



HFB PRESS BRAKES

The ultimate in precision

CE

AMADA
PROMECAM

For almost 30 years, Amada-Promecam has built and maintained a high reputation as the leader in the field of machine design and manufacturing, particularly for the sheet metal and plate working industries.

Through market research and on-going contact with existing users,

Amada-Promecam has established industry requirements and used the information to manufacture a superb range of press brakes which totally relate to the needs of the industry.

Today, with the HFB press brakes, Amada-Promecam opens a new era in metal forming technology.



HFB press brake, the ultimate in precision

The HFB press brakes are available in 3 tonnages, 138, 187 and 242 US tons (125, 170 and 220 metric tons) with 2 bed lengths, 10 and 14 feet (3 and 4 meters). The composite lower bed insures parallel deflection regardless of the bending tonnage. The large distance between side frames, the large throat



depth, and the sectionalized punch holder make the HFB a truly versatile machine. In response to the most demanding bending problems, Amada-Promecam has developed the HF 700 backgauge with up to 8 independently programmable axes. (Y1, Y2, X1, X2, R1, R2, Z1, Z2).

The Operateur, a total control

The Operateur is a new CNC control that was totally developed by Amada-Promecam. It controls all aspects of the HFB press brake yet it is simple to use and it is aesthetically and ergonomically designed. This control includes an

integrated maintenance program that can be accessed from the PC through a DNC cable.

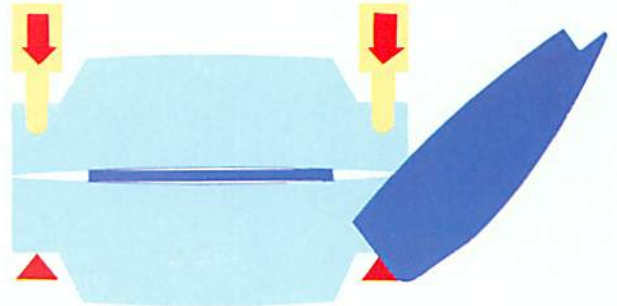
Amada-Promecam has developed new bending software that provides *the ultimate* in performance and efficiency.

A composite lower table, a key innovation

Ensuring bending quality

Bending accuracy is essentially related to angular precision of the work-piece, which must remain constant throughout the entire length of the bend. A minor variation of punch penetration into the die will lead into considerable variation of the bend angle, even on heavy duty press brakes.

Perfect control of straightness, parallelism and rigidity of the beams is therefore imperative.



"Shimming" a costly solution

To overcome deflection, operators often use out-of-date techniques ; most generally inserting shims of various thicknesses above punches or under dies.

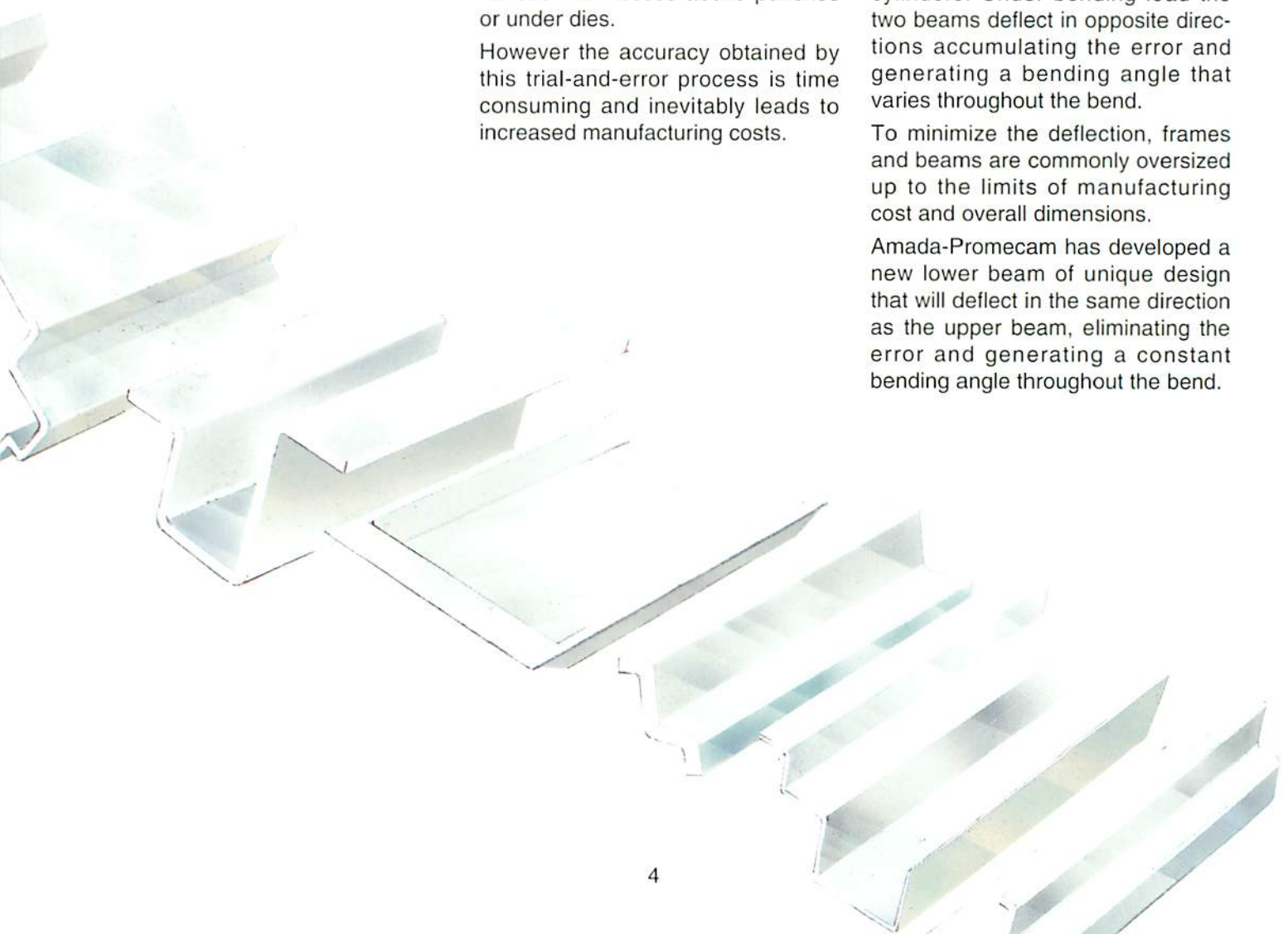
However the accuracy obtained by this trial-and-error process is time consuming and inevitably leads to increased manufacturing costs.

Even the largest press brakes deflect

Conventional press brakes have the lower beam built as a single piece, and the upper beam is driven by two cylinders. Under bending load the two beams deflect in opposite directions accumulating the error and generating a bending angle that varies throughout the bend.

To minimize the deflection, frames and beams are commonly oversized up to the limits of manufacturing cost and overall dimensions.

Amada-Promecam has developed a new lower beam of unique design that will deflect in the same direction as the upper beam, eliminating the error and generating a constant bending angle throughout the bend.



A new concept, the HFB series

By developing a unique lower fixed beam to work with the conventional moving upper beam, opposing beam deflection is canceled out.

The bottom beam is composed of a center plate "A", supporting the work table "E". This centre plate is mounted between two fixed side plates "B" and "B'".

"A" is supported by two large steel shafts "C" located each side of the brake axis.

