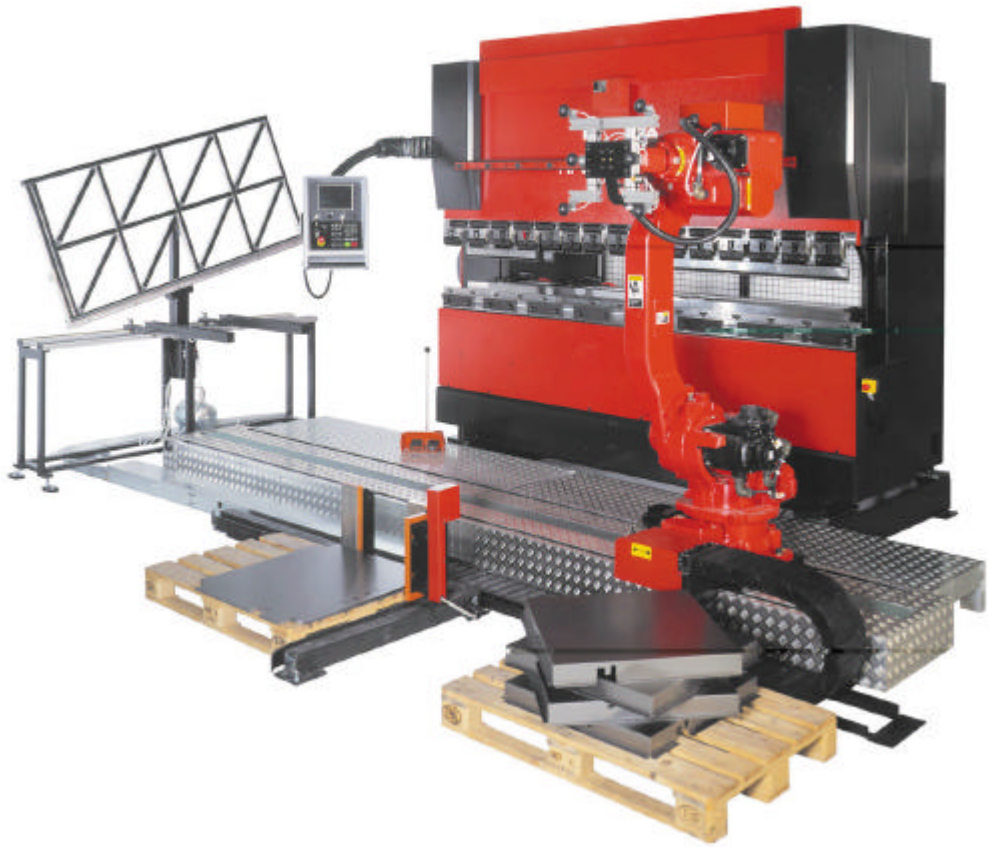
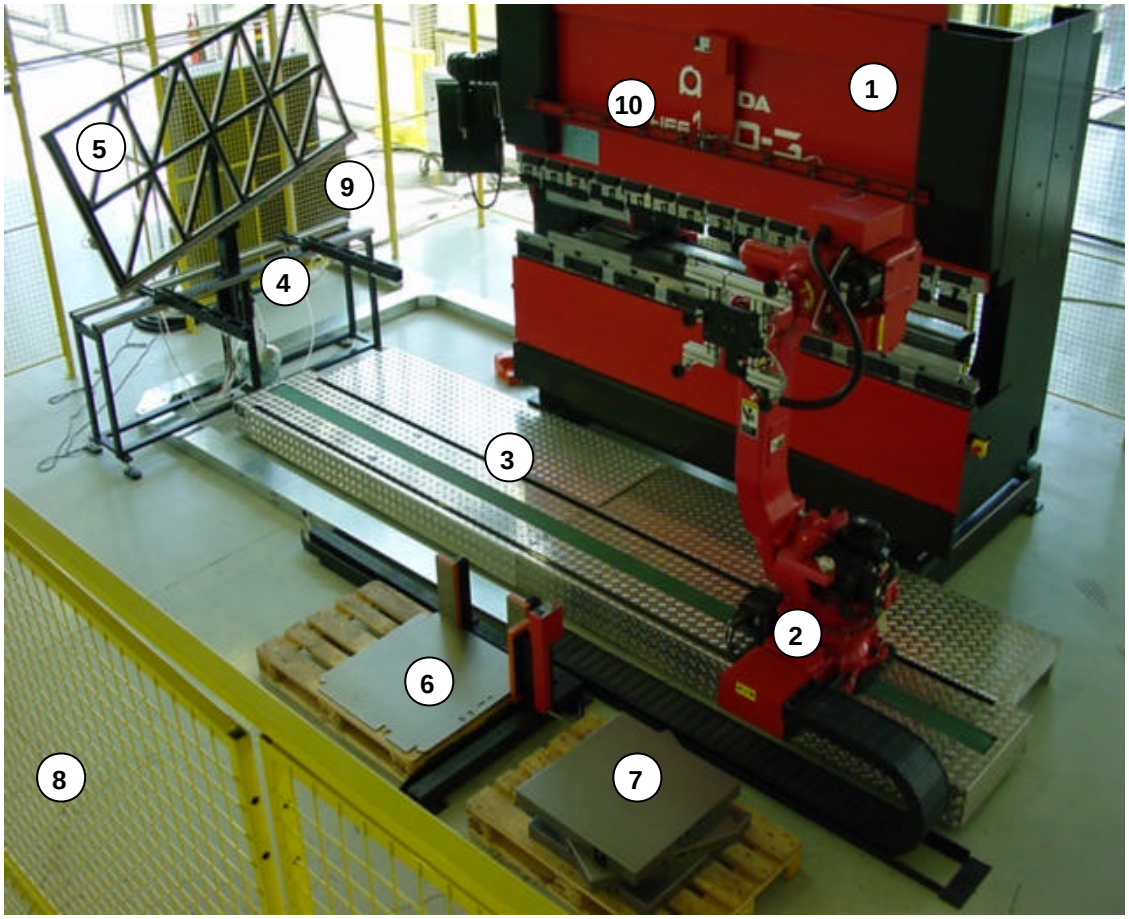
ROBOTISED BENDING CELL

