

# CARTESIAN ROBOTS

Solaut produce a wide range of Cartesian robots from 2 to 6 axes for handling objects with variable mass from 2Kg up to 180Kg with operational areas that come to 20 square meters and with operating volumes up to 50 cubic meters.

## THREE SIZES OF MACHINES

**LIGHT SERIES:** used in assembly systems, feeding device and painting.

**MEDIUM SERIES:** used in applications such as case packers, small palletizers, small warehouses and automated handling of parts.

**HEAVY SERIES:** used to make automatic warehouses, palletizers and for moving heavy objects.

## FOUR TYPES OF MACHINES

We have 15 models of Cartesian robots that can be supplied in 4 different types:

Robot series CS with 2,3,4,5 or 6 axes

- Lite version with payloads on the wrists of 5 Kg
- Medium version with payloads on the wrists of 25 Kg
- Heavy version with payloads on the wrists of 50 Kg
- Version for palletizing 3 or 4 axes payload 60 Kg



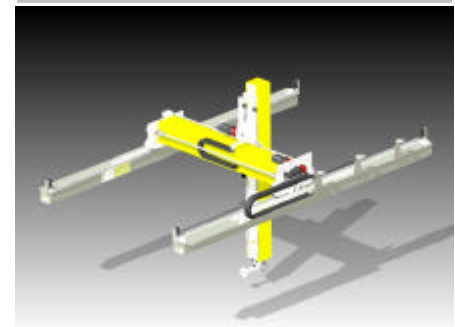
Robot series CC with 3,4,5 or 6 axes

- Lite version with payloads on the wrists of 5 Kg
- Medium version with payloads on the wrists of 25 Kg
- Heavy version with payloads on the wrists of 50 Kg
- Version for palletizing 3 or 4 axes payload 100 Kg



Gantry Robots CP series with 3,4,5 or 6 axes

- Lite version with payloads on the wrists of 10 Kg
- Medium version with payloads on the wrists 40 Kg
- Heavy version with payloads on the wrists of 80 Kg
- Version for palletizing 3 or 4 axes payload 180 Kg



Robot series CD with 3,4,5 or 6 axes

- Lite version with payloads on the wrists of 5 Kg
- Medium version with payloads on the wrists of 25 Kg
- Heavy version with payloads on the wrists of 50 Kg



Payloads above refers to 4 axis robot and are only estimates (depending on the type robots are subject to significant variations).

Cartesian robots can be supplied in the following configurations:

- 1) Base supply, the only axes, no motors, no sensors and no electrical system
- 2) Supply as point 1 more support frame
- 3) Supply as point 1 more induction motors or servo motors
- 4) Supply as point 1 more electrical panel with PLC (Siemens, Omron or Mitsubishi) or CNC (Robox), HMI touch screen 5" or 7 "color, motors, actuators and sensors.
- 5) Supply as point 3 more software for command and control

Depending on the type of application, we can provide robots driven by:

- ☐ induction motors with inverter
- ☐ stepper motors
- ☐ brushless servomotors

The axes can be positioning independently or can be interpolated (linearly or circularly with complex curves). The complex forms of interpolation are obtained with the use of axes boards or CNC.

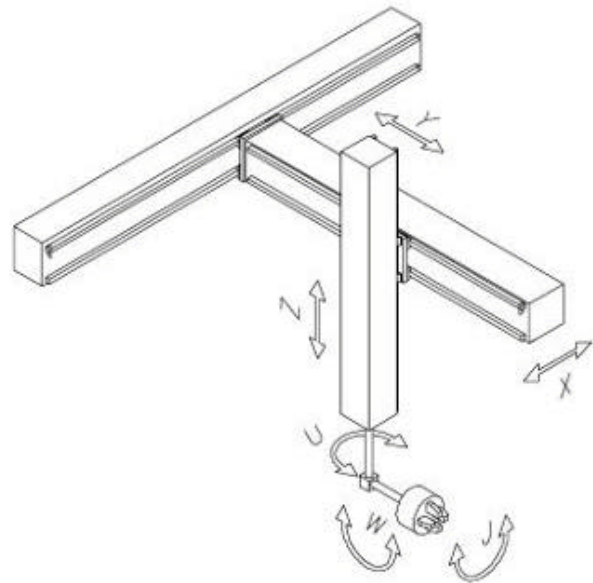
In applications that require high positioning repeatability, linear encoders are installed for position feedback of the real axis position, to eliminate the position errors caused by the backlash and the elasticity of transmissions.

