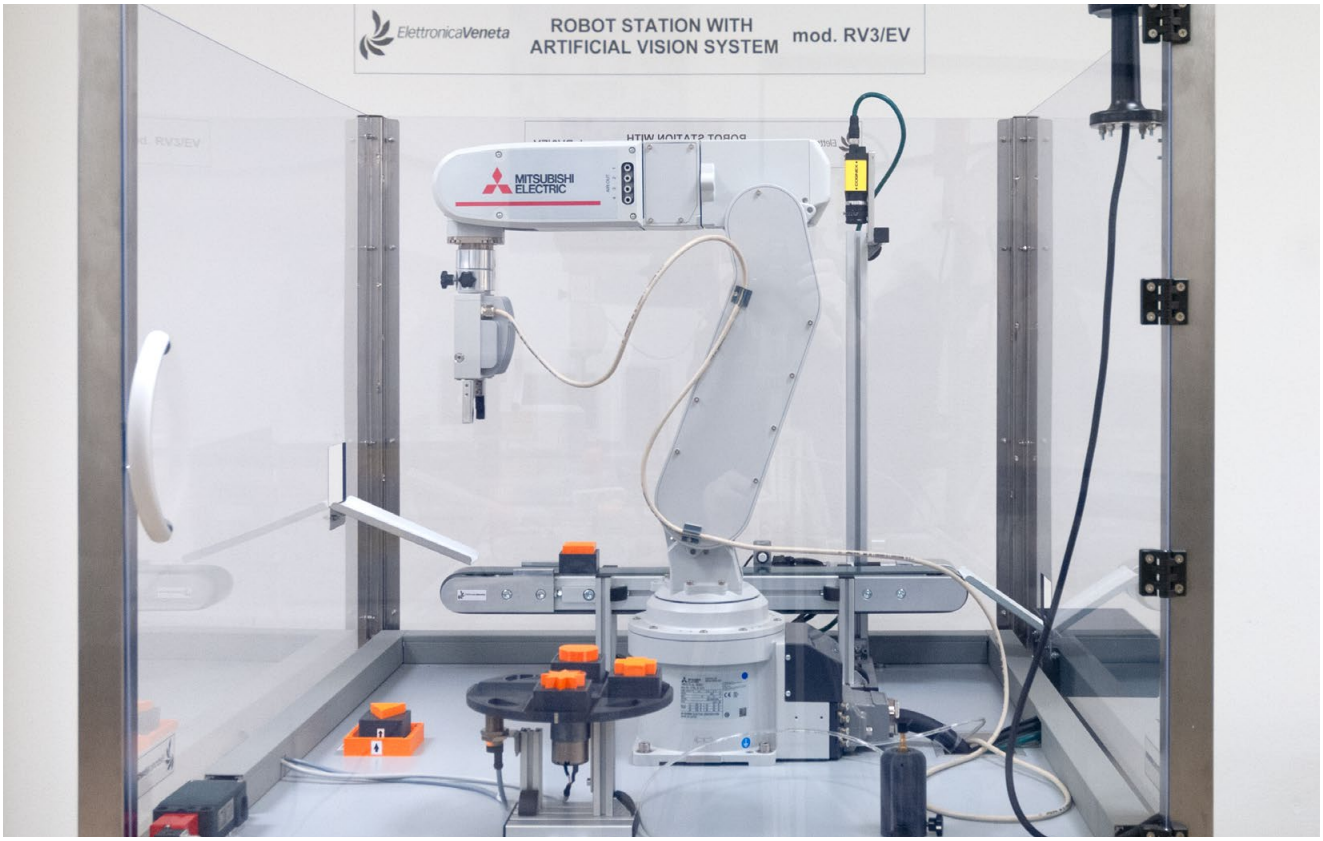
According to the data received, the robot picks the piece up and deposits it on the simulated warehouse as programmed.

In addition, the user can operate the robot station manually (in real time using the teaching box) or in automatic mode (running a preloaded or customized program).

The station includes some preloaded programs to operate in different modes such as storing from/to the rotary table, building a stack of pieces or identifying a piece using the artificial vision system.