ASTRO 50Y + HFE

Technical Description



AMADA'S ROBOTISED CELL



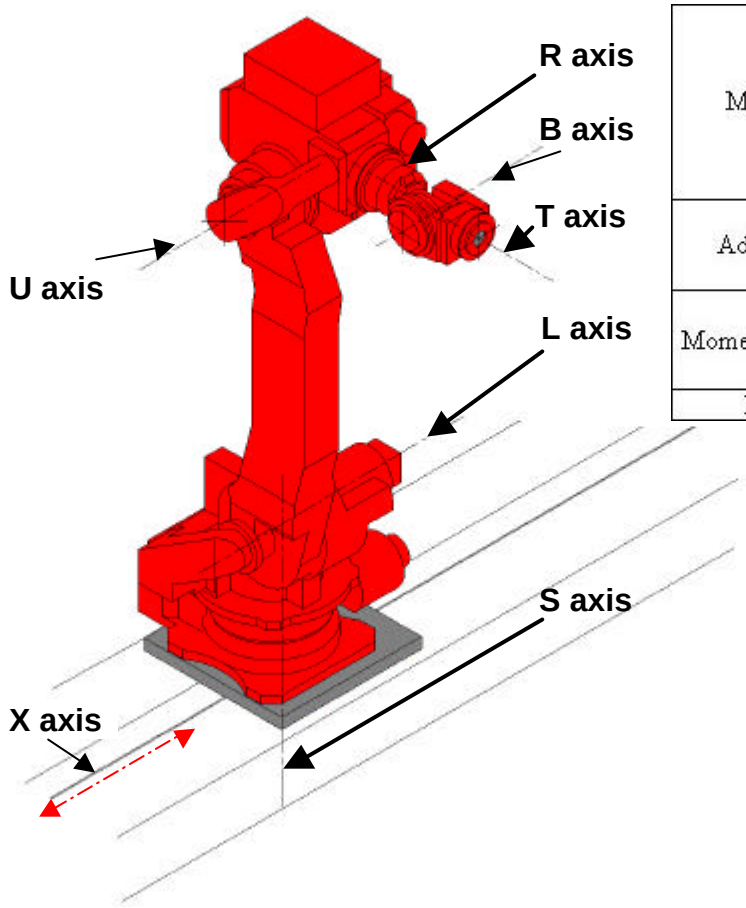
DESCRIPTION OF THE ELEMENTS

- **1** The « HFE **»** Press Brake.
- **2** The « ASTRO 50 Y » robot.
- **3** Linear axis of the robot.
- **4** Side change gripper module.
- **5** Origin pre-setting device.
- **6** Loading module with double sheet detection sensor.
- **7** Unloading area.
- **8** Peripheral safety grill.
- **9** Robot's controller « AMNC-RML ».
- **10** Equipment to assist re-clamping of straight parts**.**

Amada's bending robotised cell **«ASTRO 50Y + HFE»** (both robot & the press brake) is programmed using **«EASY CAM»** an off-line software.

«SARP», a semi-automatic programming module having macro-instructions is also provided to the programmer.

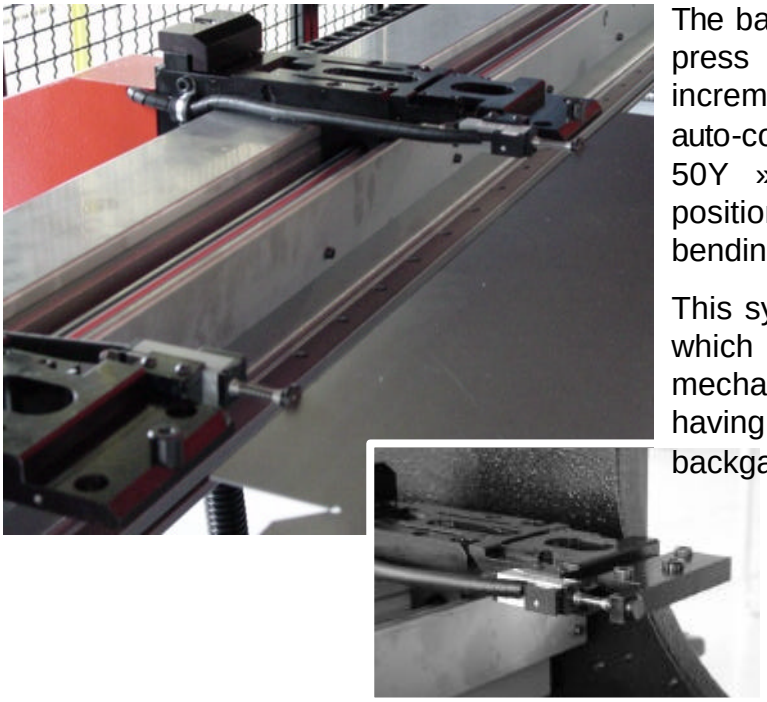
ASTRO 50Y: A robot designed for bending



Maximum speed	"S" Axis	2.97 rad/s
	"L" Axis	2.97 rad/s
	"U" Axis	2.97 rad/s
	"R" Axis	4.36 rad/s
	"B" Axis	4.36 rad/s
	"T" Axis	2.97 rad/s
Admissible torque	"R" Axis	196 Nm
	"B" Axis	196 Nm
	"T" Axis	127 Nm
Momentum of the inertia	"R" Axis	30 kg m²
	"B" Axis	27 kg m²
	"T" Axis	30kg m²
Repeatability	± 0.07 mm	

This particular profile of the "ASTRO 50Y" robot is the result of intensive work done in the field of optimisation aimed at reducing the forces induced by the highly accelerated movements of the robot and in turn permits to achieve unprecedented positioning accuracy independent to the manipulated sheet format.

ASTRO 50Y: Extreme precision



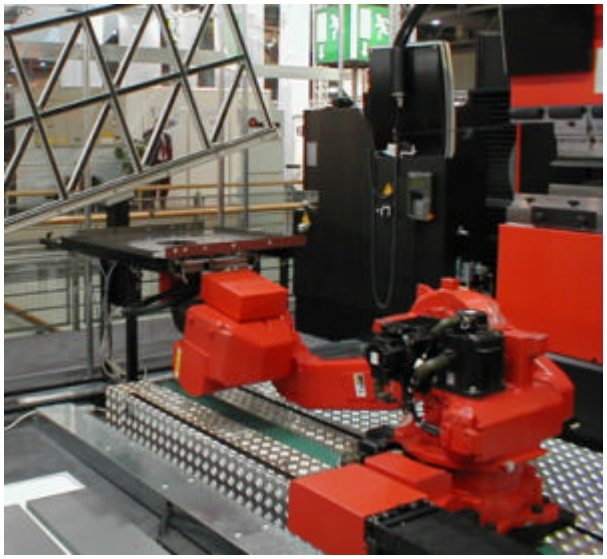
The backgauge fingers of the « HFE » press brake is equipped with incremental encoders linked to the auto-corrective system of the « ASTRO 50Y » robot ensuring the perfect positioning of the work sheet at each bending sequence.

This system also eliminates the errors which can be introduced when mechanically gauging a work sheet having deformations against the backgauge fingers.