The linear transmission standard, it is with timing belt and low backlash planetary gearboxes. In economic applications, the planetary gears can be replaced with helical-worm. The linear transmission, on request of the customer can be realized with racks.

# 1 - CARTESIAN ROBOT CS SERIES

The Cartesian robot in the standard version is shown in the figure on the right. The machine can be supplied with any combination of axes. It is possible to use the robot as in the figure, or rotated 90 ° in order to have the Y axis vertical and the Z axis horizontal.

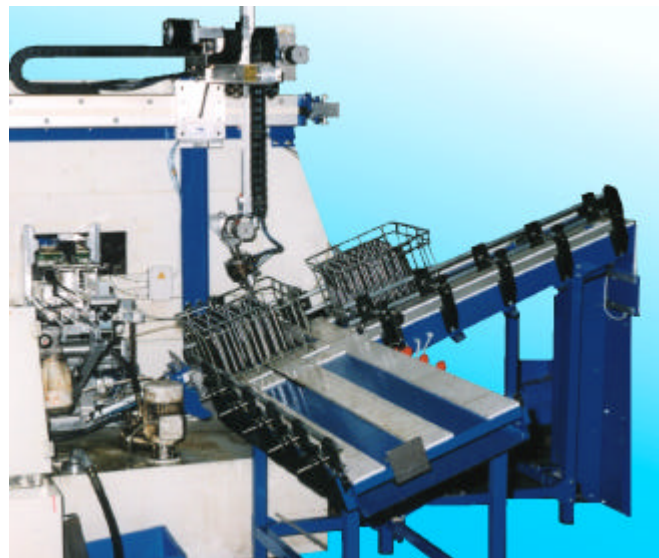
The rotations U, W, and J may be controlled by servo motors, or, if you have only two positions, it is possible to mount a pneumatic actuators.



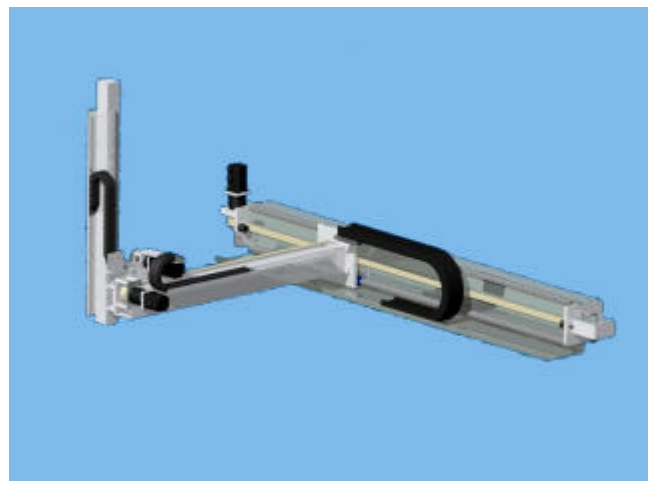
Scheme robot axes.

The transmission of the X axis can be realized with the engine axis fixed (for strokes up to 2000mm) or with the motor on the carriage, for longer strokes.

To the right is depicted a 4 axis robot light series used for the load/unload of a machine tool. The control system has been made with a CNC.



The 3-axis robot in the figure to the left shows the X-axis motor mounted on the axis beam. For strokes longer than 2 meters, the motor is installed on the carrier of X. The strokes of the X axis can be up to 20 meters. For very long strokes (version in medium and heavy) we can install the electronic control board of the mobile part of the robot and use of electrified rails for the power supply. The control with the operator interface devices are made with a wireless connection.



The figure beside is a 2-axis machine, X-motor attached to the axis beam.

