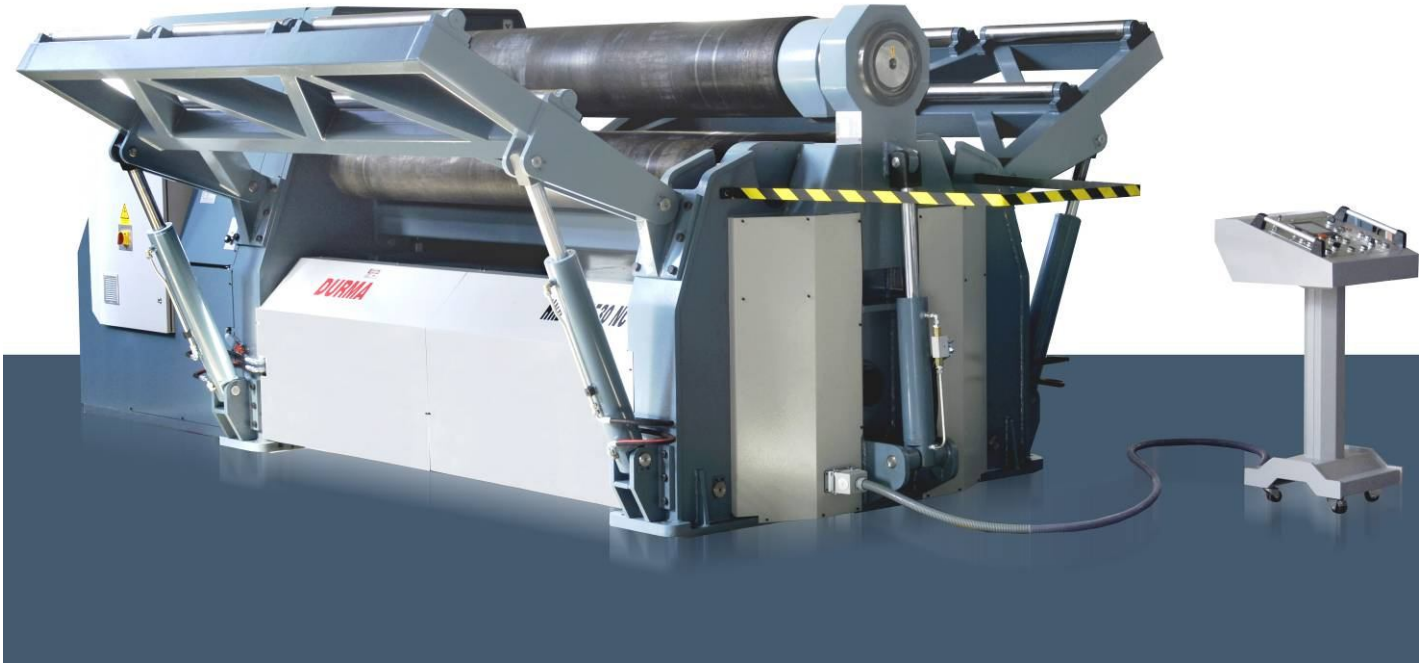
HRB-4
FULLY HYDRAULIC 4-ROLL PLATE BENDING MACHINES

HRB-4 3016
3000x 13-16 mm



HRB-4 2530 showing

BENEFITS OF 4 ROLLS PLATE ROLL BENDING MACHINES

Four roll plate rolls are more precise, productive, versatile, faster, safer and easier to operate than three roll machines. They are less dependent on operator competence. They are ideal for bending plates up to 6" thick.

• The fastest and most accurate bends are made by four roll machines. The plate is held securely in place between the top and bottom rolls while the side rolls move vertically to create the bend.

• The bottom roll moves up to hold the plate edge securely against the top roll while the side roll is raised to form an accurate pre-bend, minimizing the flat zone on the plate edge. Pre-bending on a three roll machine requires that plates be tilted down as they are being fed. In contrast, plates are loaded horizontally at the feed level for pre-bending on a four roll machine, which allows the use of horizontal motorized roller tables to help feed the plate.

• Plate feeding can take place on either side of a four roll machine. If fed from only one side, they can even be placed up against a wall to save floor space.

• The side rolls are positioned to the right and left of the bottom roll and are on their own axes. The independent axis of each roll helps make a perfect bend. The "back" side roll (at the far side of the feeding point) also functions as a back gauge to square the plate for proper alignment (see figure 1). This eliminates the need for someone to assist the operator.

• The plate is kept square without slipping during both pre-bending and rolling because of the constant secure clamping of the top and bottom rolls.