Amada's programming software offers an exclusive function called « FOLLOWING » which generates simultaneous 6 axes movement of the robot, perfectly synchronized to accompany the work sheet through out the bending operation.

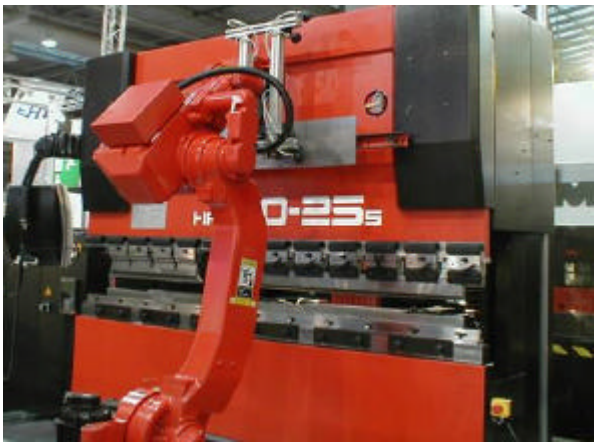
The sheet is never let loose by the gripper ensuring a remarkable bend quality and eliminate all risks of forming double bends or creating radius bend effects due to anticipation during operation.

ASTRO 50Y: Extended bending posibilities



The workstation is equipped with suction cups permitting to change gripping side on the sheet metal.

Taking into account overall accuracy of the equipment, a new origin pre-setting is not necessary for the part, which leads to a very significant gain in production time.



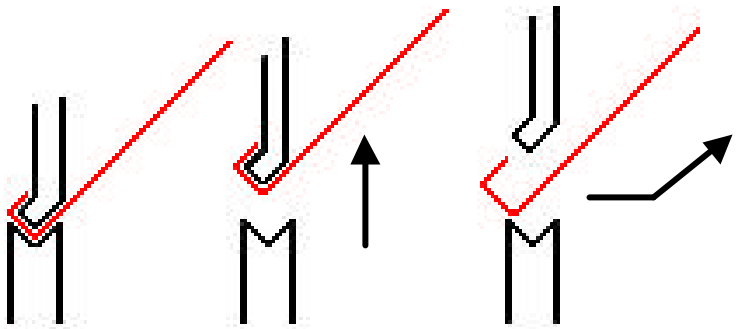
The upper part of the press brake is equipped with a regripping bar, an exclusive AMADA system to ease realisation of straight profiles.

This device eliminates all traditional turning over of the part in normal bending conditions which require considerable manoeuvring space and in turn increase considerably the production time and also the risk of deforming the part.

The specific design of the robot arm permits to reduce the spacer height for the press brake in favour of the ergonomic approach. With it's 4 meter long linear axis implanted on the ground, the "ASTRO 50Y" is perfectly suited for multiple stage bending operation.

ASTRO 50Y: improved bending functions

’’ TRACKING ’’ Function



End of bend Decompression Disengagement

The « TRACKING » function forces the robot to automatically follow the upper beam rising movement until there is enough space to execute useful movement to disengage parts having return bends which rolls around the punch tip.

Other functions

Depending on the tool, a minimum of 24° angle can be achieved.

Management of multiple gauging.

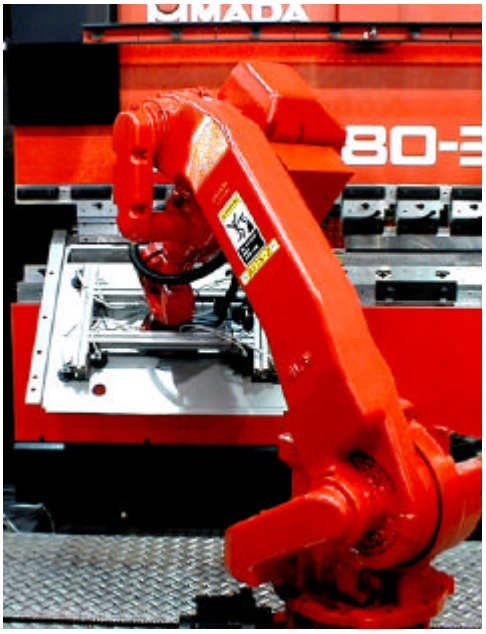
To perform internal bends, work sheet is accompanied towards the bottom.

Boxes having internal return bends on all four sides are rotated to disengage tools.

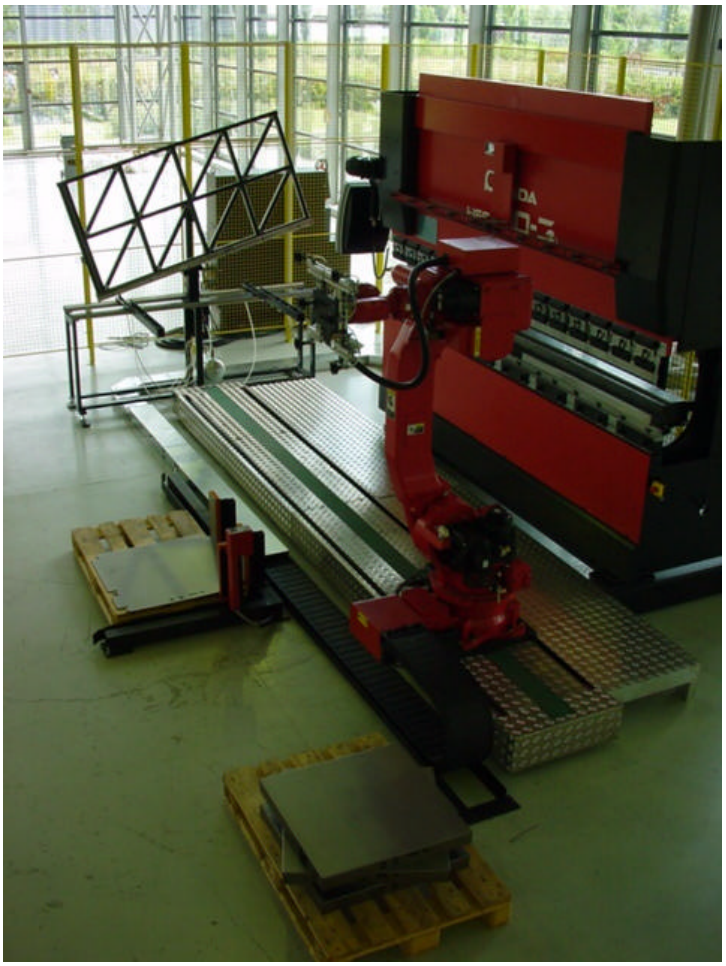
Retractable horn tooling management.