The maximum strokes are approximately:

light series

Y= 1200 Z=1200

medium series

Y= 1400 Z=1600

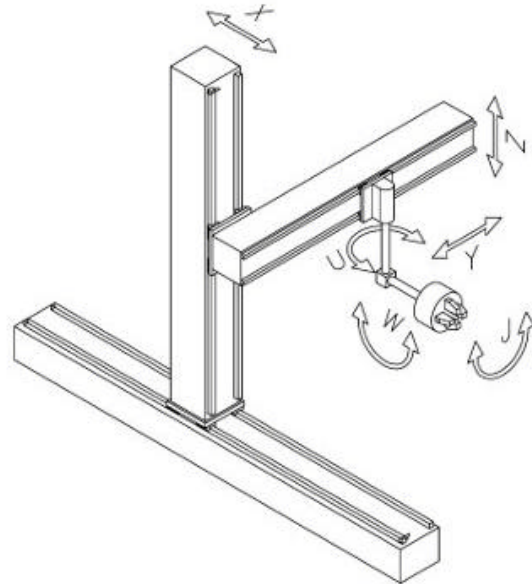
heavy series

Y= 1800 Z=1800



## 2 - CARTESIAN ROBOT CC SERIES

The Cartesian robot in the compact version is shown in the figure beside. The machine can be supplied with any combination of axes. The rotations U, W, and J may be controlled by servo motors, or, if you have only two positions, it is possible to mount a pneumatic actuators. This version of the robot has the particularity of not having axes protruding from the volume of space served from the machine; it is therefore particularly suitable in applications where space is limited. A contraindication to the use of this version compared to the CS series is that the Y-axis moves within the space served by the robot, limiting their freedom of movement.



The transmission of the X axis can be realized with the axis motor fixed (for strokes up to 2000mm) or with the motor on the carriage, for longer strokes. The maximum strokes are approximately:

light series

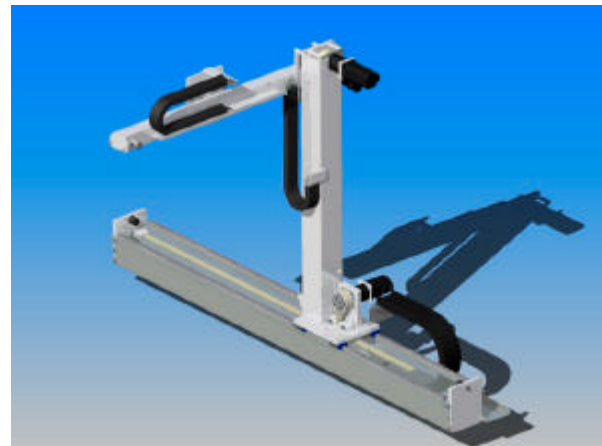
Y= 1000 Z=1600

medium series

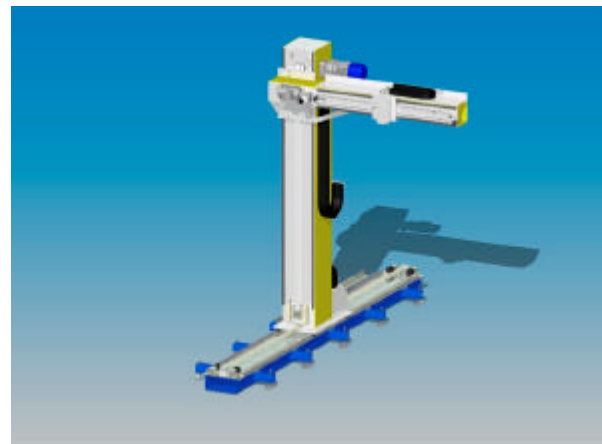
Y= 1200 Z=2200

heavy series

Y= 1400 Z=3000

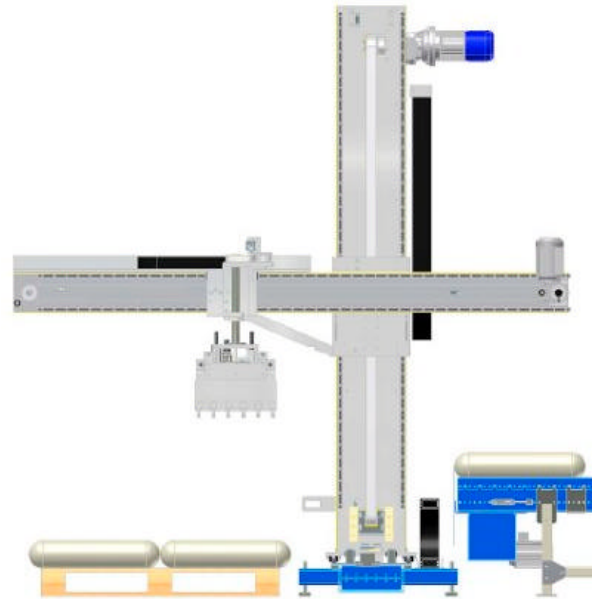


In the picture aside depicts a 3-axis robot heavy series. The Y horizontal axis may protrude from both sides of the X axis: the volume of space served by the robot can be so right part and left part with respect to the XZ plane of the axes.