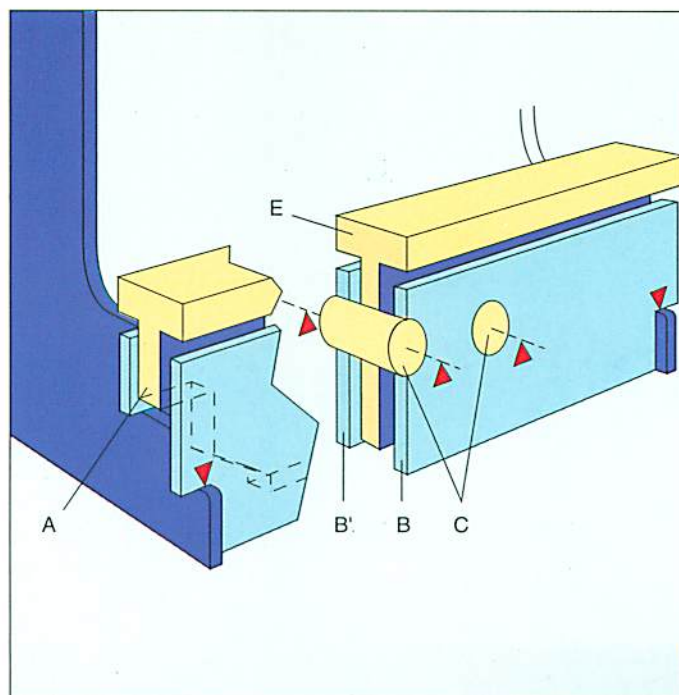
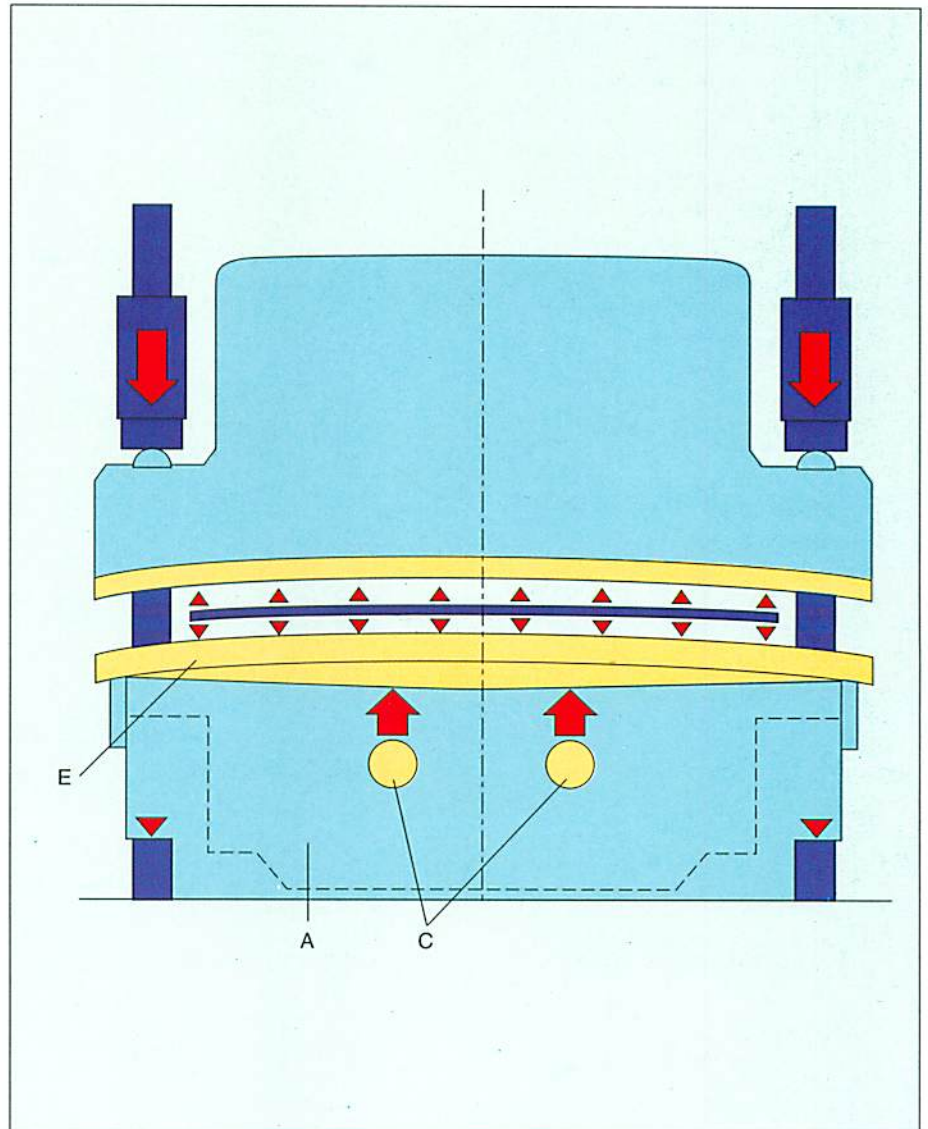
"B" and "B'" are welded to the side frames.

During bending, the reactive forces deform the plate in parallel with the upper beam.

Consequently, the deflection of the two beams, is of the same value, thereby ensuring that the punch penetration into the die remains constant throughout its entire length, ensuring accurate bending.

This simple, efficient and low cost technique of ensuring constant parallelism between the two beams eliminates the inherent inaccuracy found in conventional press brake designs.

All conventional down stroking press brakes utilizing mechanical or hydraulic methods of controlling deflection are now rendered obsolete by the Amada-Promecam composite lower table patented in 20 countries.

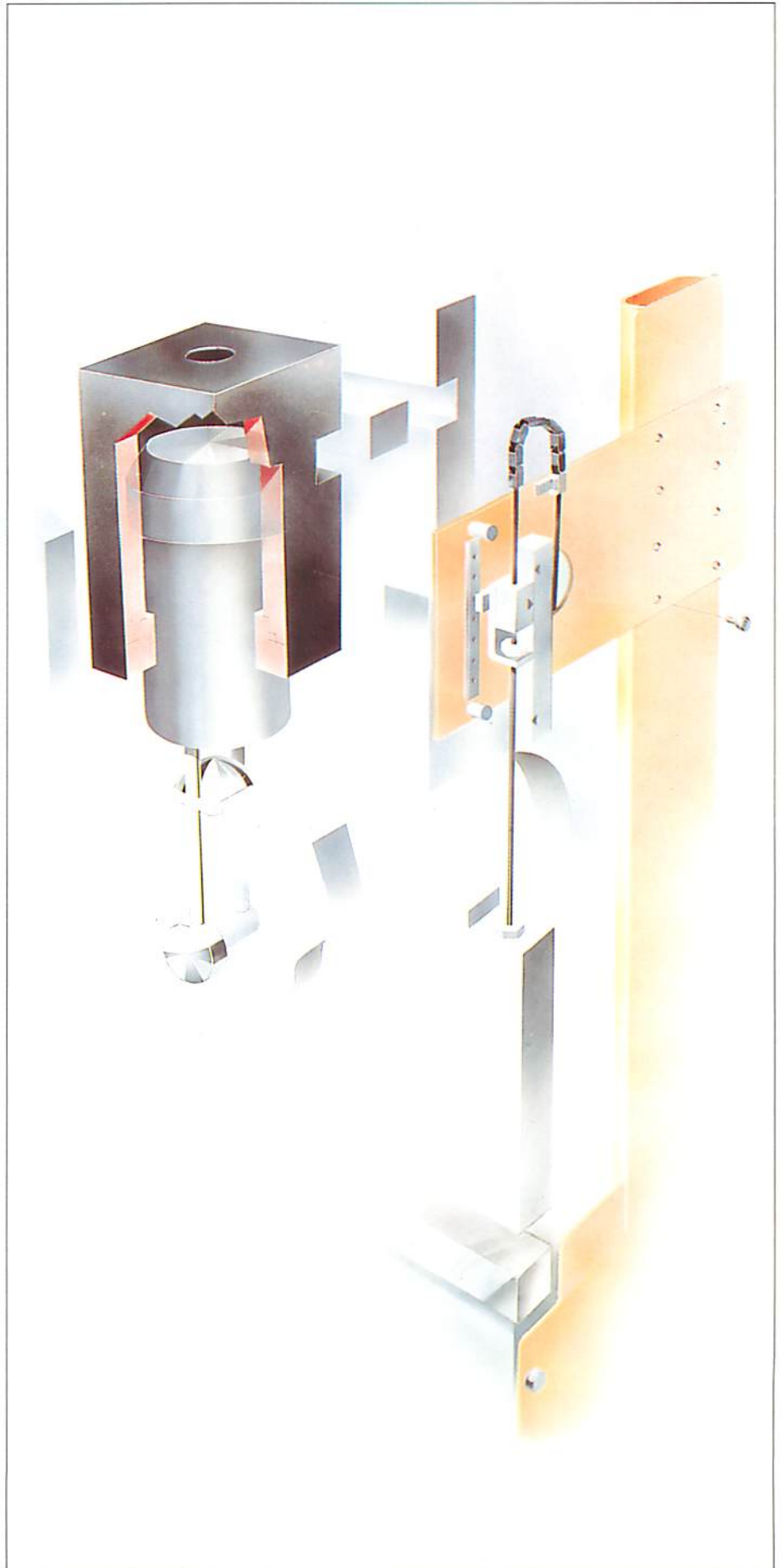
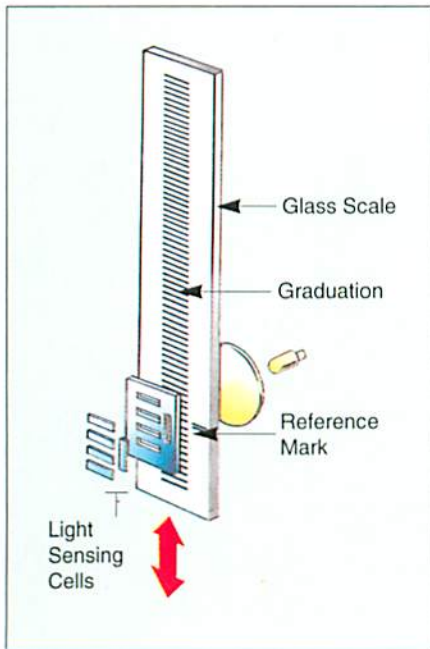