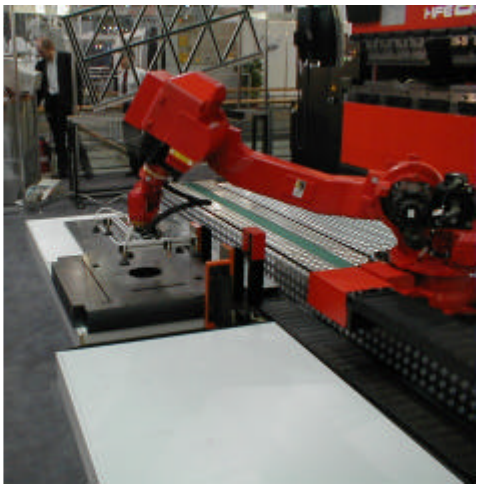
Flat bends.

Radius bends.



ASTRO 50Y: An optimised integration





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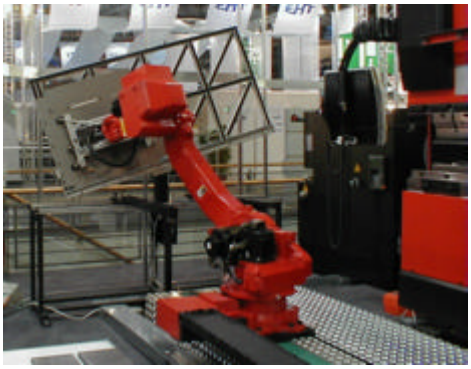
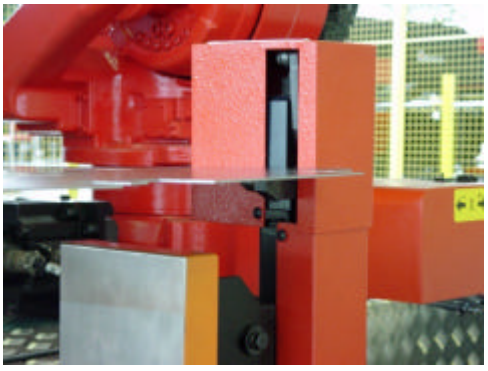
4 meter linear axis implanted on the ground provides a remarkable flexibility when it comes to placing the load / unload stations.

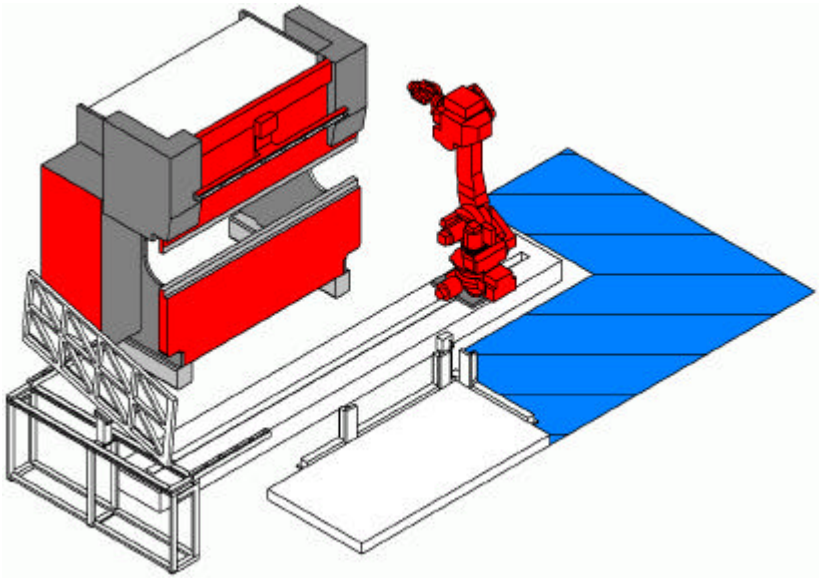


Irrespective of the number of bends or the complexity of the part to be realised, the origin preset is done only once by the « ASTRO 50Y » robot.



The presence of a double sheet thickness sensing device at the loading station ensures that single sheet is loaded at any one time, thus securing totally the operation of a fully automated system.

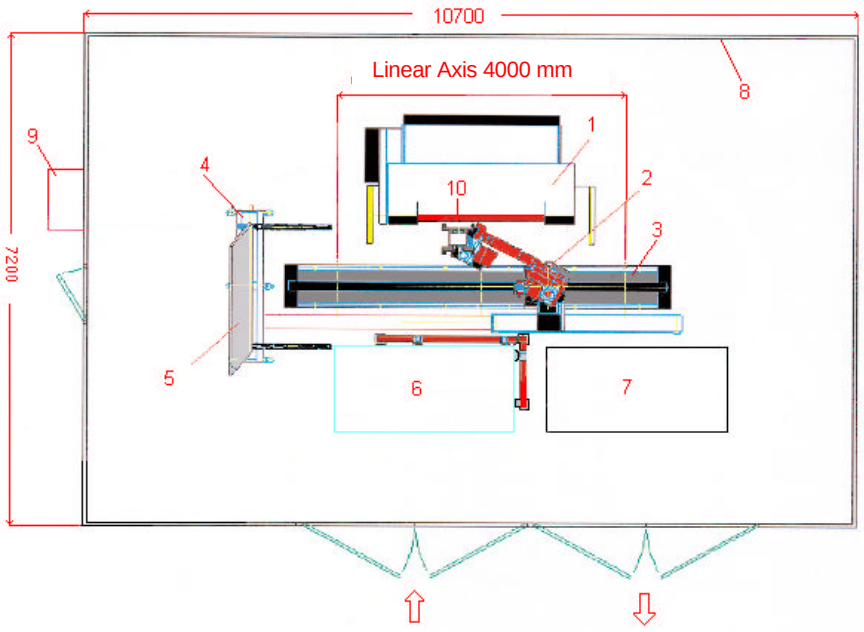
ASTRO 50Y: Multiple unloading possibilities



The unloading area can be organised in different ways :

- - Parts can be stacked directly on pallets in crossed, alternated or side by side
  - Directly inside the cases or on pallets with sides
- - Etc……..