The figure beside is a palletizer where the gripper can cross the X axis

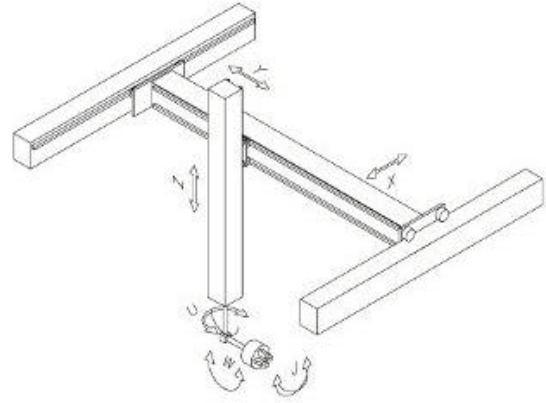
This solution greatly increases the volume of space served by the robot. The strokes of the Y axis in these models can be up to 70% greater than the values shown in the previous page.



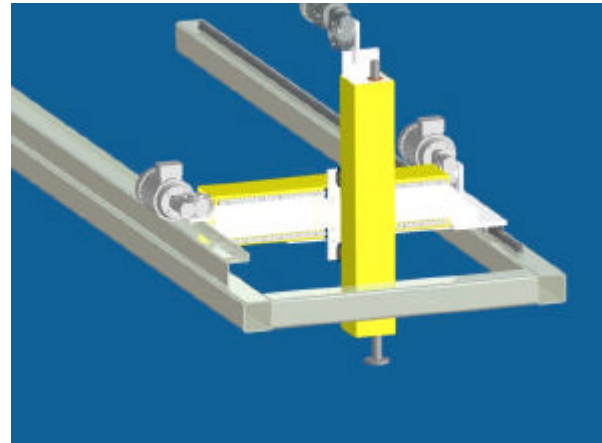


### 3 - GANTRY CARTESIAN ROBOT

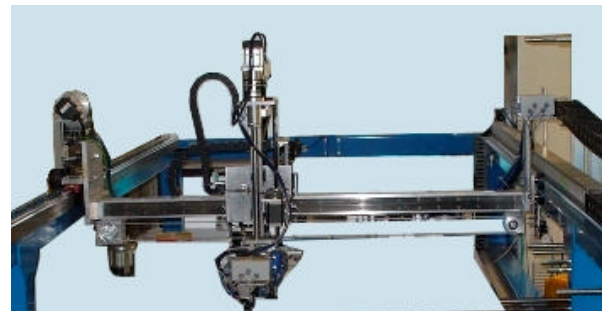
The Cartesian robot, in the version in portal is shown in the figure, by side. The machine can be supplied with any combination of axes. The rotations U, W, and J may be controlled by servo motors, or, if you have only two positions, it is possible to mount a pneumatic actuators. The Y-axis can have particularly long strokes; in these cases, the displacement along the X axis is realized by means of a double transmission on both runways.



The X-axis motor is installed on the axis carriage. The machine shown in the figure by side, has the Y axis with a limited stroke, has a unique transmission realized on one of the two runways of the axis X.

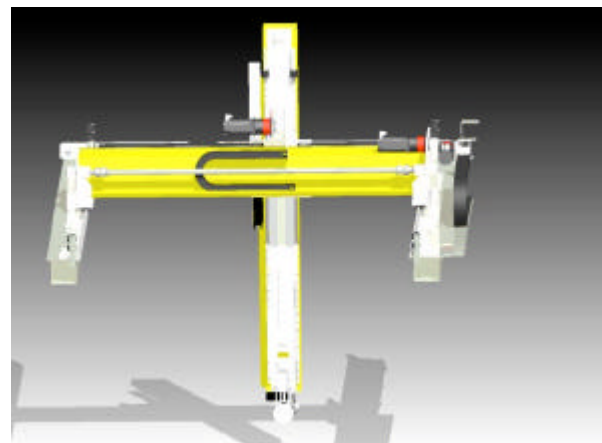


Aside is shown the figure of a light gantry robot, used for a mounting machine. The motorization of the X axis is positioned on the left side of the machine.