TRAINING PROGRAM

- Structure of a six-axis robot
- Robot operation analysis
- Movement technique analysis
- Control software analysis with specific emphasis on:
  - Movement algorithms
  - Self learning
- Industrial robot applications
- Artificial vision
- Calibration
- Movement resolution
- Load capacity, speed
- Safety
- Programming the controller
- Using the teach box



Detail of the robot workcell

TECHNICAL SPECIFICATIONS

General features of the station:

- Wheeled stainless steel framework
- Robot workcell
- Polycarbonate transparent protective panels
- Front access door with safety sensor
- Bottom support shelf for the control units, Ethernet switch, electrical cabinet and compressor (optional item)
- Electrical cabinet including a conveyor servo controller and other devices

The station complies with industrial safety standards.

Power supply: 230 Vac 50 Hz single phase
(Other voltage and frequency on request)
Dimensions: 1050 x 1000 x 1950 mm
Weight: 160 Kg

ROBOT STATION COMPONENTS

6-AXIS ROBOT (MITSUBISHI RV-2FRL-D or similar)

The robot has 6 degrees of freedom, as follows:

- Base: Movement range: ±240°; Max speed: 225°/s
- Shoulder: Movement range: ±120°; Max speed: 105°/s
- Elbow: Movement range: 0° ÷160°; Max speed: 165°/s
- Bottom arm: Movement range: ±200°; Max speed: 412°/s
- Wrist torsion: Movement range: ±120°; Max speed: 450°/s
- Wrist rotation: Movement range: ±360°; Max speed: 720°/s
- Repeatability precision: ±0.02 mm
- Maximum load: 2 kg; wrist downward
- Drive system: AC Servomotor
- Position detection: absolute encoders
- Protection specification: IP30 (all axis)
- Ambient temperature: 0 to 40 °C

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ROBOT CONTROLLER (MITSUBISHI CR800-D SERIES or similar)

- Processor type: 64-bit RISC main CPU with EMERGENCY OFF security functions and door opening sensor
- RJ45 / USB interface for PC programming
- Connector for the teaching box

PUSH-BUTTON PANEL

- Emergency stop button
- Voltage presence indicator
- MAN/AUT selection
- Cycle/Door start/stop buttons

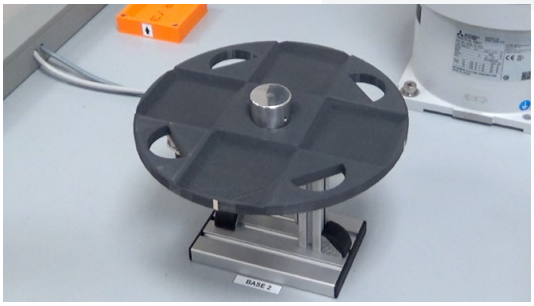
TEACHING BOX (MITSUBISHI R56TB or similar)

- Display: 6.5" TFT with backlight, resolution 640 x 480 pixel
- Integrated O.S. software with menu-driven user interface
- Information reading during operation
- Program loading and starting
- Robot override control
- Maintenance page with information on intervention intervals
- Error page with details of the last alarms
- Emergency stop button
- Interfaces: USB for USB keys, RS-422 for connection to robot controller

ARTIFICIAL VISION SYSTEM (COGNEX IN-SIGHT 8000 SERIES or similar)

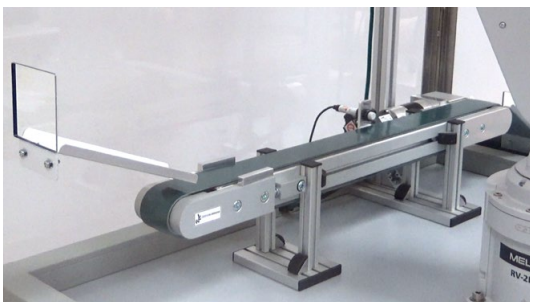
- Resolution (pixel): 640 x 480
- Electronic shutter speed: 14 µs → 520 ms
- Frames Per Second: 217 FPS
- Memory:
  - Work/Program: 512 MB
  - Process image: 512 MB
- Communication: Ethernet Port 10/100 T Base
- Function for object recognition
- Interfaced with In-Sight artificial vision software

ROTARY TABLE



- 4-position rotary table Ø = 200 mm
- 24 Vdc geared motor
- 24 Vdc Inductive sensor for piece position identification