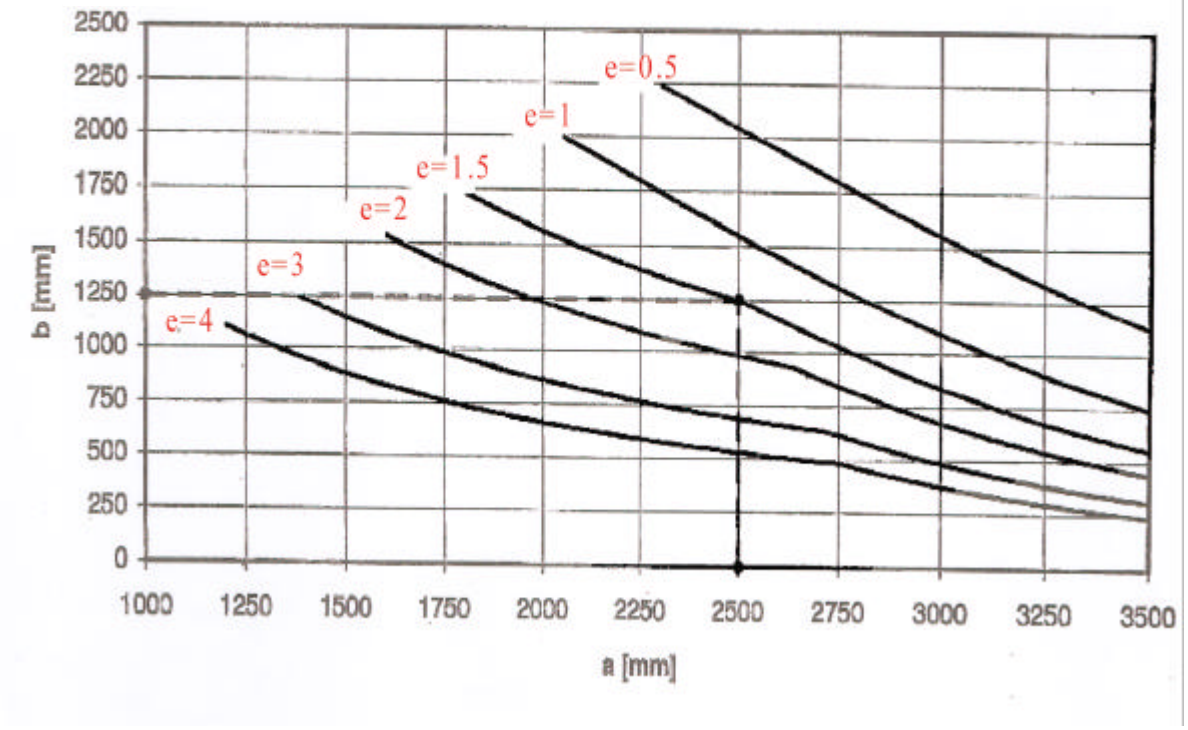
The installation also includes an electric interface for auxiliary equipment such as conveyors.



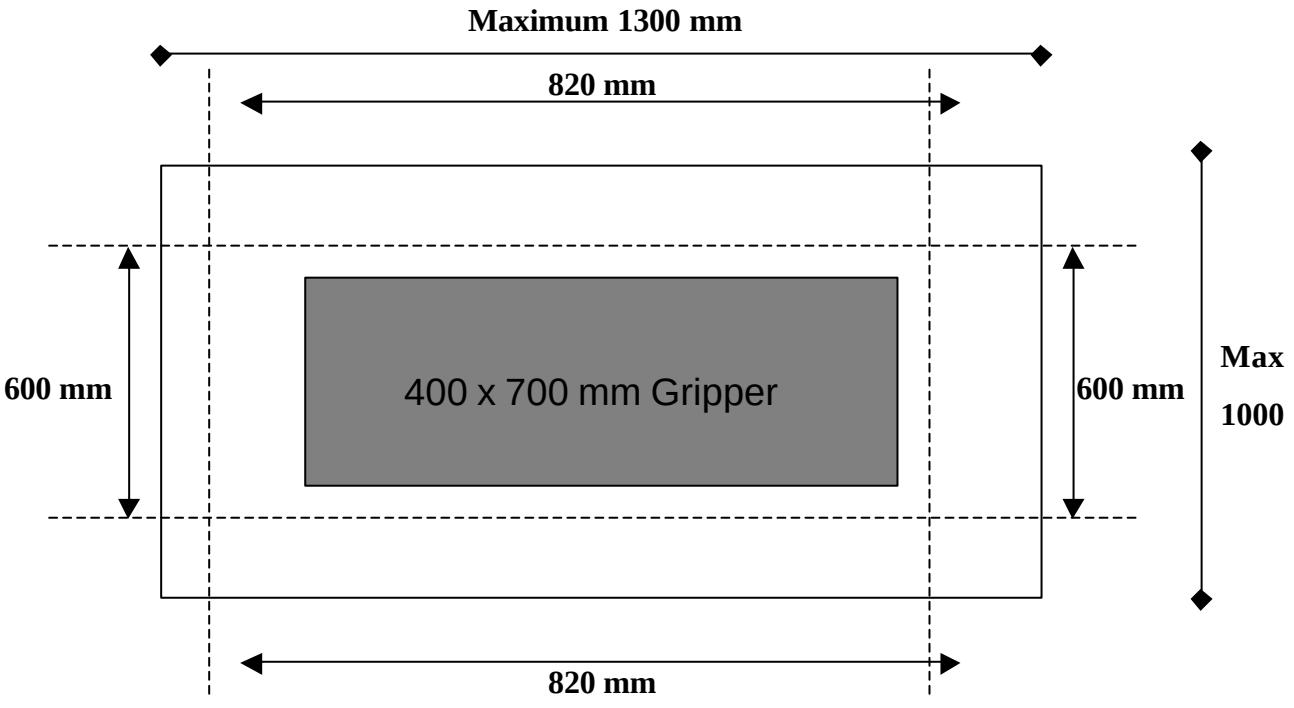
ASTRO 50Y: The dimensional possibilities