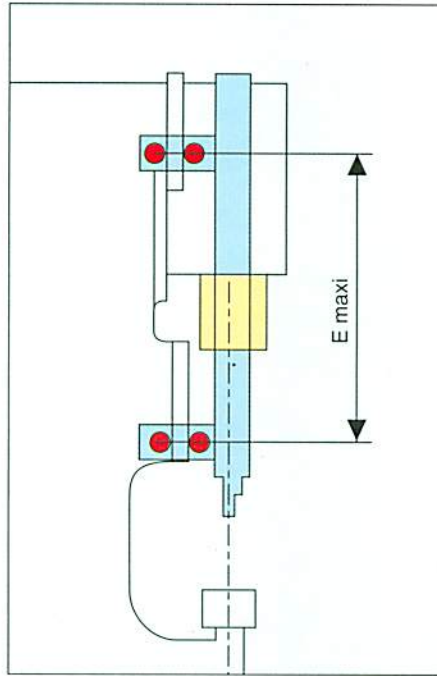
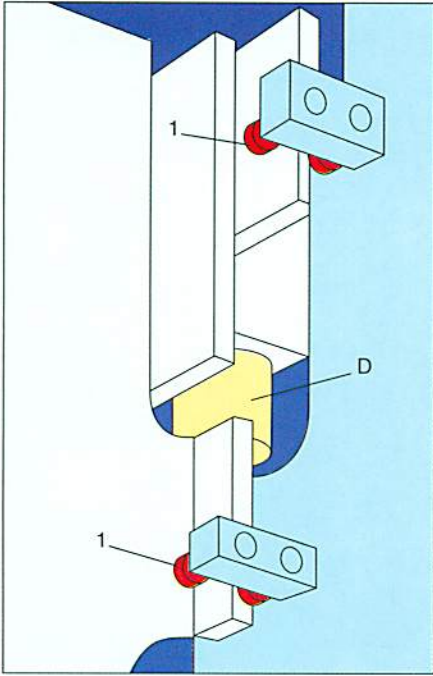
In search of absolute accuracy and precision

With the HFB press brakes, the reference position of the moving table is taken completely independently of the side frame to avoid introducing any error resulting from side frame deflection. A uniquely designed "C" frame that remains rigid under all bending conditions insures that accurate ram positioning is maintained even with side frame deflection.

Incremental measurement through accurate sensing

The graduated glass scale regulates the upper beam motion to a positioning accuracy of ± 0.0004 " between punch and die.





Roller bearing beam guidance

The upper beam is guided by 4 pairs of roller bearing guide assemblies, oversized for added stability. These roller bearings work on hardened and ground surfaces located on the side frame of the machine. The long distance between upper and lower roller bearings (E) as well as zero operating clearances ensures accurate punch and die alignment through the entire stroke length.

Precision electronic control

Guaranteeing angular accuracy

During normal operation of a press brake, many factors can affect the angular precision of a formed component, including :

- oil viscosity variation through temperature change
- working forces (pressure)
- position of the sheet in relation to the side frames

Without mastering all of these parameters, the quality of bend suffers. A new technique has enabled Amada-Promecam to completely overcome these problems.

Reliable proportional valve system

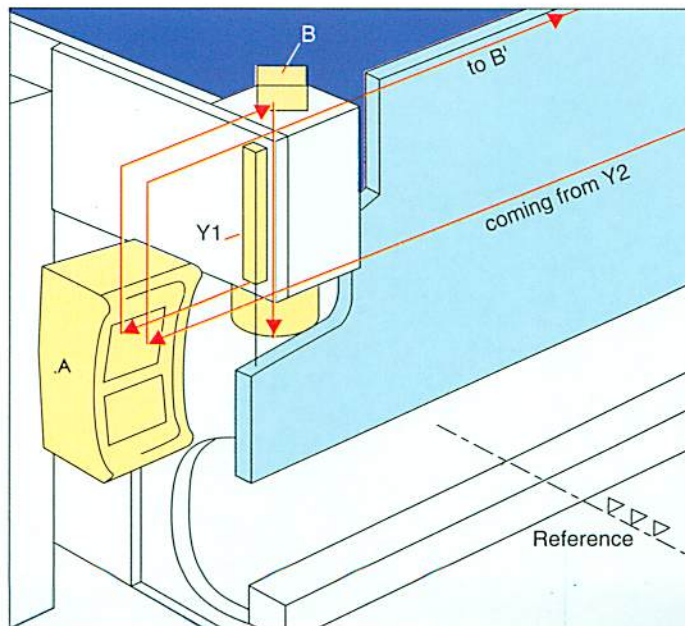
The sophisticated technique of electronic regulation guarantees parallelism regardless of external elements which might affect it.

Incremental linear encoders (Y1 - Y2) are fitted on each end of the upper beam. The sensors are supported by two "C" frames mounted to the lower beam. These optical sensors are electronically connected to

the CNC control of the machine (A) which regulates oil flow to each cylinder through proportional valves (B and B'). During the descent of the upper beam, the optical sensors continuously monitor its position with a high degree of precision.