• Four roll machines do not require the operator to remove, flip, and then try to square the plate a second time after pre-bending, as is the case with three roll IP machines. Keeping the material in the machine makes four rolls 50% more efficient than three roll IP machines, and allows a cylinder to be rolled to the required diameter immediately following pre-bending.

• Bending the back edge takes place after the cylinder is rolled, for a one direction, single pass operation.

• Cone rolling is easier on a four roll machine. The side rolls can be tilted to establish the cone angle and the bottom roll can also be tilted to clamp and drive the plate.

• Four roll machines are the only type of plate rolls that can effectively make use of NC and CNC controls because of the constant clamping and driving of the material during all steps of rolling. Bending difficult shapes like polycentric or elliptic work pieces can be easily done with CNC four roll machines.

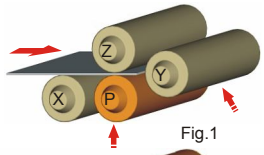


Fig.1

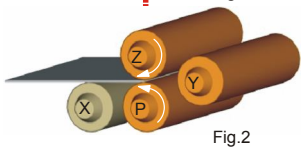


Fig.2

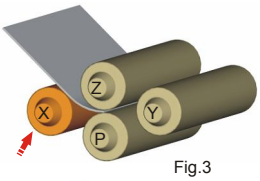


Fig.3

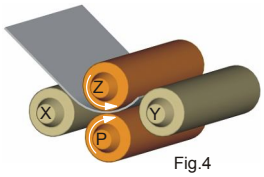


Fig.4

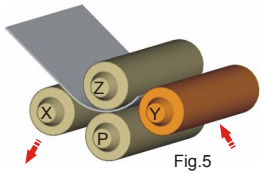


Fig.5

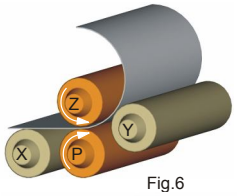


Fig.6

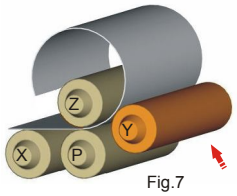


Fig.7

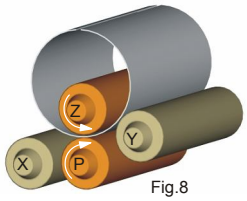


Fig.8

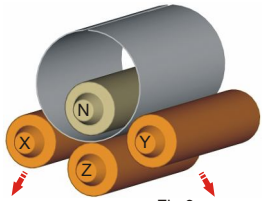
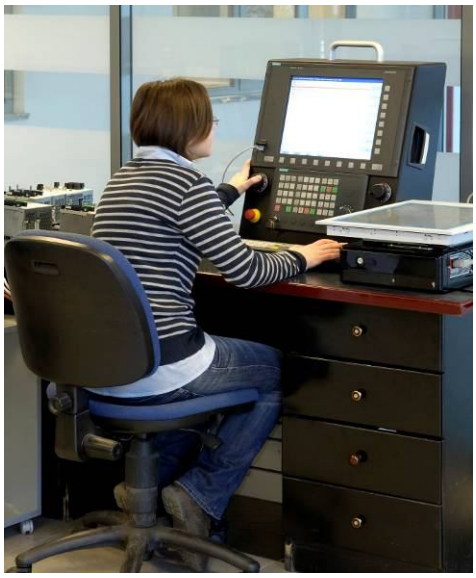
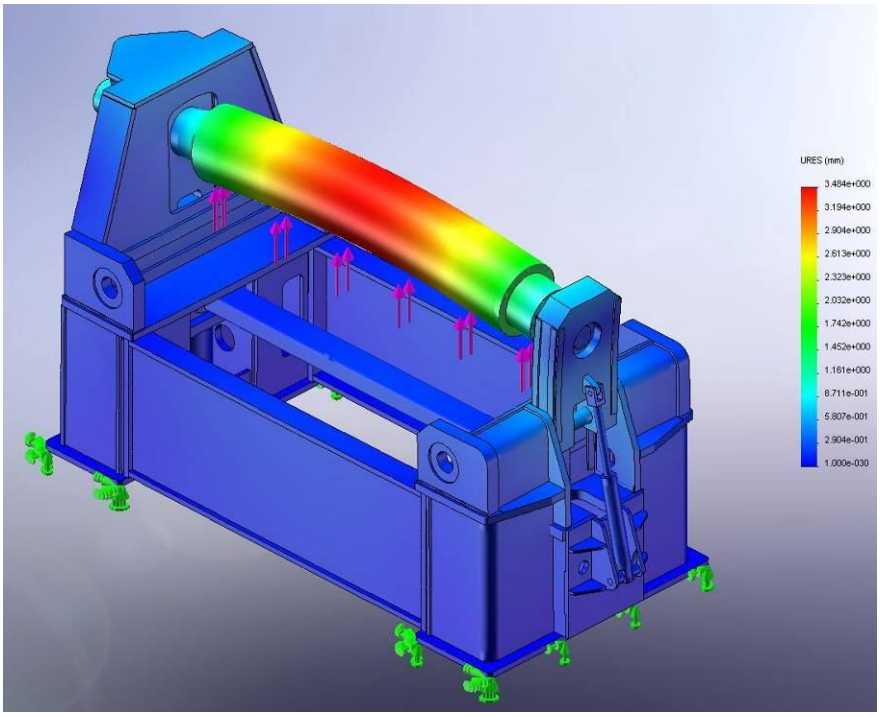