Maximum sheet format in accordance with the sheet thickness

Material : Mild Steel

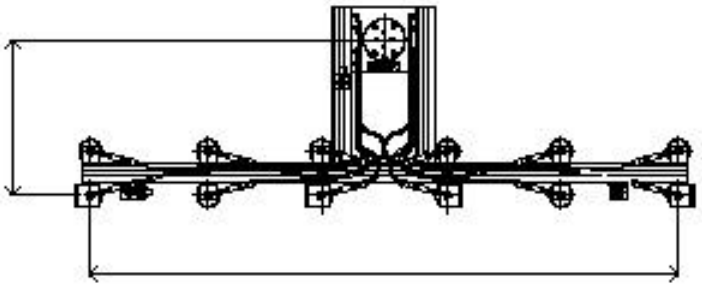


Example showing permissible work sheet dimensions in relation to the gripper



ASTRO 50Y: Gripping systems

« T » SHAPE GRIPPER



Standard dimensions

2200 mm

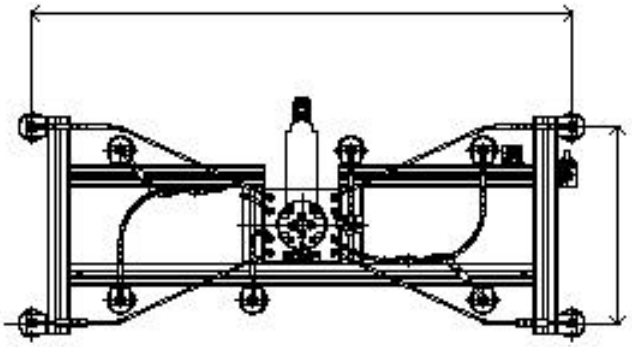
1800 mm

1400 mm

1000 mm

600 mm

« H » SHAPE GRIPPER

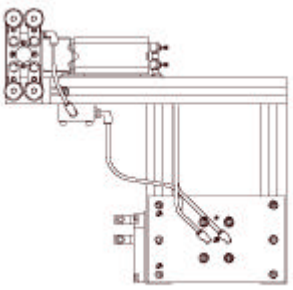


Standard dimensions

650 x 1900 mm	400 x 1900 mm
650 x 1500 mm	400 x 1500 mm
650 x 1100 mm	400 x 1100 mm
	400 x 700 mm
	400 x 400 mm

SMALL ROTATIVE GRIPPERS

MG-B1



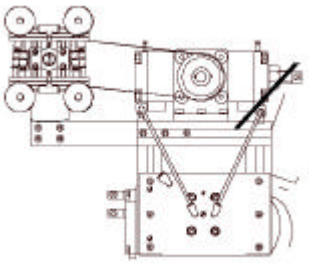
Standard dimensions

46 x 36 mm

From 86 x 36 to 126 x 65mm

From 176 x 36 to 176 x 82mm

MG-B2



Standard dimensions

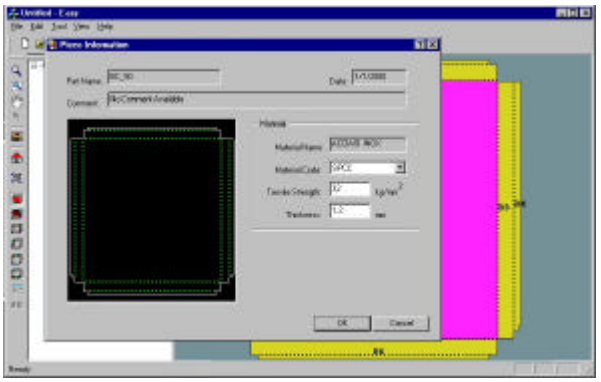
133 x 107 mm

206 x 167 mm

266 x 266 mm

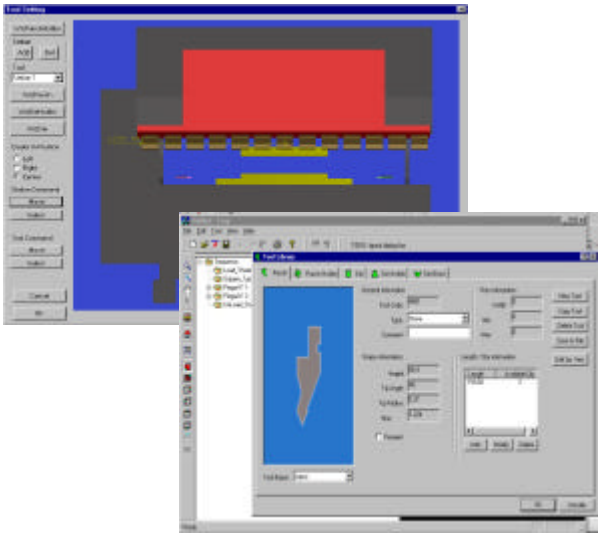
EASY CAM : Simplified programming

The programming of the « ASTRO 50 Y » robot and the « HFE » press brake is carried out in six phases:



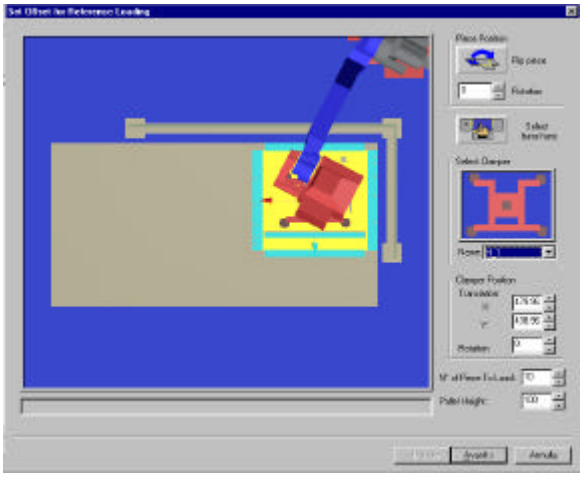
PHASE 1

The programmer imports the part drawing with its bend lines. The « EASY CAM » software recognises the standard « IGES, DXF, DWG, IGA (AP 100) » formats.



PHASE 2

The programmer sets up the press brake using tooling data base.



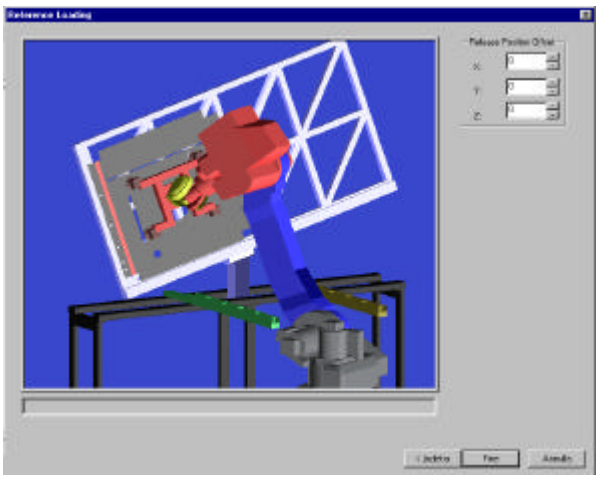
PHASE 3

The programmer feeds in the parameters related to loading station :

- part position
- number of parts to load
- palette height

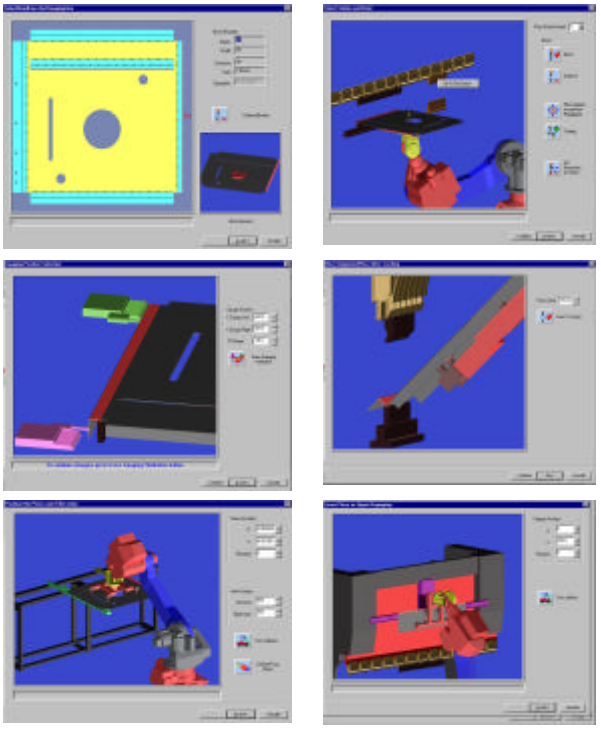
He also indicates if the part need to be flip over, rotated and which base face is to be selected automatically.