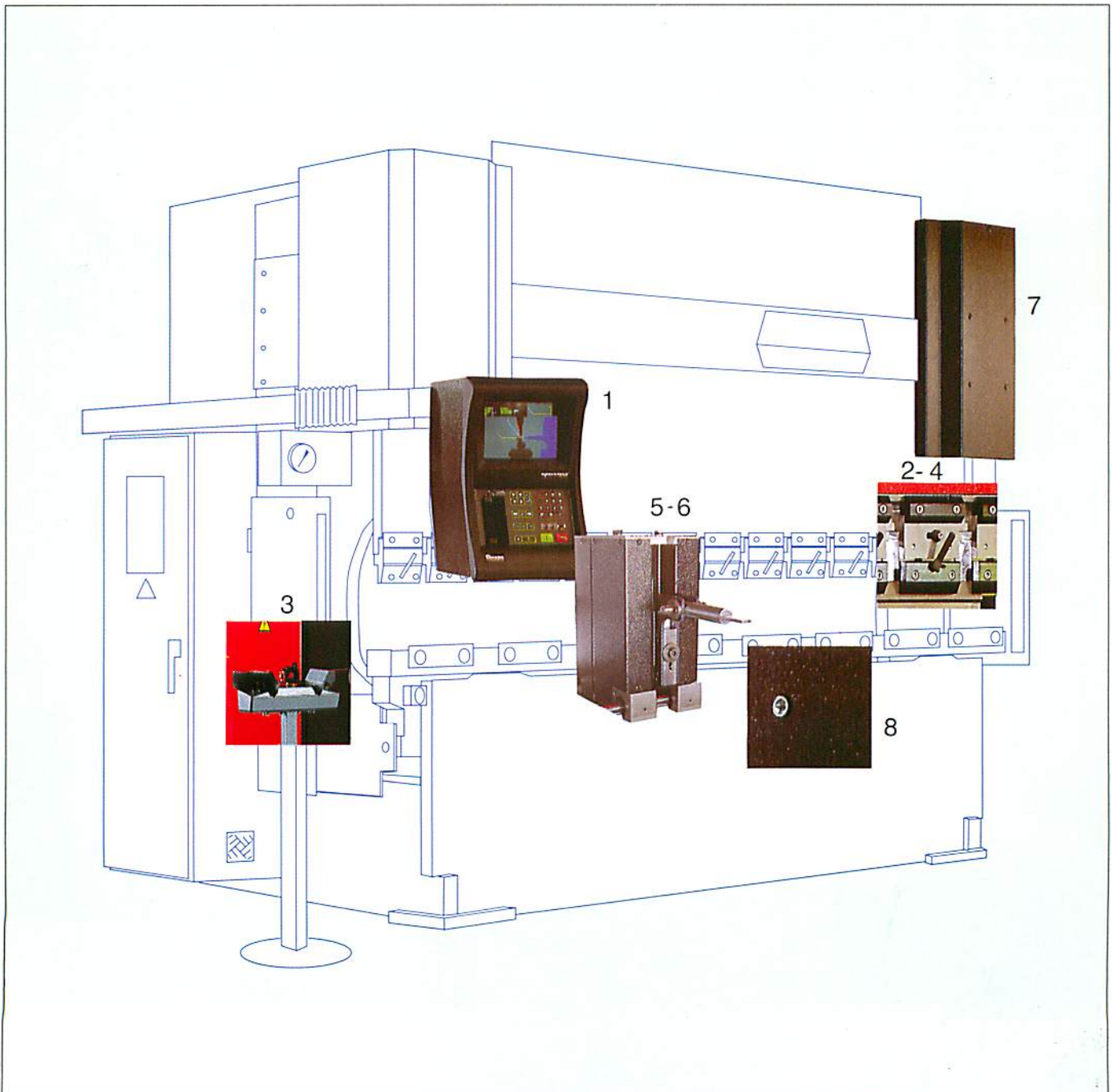
The information is transmitted directly to the CNC control which monitors the respective valves. Any informational difference between the two

optical sensors automatically commands oil compensation and pressure equalization. The side frame deflection due to the bending force is similarly checked and compensated for.



A complete technological concept

- 1 - CNC color graphic control.
- 2 - Handle for quick punch clamping.
- 3 - Electrical cabinet.
- 4 - Adjustable punch holder, designed for punch reversal.
- 5 - Backgauge guides designed for high speed.
- 6 - All back gauge axes are controlled independantly.
- 7 - Steel covers to protect hydraulic cylinders.
- 8 - Large bolt to secure the front support.
 - Constant parallelism between upper and lower beams.
 - Double foot pedal with flexible lead.
 - Rigid guide roller for the upper beam.
 - No special foundation is needed for any length or tonnage.
 - Port for connection with PC (RS 232).
- Automatic or manual beam movement
- 3" 1/2 floppy disk to save programs and tooling library.
- Noise level is less than 70 dBA.



Large open area at the rear of the machine

The alignment of the cylinders with the side frames increase the working area at the rear of the upper beam. This arrangement increases the working area available for the operator for complex bends where torsion bars, would prevent the fabrication of some sections, such as large square tanks, boxes, etc...



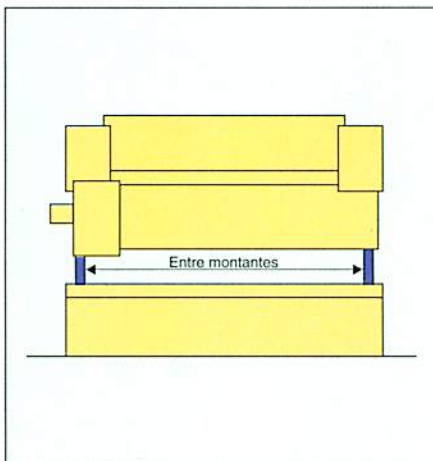
Hand-wheel

This device allows the operator to regulate the tonnage applied to a workpiece while bending, or to set the angle for the first bend.

The wheel is finely graduated to control the progressive variation of penetration between the punch and die.

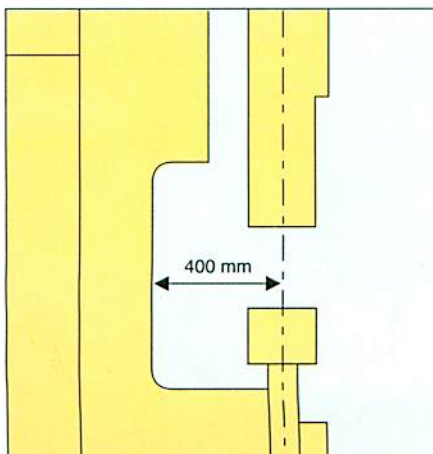
Large distance between side frames

The large distance between side frames allows clearance for wide work pieces.



Throat depth

The large throat depth allows for bending up to 410 mm (16") flanges over the entire bed length.



The Operateur, a total control



**French 1992
Industrial awards**

By offering our customers a micro-processor, CNC control that is intended for sheet metal machinery, Amada remains on the cutting edge of technology. This new line of CNC controls attains a unique degree of utilization simplicity. Once again Amada provides a complete forming system ; machine, CNC control and tooling in a very modern looking and ergonomical package.

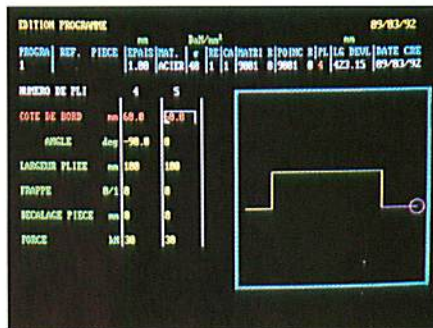
The results : a very user friendly bending system that minimizes set-up time and increases overall accuracy.

Three modes of programming

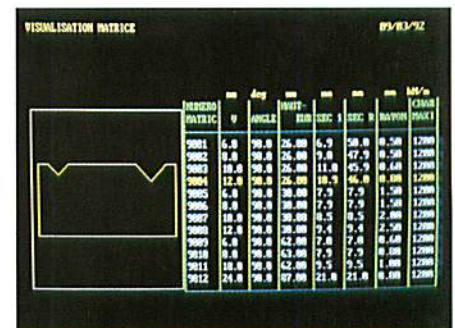
Depth mode : The operator holds the workpiece against the backgauge finger, and pushes the foot pedal to lower the upper beam to a preset depth. Then, the operator turns the hand wheel that is mounted on the foot pedal. The hand wheel will control the punch penetration into the die. When the desired angle is achieved, the operator presses a button to memorize the ram position.