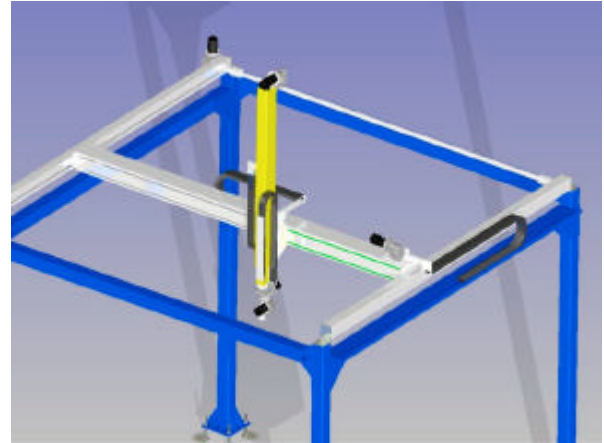
To reduce the overall dimensions of the machine, the vertical axis Z, can be telescopic (for strokes > 1500, 1800mm).

The figure beside is a heavy gantry robot: in the foreground you can see the drive shaft connecting the two belts of the X axis.



The light size of the gantry robot can be realized with linear modules. The modules have the characteristic of being closed and protected from dust and dirt. The section of the module has a closed area that ensures high rigidity to bending and torsion.

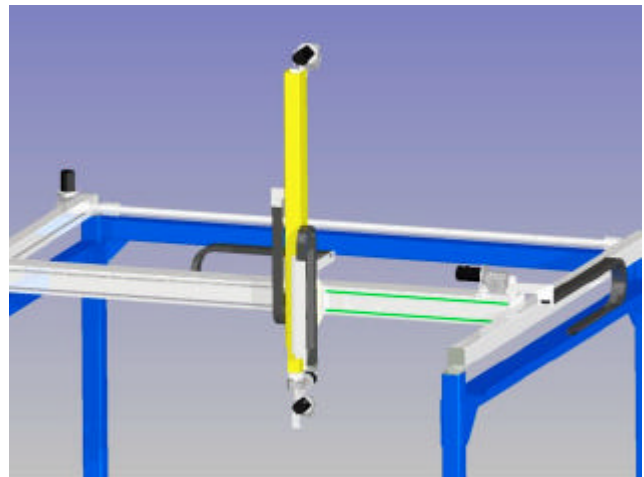
The figure on side is a machine with two modules of the X axis connected with a transmission shaft. The Z axis is vertical telescopic.



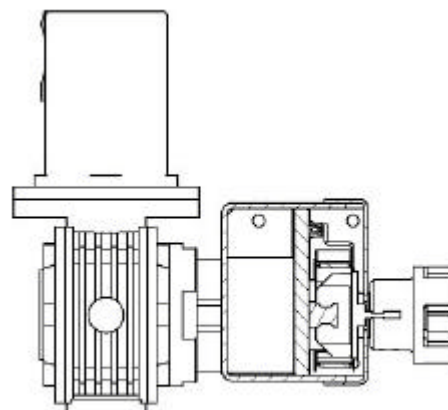
## LINEAR MODULS

The light size gantry robot are made with linear modules that properly combined permit the construction of complete machines.

An example of embodiment is the machine shown to the right: 5-axis robot with strokes  $X = 2400$ ,  $Y = 2400$ ,  $Z = 2000$  (telescopic).



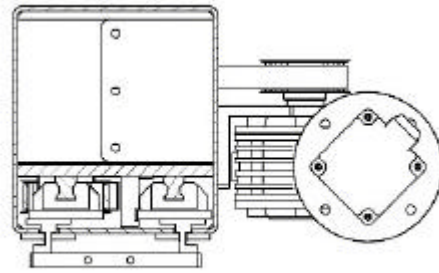
The figure beside is the section of X module motorized (module left in the figure above). This module is used in combination with the twin, devoid of gearmotor, to achieve the X-axis of the gantry robot. The elastic coupling (to the right in the figure) transmits the motion from one module to another. The module has a recirculating ball guide size 15 with timing belt AT5-16. Guide, carriages and belt drive are enclosed in a compartment protected with a pair of lip seals.