EASY CAM : Simplified programming



PHASE 4

The programmer determines the point the part is to reach at the origin pre-setting equipment.

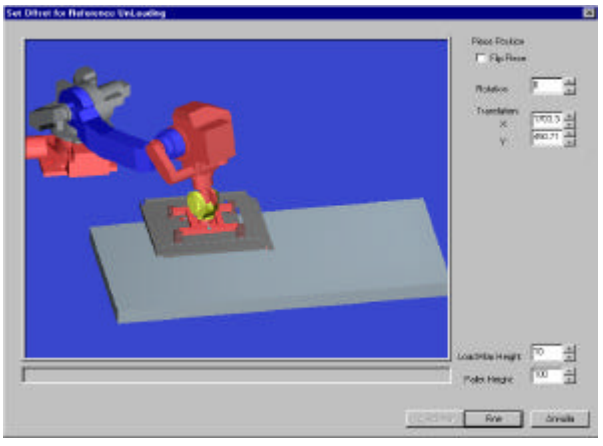


PHASE 5

The programmer introduces the parameters for the bending sequences: bend number, backgauge finger position, press brake beam opening, etc.

If required, « EASY CAM » automatically generates the visualisation of the holding position of the large sheets or change in sides to program different values.

At all times, the programmer has the 3D visualisation of different steps.

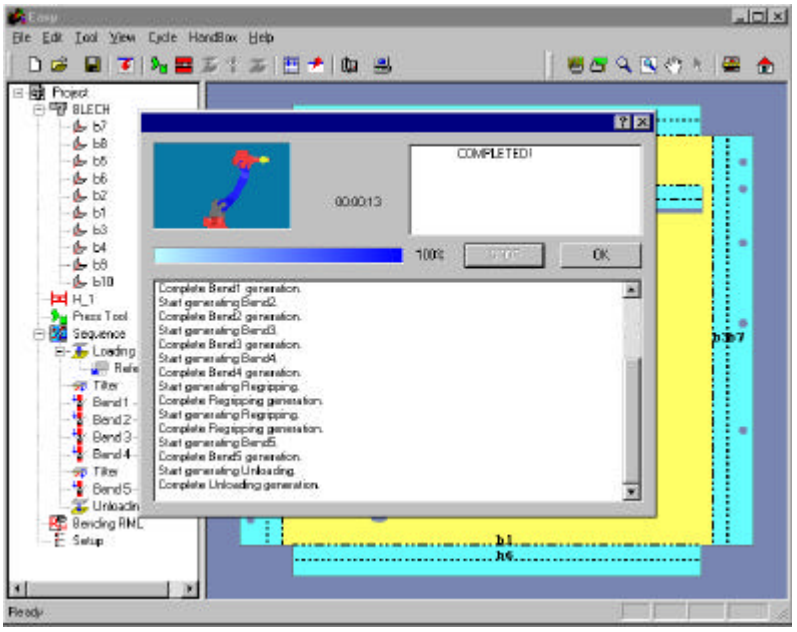


PHASE 6

The programmer sets up the unload station.

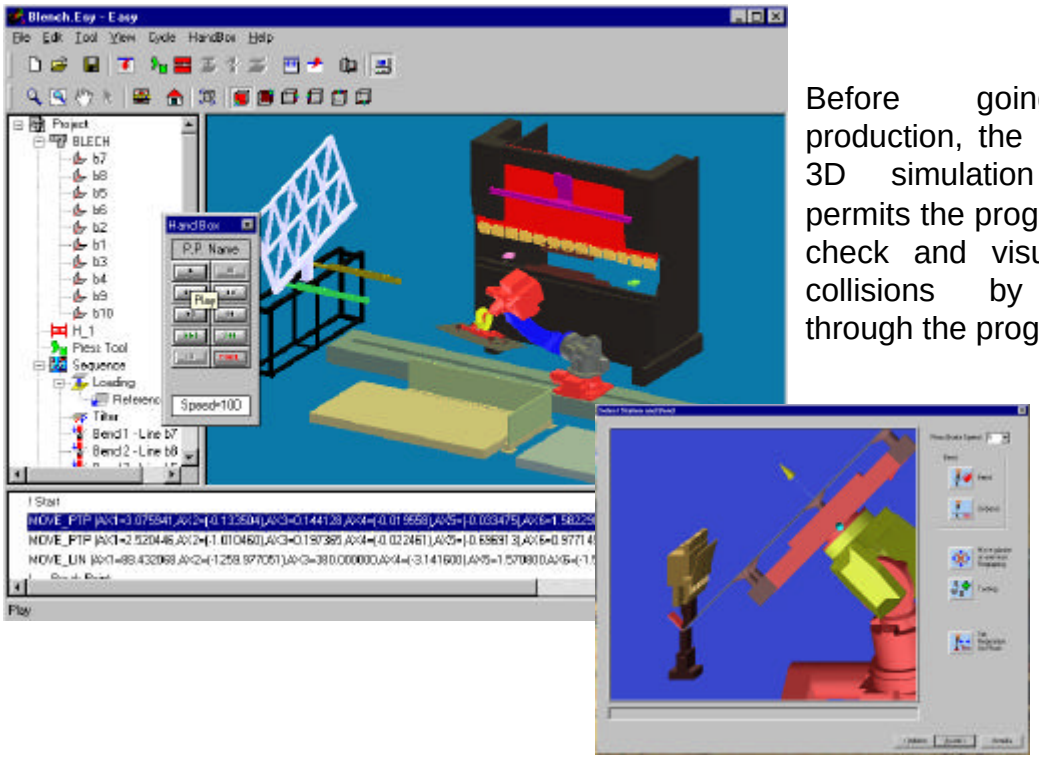
In relation to the height of the part and pallet, the system generates automatically the number of parts to stack.

EASY CAM : Simplified programming



« EASY CAM » generates automatically the program for both the robot and the press brake.

The transmission of the program to both numerical controllers (robot and press brake) is carried out through a specific integrated module.