Angle mode : calculates automatically the penetration between the punch and die, the bending speed, and the backgauge finger positions. All other machine functions are entered by the operator.

Graphic angle mode : allows the user to program a part and see its shape on the color CRT. The control will draw the part proportionally to its dimensions. Also the screen will give additional information about the part, such as bending sequence, part rotation, and bending angle. In addition many machine functions normally requiring operator input are automatically calculated and entered into the program.

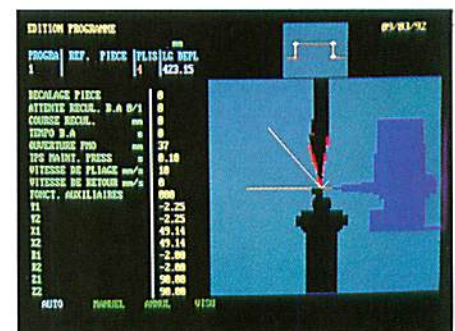


1 - Definition of the workpiece shape

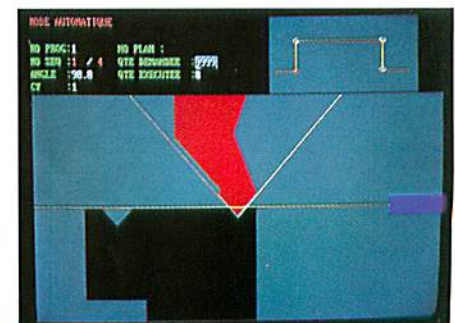
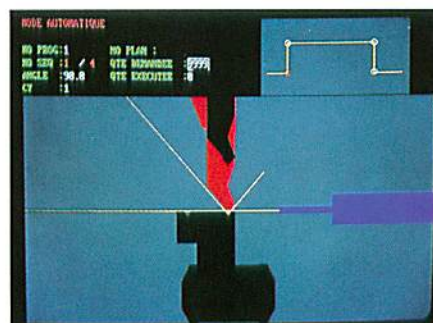
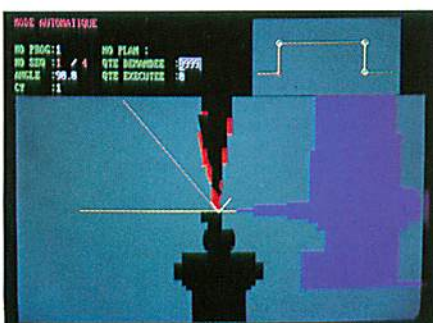


2 - Punch and die library

3 - Automatic calculation of bend sequence



4 - Graphic display of bending sequence



700 HF backgauge, ultimate precision

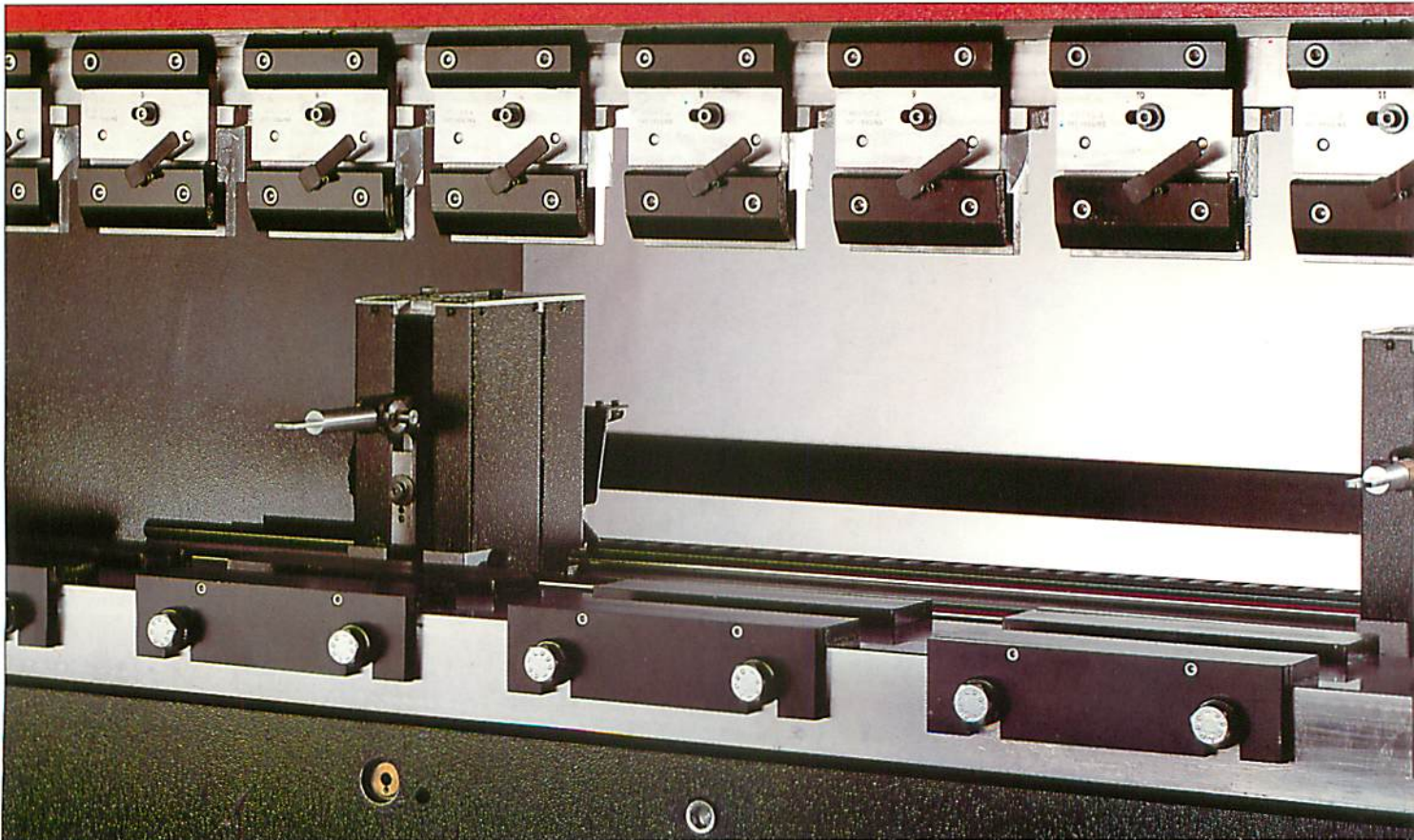
With its 6 axes, Amada's 700 HF backgauge addresses all imaginable bending problems, even the most delicate ones. It is extremely accurate even when working independently on each axis (X1-X2, R1-R2, Z1-Z2).

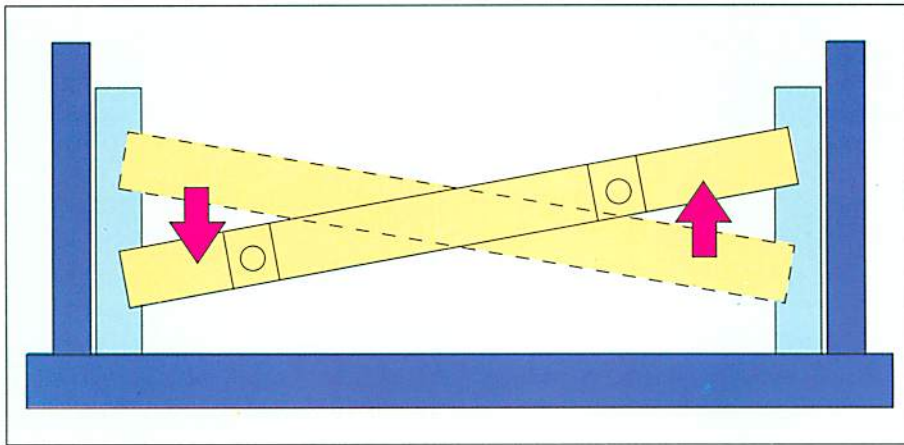
The high performance backgauge rail

is made of an extruded aluminum alloy and has been exclusively designed for Amada. The use of this technology allows a very light but strong and rigid moving element, giving maximum speed and maintaining long term accuracy.