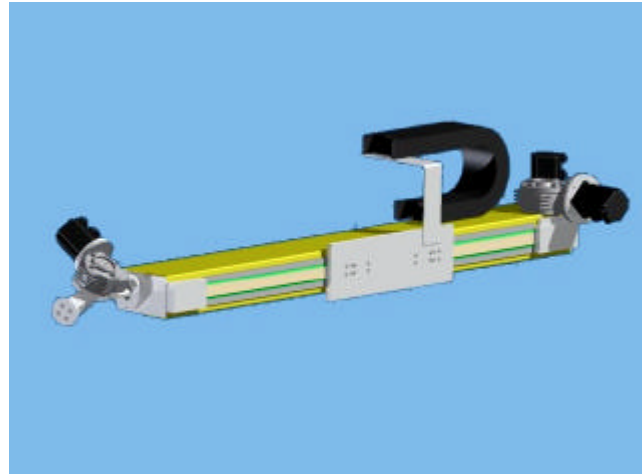
The figure beside is the module Y, which usually is mounted between two modules X, or used as axis on the floor in 2 axes robot.

The module consists of a beam with a square section with a pair of recirculating ball guides size 15. The guides and the belt transmission, are enclosed in a compartment protected by two pairs of lip seals. The geared motor unit is mounted at one end of the module.

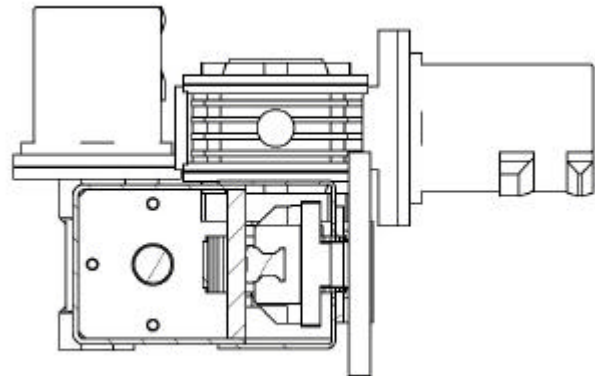


The module shown in figure beside is one of 3 Z modules are currently available: called ZC, it has stroke up to 1200mm. The motor is installed at one end of the axis. The belt, in addition to being the component used for the linear transmission, constitutes the element for closing the compartment that contains the guide carriages and the pulleys.

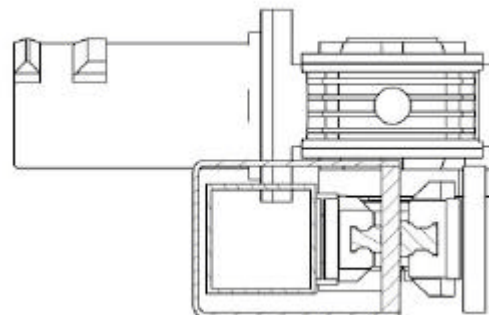
The module in the figure has a shaft passing through it, used for the rotation of U axis. At the end of the shaft we have the W axis gearbox.



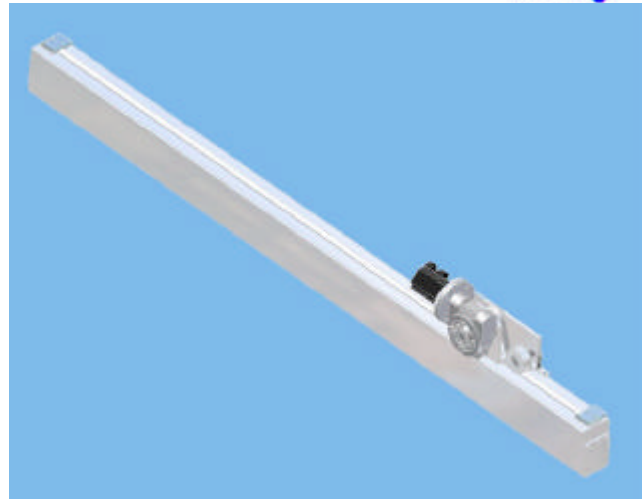
Beside we have the section axis ZC. The gearmotor on the right drives the linear transmission of the axis; the reduction gear on the left is used for the axis W.



The section below illustrates the module ZT telescopic; made by a pair of guides size 20 and 15 is used in those applications in which the vertical stroke is higher than 1400mm. This module is open: the recirculation guides, pulleys and belts are in view.