CONVEYOR BELT

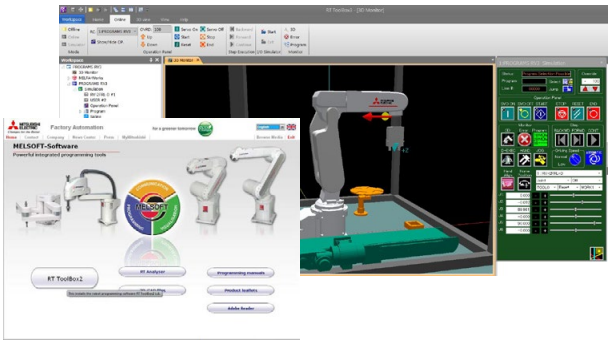


- Belt dimensions: about 730 x 80 x 120 mm
- Piece entrance and exit chutes
- Piece identification sensor
- Stepper motor
- Mitsubishi Servo drive controller

SET OF PIECES

- 5 different pieces supplied
- Each piece has a different geometric figure in relief on the top:
  - Circle
  - Cross
  - Triangle
  - Square
  - Star
- The pieces are stackable one on top of the other

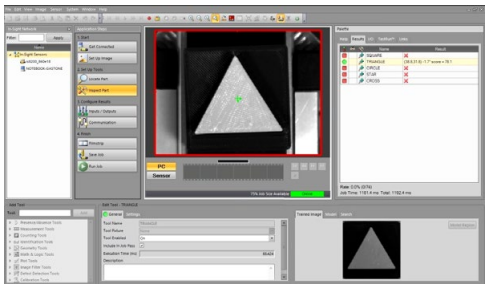
ROBOT SIMULATION AND PROGRAMMING SOFTWARE



The software enables the creation and loading of programs to the robot. It is also possible to test the programs, simulate the work cycles and carry out the necessary optimizations even before commissioning.
Main features:

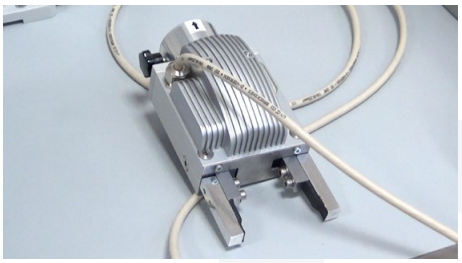
- Includes a wide library of operating functions allowing the programming of different work settings
- Customization of each robot parameter
- Workstation area settings
- Supported robot language: MELFA-BASIC V, VI
- Required O.S.: Windows 10, 64 bit version

IN-SIGHT ARTIFICIAL VISION SOFTWARE



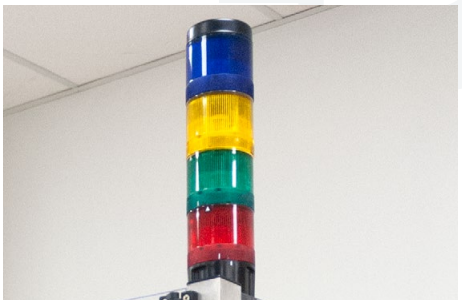
The software, through an easy-builder interface, guides the user through the configuration process of the vision sensor. It calibrates and memorizes the pieces that the sensor needs to identify.
Once these operations have been completed, just run the program created.

ELECTRIC GRIPPER



- Easy installation to the robot arm
- Electric parallel gripper with 12 mm opening
- Repeatability precision: ±0.05 mm
- Brushless motor drive
- Power supply: 24 Vdc / 1.5 A

ALARM LAMP



- 4 LED lamps of different colors
- They signal specific operations of a working cycle (start cycle, end cycle, etc.)

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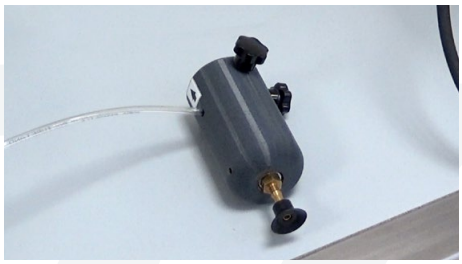
OPTIONAL UNITS

PNEUMATIC GRIPPER Mod. VACS/EV



- Easy installation to the robot arm
- With vacuum generator and electric valve
- Working pressure: 4…6 bar
- Suction cup diameter: 20 mm

SILENCED COMPRESSOR Mod. 3409A

- Capacity: 9 lt
- Flow: 30 lt/min
- Operating pressure: 6 bar
- Safety valve
- Noise level: 40 dB/m
- Power: 0.25 hp
- Motor with thermal protection
- Dimensions: 330 x 330 x 450 mm
- Power supply: 230 Vac ±10% 50 Hz

REQUIRED

PERSONAL COMPUTER

SUPPLIED WITH

THEORETICAL-EXPERIMENTAL HANDBOOK OF THE STATION WITH APPLICATION GUIDE