Maximum distance between the backgauge drive arms

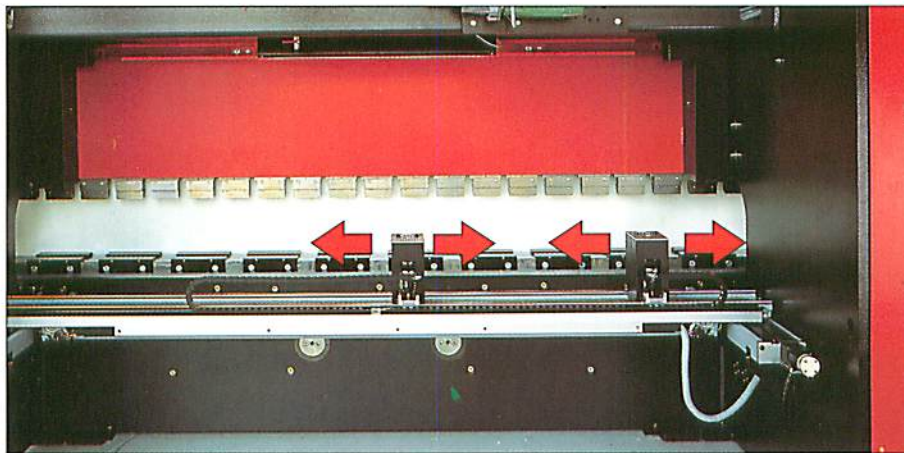
The backgauge mechanism with independent drive arms mounted directly to the side frames allows maximum opening at the rear of the machine.





Independent X1-X2

The CNC unit controls the two independent servo motors, eliminating all mechanical linkages such as chains or belts between the drive arms. This guarantees backgauge parallelism. In the long term, any misalignment in the parallelism can be adjusted simply by an input to the numerical control. Positioning of X1 differently from X2 for gauging on a specific bend can be easily achieved.

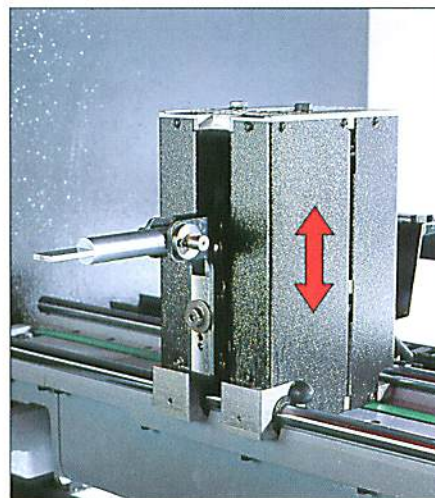
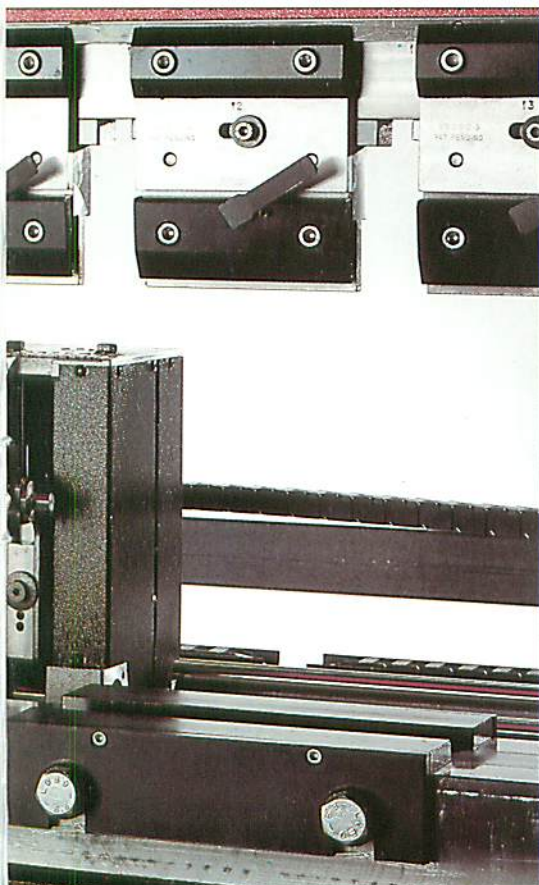


Perfect solution for multi bed set ups : Z1-Z2 axes, positioning over full machine length

The two moving gauge fingers are independently programmable over the full length of the gauge bar.

The operator can work on any part of the beam without any restrictions.

High speed backgauge movement ensures that the operator is never waiting for the fingers to reach their final position.



High precision : R1-R2

Whatever the shape of the part to be formed and the progress of its profile, the CNC unit calculates the optimum position of the finger stops.

Furthermore, the CNC unit avoids collisions between the fingers and the tooling by continuously monitoring all the programmed and calculated values..

All 6 axes of the 700 HF backgauge are controlled by the CNC "Operateur" control for simultaneous movement of all axes. The design of all backgauge compo-

nents, including servo motors and hardened/chromed guide backgauge surface is guaranteed to provide high reliability and *the ultimate in precision.*

Optional equipment

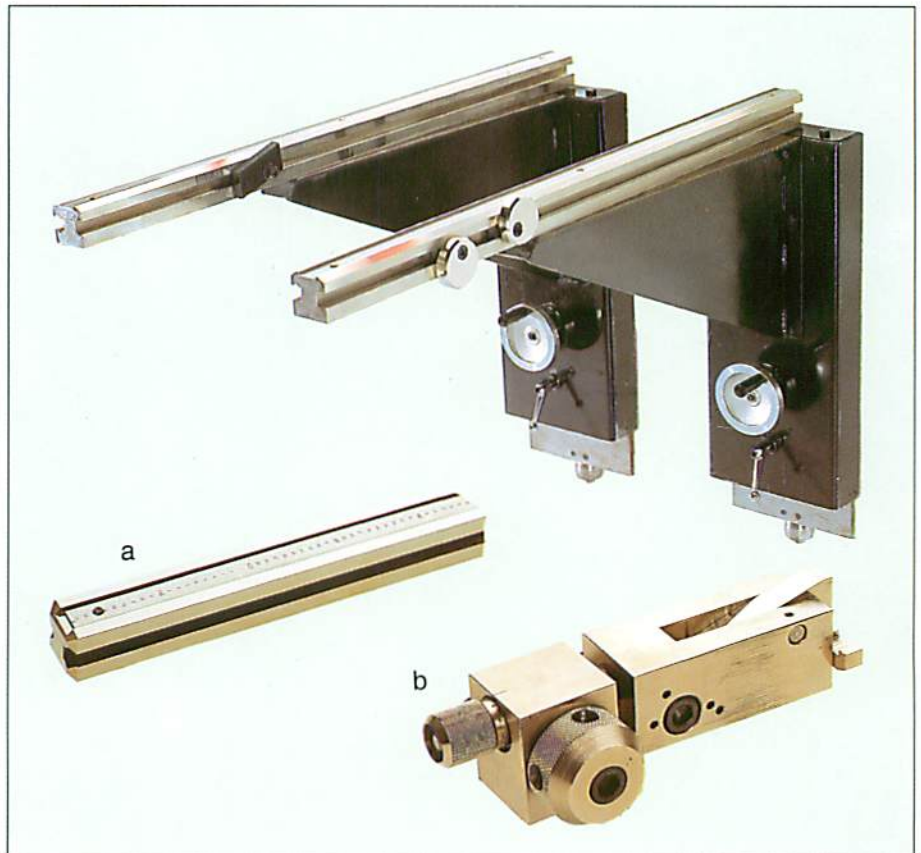
A variety of optional accessories are available to facilitate the tasks of the operators. These accessories help to resolve most of the problems such as positioning, handling and gauging. By improving the work condition, these accessories will assist in increasing productivity and safety.