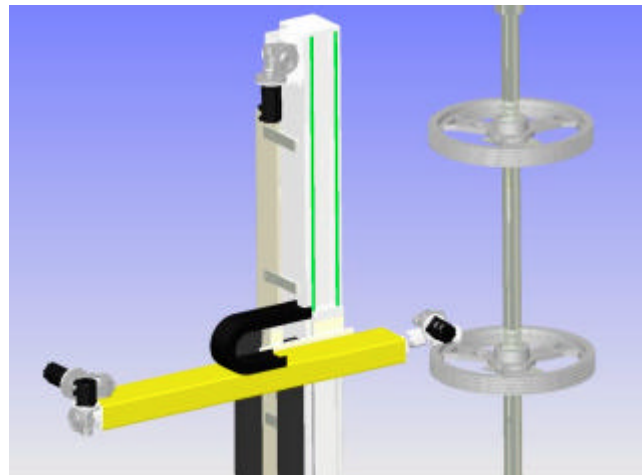
The section below illustrates the ZS; The motorization is applied to the carriage. On the carriage are also installed returning wheels. The timing belt AT5-16 used for transmission also covers the compartment that contains the size 15 linear guide with recirculating ball carriages.



The figure beside is a 3-axis gantry robot with the y-axis vertical.



The figure beside is a 2-axis Cartesian robot with 2 rotary axes U and W used for painting. The vertical axis is a Y module while the transverse axis is a ZC module.



## MECHANICAL FEATURES

The transmissions are made with planetary gears (standard) or worm or coaxial, as a function of performance and positioning accuracy. The linear transmission uses a timing belts (standard) or racks.

The linear guides are made of rails and recirculating ball carriages.

Structure on the ground of the machine is designed with molded case made of sheet steel.

The movable elements are made of molded aluminum sheet, and aluminum plates.

In order to provide the turnkey systems, we make the frames and supporting structures of the robot.

## ELECTRICAL DATA

The machines can be supplied with the wiring on the machine. For the sensors, we use Omron sensors. The cables are suitable for flexible installation.

The electrical panel is supplied with a signal tower, fan with thermostat, 24 VDC power supply, category 4 safety relay, contactors for power drives.

The motion controller will change depending on the application.

For point-to-point positionings non-interpolated you use Omron PLC and optional Siemens. The robot axes with linear interpolati use Omron PLC or motion control Robox.

If there is the need to achieve complex motion profiles (circular spline interpolations etc.) you use Robox motion control.

Robot series medium and heavy use both Omron PLC or Siemens PLC with Profibus DP network connected to drives with positioning functionality.

Touch screen operator panel for connection to PLCs or portable terminal for controllers Robox.

It can optionally be installed a web server module for the control of the machine both from the local network that from the web by means of a normal browser.

## APPLICATIONS

Typical uses of robots Solaut are:

Moving parts in machine tools

Moving parts in assembly and bonding machine

Spraying and painting

Dispensing adhesives and sealants

Handling and storage products in automated warehouses

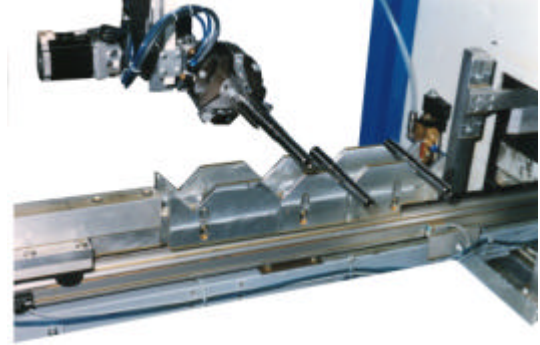
Palletizers

## WHY CHOOSE ROBOT SOLAUT

Our technicians realize machines ad hoc for each application, ensuring realizations, sure success. The software and motion controller are designed and selected to meet the needs of the application.



**Engagement shaft from collecting basket**



**Repositioning shaft on the feeder**

## NOT ONLY ROBOT

Solaut is a manufacturer of automatic machines and systems and can provide in addition to the handling robot also the whole outline which is often essential for a successful realization.

## REQUEST A QUOTE

To request a quote you can:

send us an email

[solaut@solaut.it](mailto:solaut@solaut.it)

To make it easier to request a quote on our website you can find a form that will guide you in defining the features of your robot. The page address is:

[http://www.solaut.it/English/01-1\\_Cartesian+coordinate+robot+CS+serie.htm](http://www.solaut.it/English/01-1_Cartesian+coordinate+robot+CS+serie.htm)