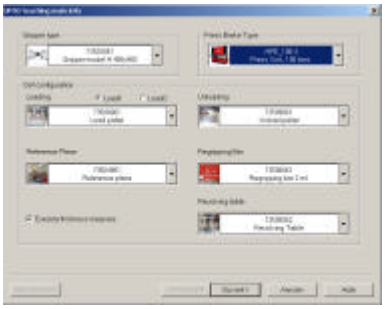


Before going into production, the integrated 3D simulation module permits the programmer to check and visualise the collisions by running through the program.

SARP : Semi-Automatic programming module

« SARP » is a complimentary programming module which allows to overcome problems linked with complex parts which require definition of special tooling or specific grippers. Among other things, it also permits to realise highly optimised programs for parts which are frequently repeated in large quantities all year long.

PROGRAMMING AND INITIALISATION OF THE BENDING CELL

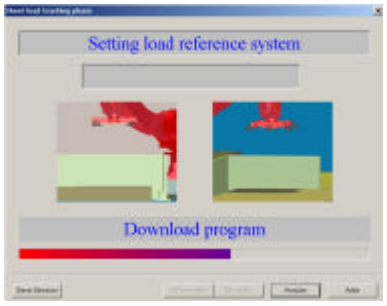


Selecting the surrounding equipement

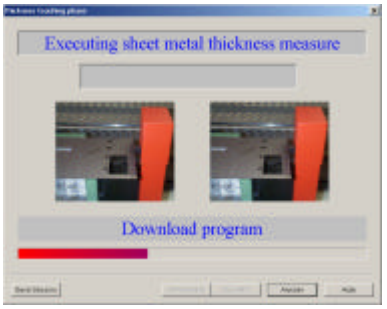
Programming and generating bending program

Initialisation

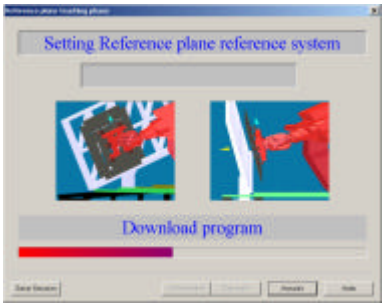
SET UP OF SURROUNDING EQUIPMENT THROUGH TEACHING



Setting the load station



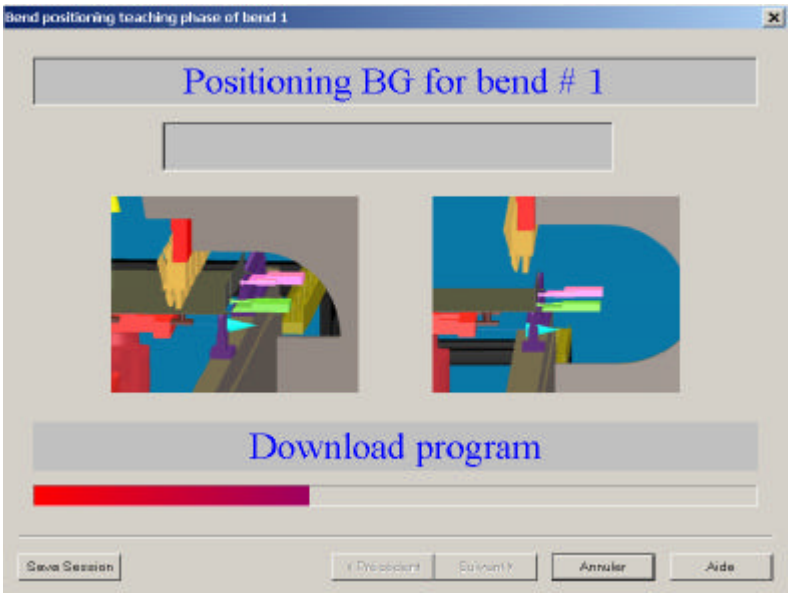
Setting the sheet thickness sensing device



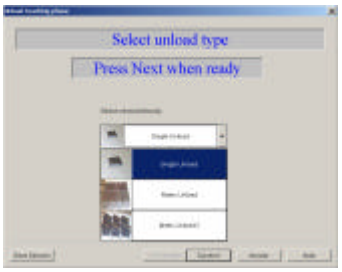
Setting up the origin taking station

SARP : Semi-Automatic programming module

REALISING A BEND

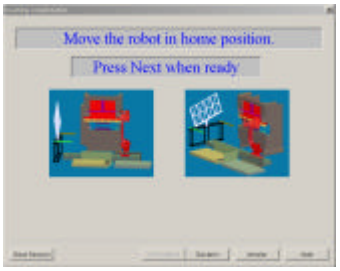


SETTING UNLOADING STATION



RETURNING TO HOME (ORIGIN) POSITION

PROGRAM STORAGE



ASTRO 50Y : Main Technical Specifications

	ASTRO 50 Y
Number of numerically controlled axes	6 Robot axes and a 4000 mm linear axis
Robot's numerical controller	AMADA AMNC-RML
Maximum load	50 Kg
Linear axis speed	1.4 m/s
Linear axis acceleration	2.5 m/s²
Press Brake type	« HFE » (2.5 M, 3 M & 4 M) NC « OP2000 »
Nominal dimension of the part	2500 x 1250 x 1.5 mm
Maximum dimension of the part	3000 x 1000 x 1mm 2000 x 2000 x 1 mm
Maximum weight of the part	35 Kg
Minimum dimension of the part	100 x 600 (with « T » shape gripper) 100 x 120 (with small rotative gripper)
Maximum bend angle	Up to 24°
Loading system	Maximum size: 2500 x 1250 mm Stack height: 350 mm Three magnetic adjustable blocks Double sheet thickness sensor
Gripper	With suction cups
Origin pre-setting device	Inclined surface of 2000 x 1000 mm
Re-clamping device management	Adjustable arm with suction cup gripper
Re-clamping device for straight parts	Maximum part size: 3000 mm With suction cup gripper

AMADA constantly strives to improve it's products and reserves the right to alter the characteristics of ASTRO 50Y with out any prior notice.

AMADA’s robotised bending cell

« ASTRO 50 Y » robotised bending cell is built around AMADA’s « HFE » type press brake equiped with AMADA’s « OPERATEUR 2000 » numerical controller either in standard version or in long stroke version.

Range of models

HFE 80-25

HFE 100-3

HFE 130-3

HFE 130-4

HFE 170-4

HFE 220-4

The cell retains all the advantages inherent to HFE press brake.

Among those :

- parallel beam deflection,
- latest generation of high speed and high precision backgauge,
- 420 mm throat depth as standard,
- 100 mm/sec high approach speed,
- full range of AMADA tooling,
- etc. etc.