Adjustable front supports

A total of two supports slide on a rail, and have adjustable height using a hand wheel.

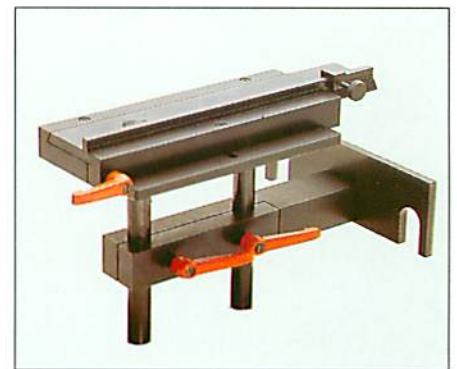
They insure the support of the formed material when required.

Customers can choose the option of a front rail that can be equipped with a simple stop, or a scaled micrometer head for front gauging purposes.



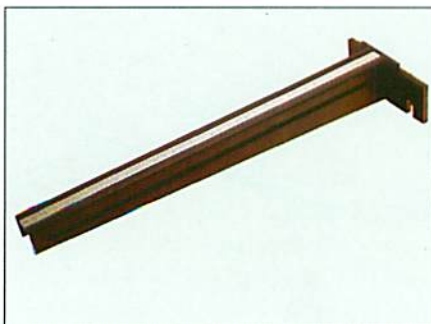
Squaring arm

This device can be installed on the vee die. It is designed to assist gauging of a part with irregular edges or dimensions.



Front support arms

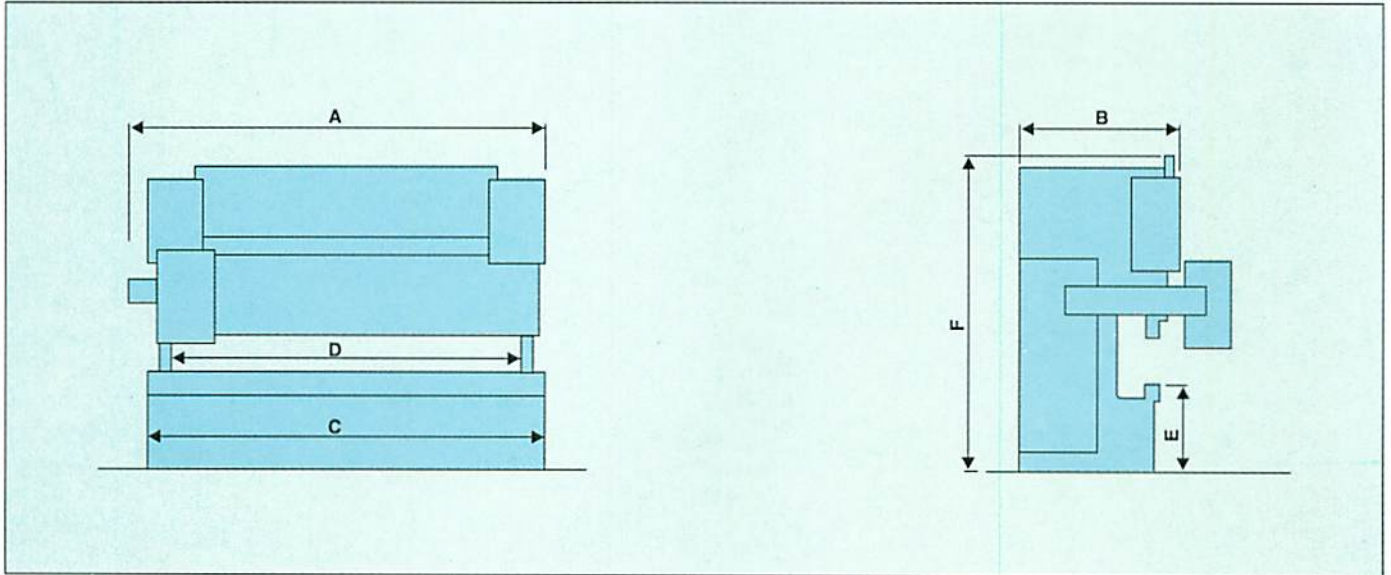
Installed to the front of the machine to support large workpieces. They are available with an optional simple stop, or a scaled micrometer stop.



Adjustable guide support

This support is designed for the purpose of bending narrow and long parts. It is fixed on the front of the lower table and can be adapted to any length or height of vee die.