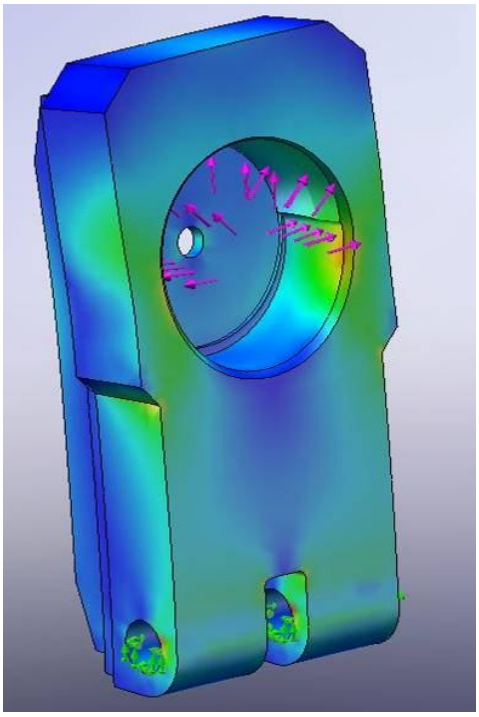
Fig.9

ENGINEERING AND PRODUCTION ADVANTAGE

The mechanical and hydraulic systems on HRB-4 machines are designed by experienced Durma engineers. These engineers design the machines utilizing parametric 3D engineering technology (Pro/Engineer) as well as implementation of static and mechanism analysis.
All mechanical, hydraulic, and electronic systems are designed and tested by Durma electrical and mechanical engineers. Only following lengthy tests and evaluations are the machines authorized to be manufactured in serial production.