Highly versatile press brakes for all applications

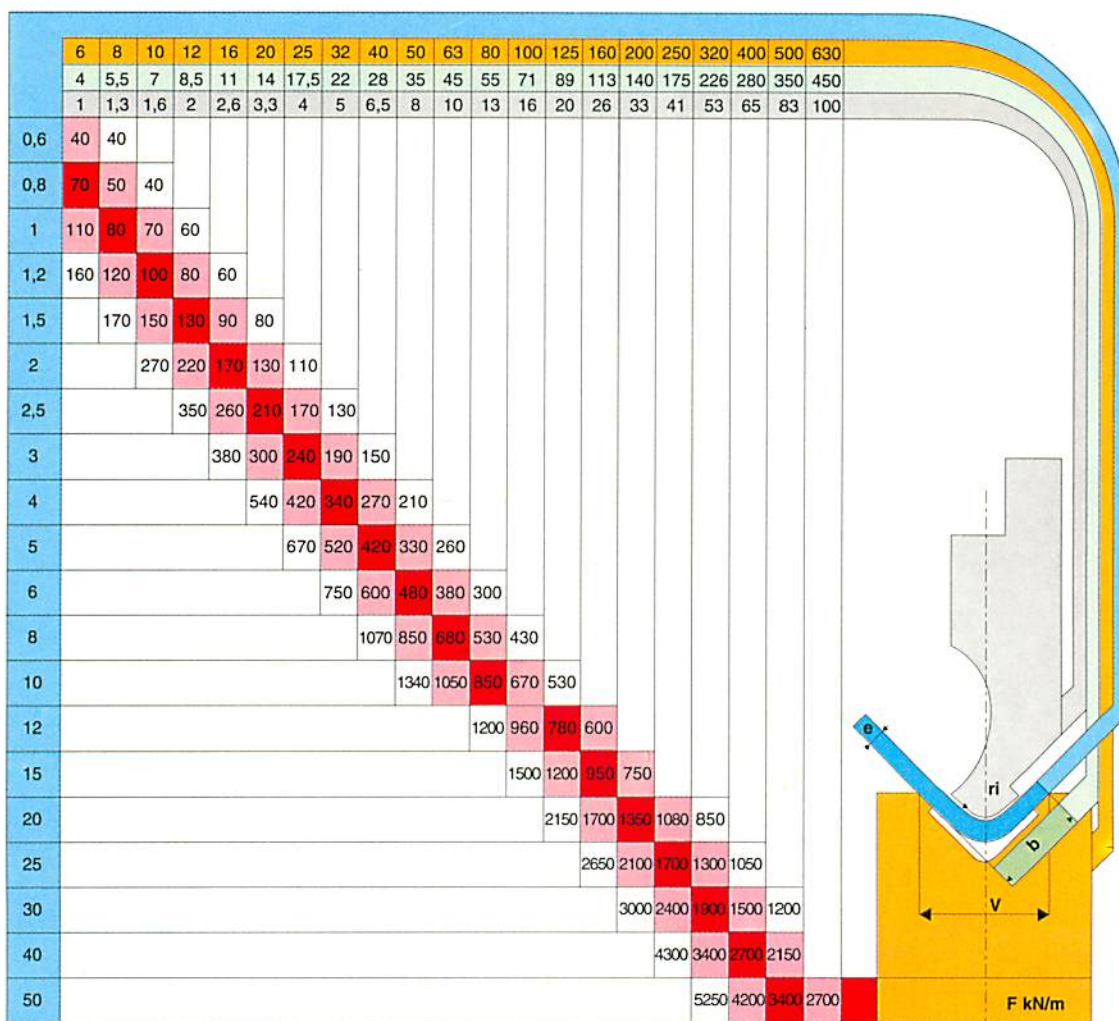


Specifications

SPECIFICATION UNITS		125/3	125/4	170/3	170/4	220/3	220/4
Tonnage (tons)		138	138	187	187	242	242
Table width (inch)		3.5	3.5	3.5	3.5	7.0	7.0
Motor power (HP)		12	12	15	15	20	20
Open height (inch)		17.70	17.70	17.70	17.70	17.70	17.70
Stroke length (inch)		7.0	7.0	7.0	7.0	7.0	7.0
Throat depth (inch)		16.1	16.1	16.1	16.1	16.1	16.1
Oil capacity (gallons)		30	30	40	40	50	50
Speed	Approach speed (inch/sec)	3.94	3.94	3.94	3.94	3.94	3.94
	Bending speed (inch/sec)	0.04 to 0.32	0.04 to 0.32	0.04 to 0.32	0.04 to 0.32	0.04 to 0.32	0.04 to 0.32
	Return speed (inch/sec)	0.04 to 3.15	0.04 to 3.15	0.04 to 3.15	0.04 to 3.15	0.04 to 3.15	0.04 to 3.15
Machine length (inch)	A	137.7	177.9	139.3	179.5	141.3	181.4
Machine width (inch)	B	85.2	85.24	85.8	85.8	86.6	86.6
Table length (inch)	C	126.7	165.3	128.7	167.3	131.49	170.0
Frame distance (inch)	D	106.3	148.0	106.3	148.0	106.3	148.0
Table height (inch)	E	37.8	37.8	37.8	37.8	37.8	37.8
Machine height (inch)	F	113.8	113.8	115.7	115.7	117.7	117.7
Machine weight (lbs)*		16500	22000	24200	28600	29260	35200

*Weight is approximated

Air bending force chart (Metric system)



SPECIFICATION UNITS		125/3	125/4	170/3	170/4	220/3	220/4
Tonnage (KN)		1 250	1 250	1 700	1 700	2 200	2 200
Table width (mm)		90	180	180	180	180	180
Motor power (kW)		9	9	11	11	15	15
Open height (mm)		450	450	450	450	450	450
Stroke length (mm)		180	180	180	180	180	180
Throat depth (mm)		410	410	410	410	410	410
Oil capacity (litres)		115	115	150	150	190	190
Speed	Approach speed (mm/sec)	100	100	100	100	100	100
	Bending speed (mm/sec)	1 to 8	1 to 8	1 to 8	1 to 8	1 to 7.5	1 to 7.5
	Return speed (mm/sec)	1 to 80	1 to 80	1 to 80	1 to 80	1 to 75	1 to 75
Machine length (mm)	A	3 800	4 900	3 820	4 940	3 900	4 970
Machine width (mm)	B	2 270	2 270	2 270	2 270	2 270	2 270
Table length (mm)	C	3 140	4 200	3 170	4 230	3 220	4 280
Frame distance (mm)	D	2 700	3 760	2 700	3 760	2 700	3 760
Table height (mm)	E	960	960	960	960	960	960
Machine height (mm)	F	2 890	2 890	2 940	2 940	2 975	2 975
Machine weight (Kg)*		7 500	10 000	11 000	13 000	13 300	16 000

*Weight is approximated

Air bending force chart

t m/m	4	6	7	8	10	12	14	16	18	20	25	32	40	50	63	80	100	125	160	200	250	V
	2.8	4	5.0	5.5	7	8.5	10	11	13.5	14	17.5	22	28	35	45	55	71	89	113	140	175	b
	0.7	1	1.1	1.3	1.6	2	2.3	2.6	3	3.3	4	5	6.5	8	10	13	16	20	26	33	41	ir
0.5	4	3																				
0.6	6	4	4	4																		
0.8		7	7	5	4																	
1.0		11	10	8	7	6																
1.2			14	12	10	8	7	6														
1.4				15	13	11	10	9	8													
1.6					17	15	13	11	10	9												
2.0						22	19	17	15	13	11											
2.3							25	23	19	17	15	12										
2.6								28	25	22	18	14										
3.0									34	30	24	19	15									
3.2										34	27	22	17	14								
3.5											33	26	20	16	13							
4.0											43	34	27	21	17							
4.5												44	34	27	21							
5.0												52	42	33	26	21						
6													60	48	38	30	24					
7															52	41	33	26				
9																67	54	43				
10																85	67	53	42			
12																	96	78	60	55		
16																		136	107	86		
19																			150	125	100	
22																				160	130	
25																					210	170
30																						240

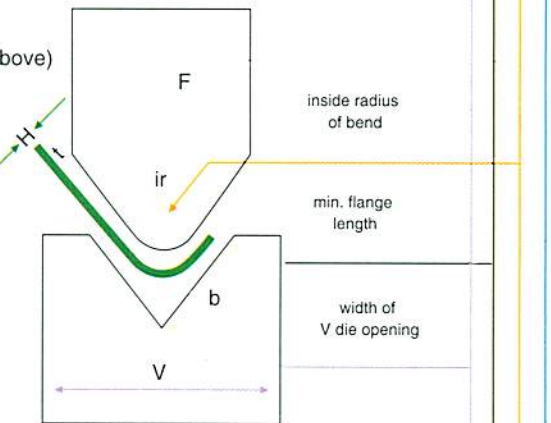
If the material thickness and inside bending radius are known, the following can be obtained from the chart.

1. Pressure required for bending the material for 1 meter (above) or 1 foot (below).
2. Opening of the die to be used.
3. Minimum bendable flange length.

t Material thickness
(tensile strength : 45-50 kg/mm² (above)
or 56892-71115 lbs/in² (below))
F Pressure per 1 meter (above) or
1 foot (below)
ir Inside bending radius
b Minimum flange length
V Die opening

t	Gauge or Frac.	Dec.

thickness (mild steel)



t	4	6	7	8	10	12	14	16	18	20	25	32	40	50	63	80	100	125	160	200	250	V
	5/32	1/4	9/32	5/16	3/8	1/2	9/16	5/8	11/16	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5	6	8	10	b
	1/8	3/16	13/64	7/32	9/32	11/32	13/32	7/16	17/32	9/16	11/16	7/8	1-1/8	1-3/8	1-3/4	2-3/16	2-13/16	3-1/2	4-1/2	5-1/2	6-7/8	ir
	1/32	1/32	3/64	3/64	1/16	5/64	3/32	7/64	1/8	9/64	5/32	13/64	1/4	5/16	13/32	33/64	5/8	3/4	1-1/32	1-5/16	1-5/8	
20	0.036	5.4	3.6	3.0	2.5	2	1.7															
18	0.048		6.8	5.8	4.8	3.7	2.7	2.4	2													
16	0.060			7.8	6.2	5	4.2	3.5	3.1	2.7												
14	0.075				11.0	8.2	7.0	5.5	4.8	4.1	3.1											
12	0.105					15	13	11	9.4	7.4	5.5	4										
11	0.120						16	13	10	7.3	5	3.8										
10	0.135								12	9	6.2	4.7	3.5									
3/16	0.188									24	15	11	7.5	5.7								
1/4	0.250										30	20	14	10.5	8.5							
5/16	0.313											36	25	18	13	10						
3/8	0.375												38	28	20	15						
1/2	0.500													52	39	30	22	16				
5/8	0.625														70	52	38	27	20	15		
3/4	0.750																66	43	32	22		
1	1.000																		90	61	44	
1-1/4	1.250																				102	70



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