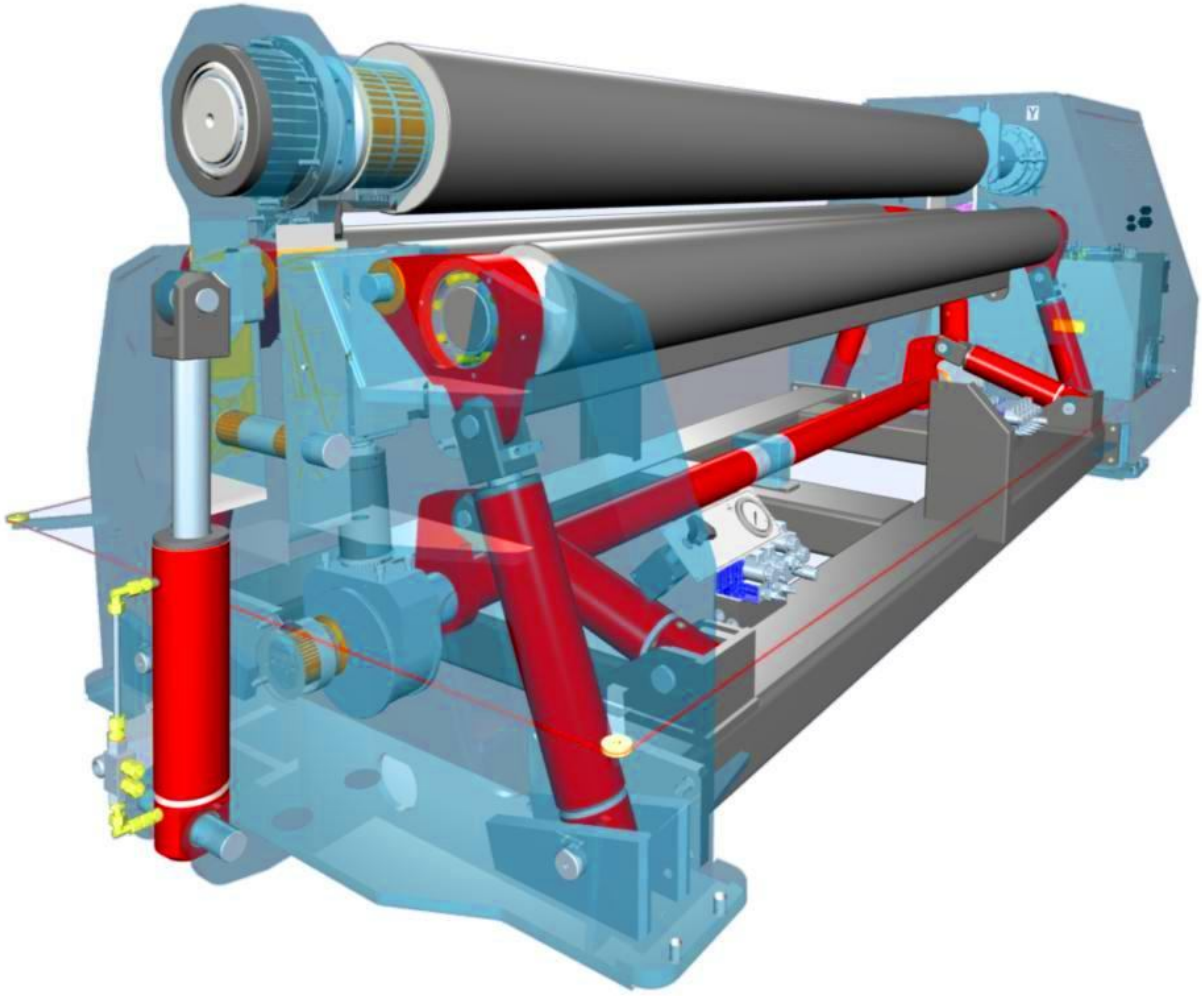




Stable and Robust Machine Body

Machine body is strengthen and lowered to minimise the twists and deformation.The robust body of the machine is joined to the strong frame of the machine by steel bars.

Machine body, frame and steel bar connections are stres relieved after the welding operation.Whole body is machined with 5 axes CNC machining centers with single reference fixing .By this way parallelism of all axes and the surfaces of the machine precisely which assures the precision and longlasting of the crticial characteristics machine.

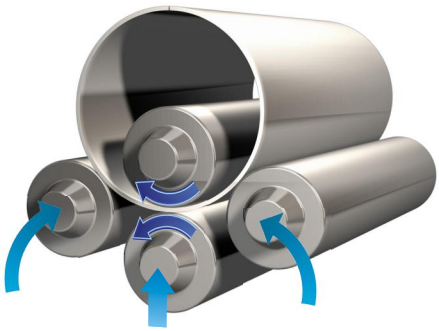


Strengthen Guiding Systems

Rolls are guided with spherical roller bearings and bronze beds.Guiding system requires less lubrication and keeps it precision in long term.

Rolls

Rolls and their positions are selected after long term engineering, tests and evaluation periods.
Side rolls are guided by swing beds which allows them to act as 2 independent axes moving on planetary shape.
System allows to bend minimum workpiece diameter as 1.2 times of top roll diameter dependent to the capacity of the machine.
Side rolls are approaches to the top roll on curve movement which allows to get perfect prebendings as well as spring back minimisation.

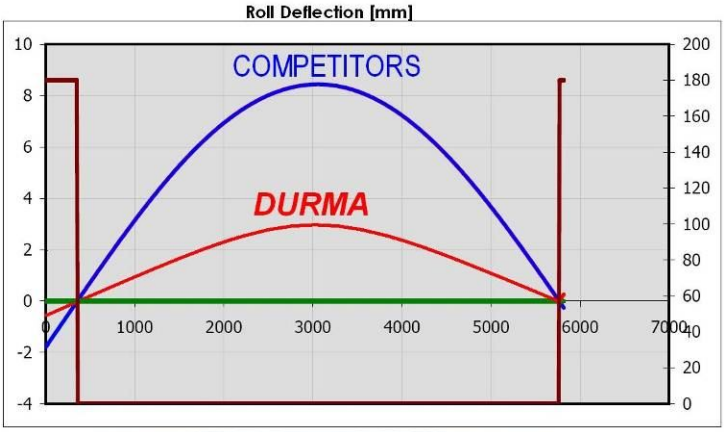


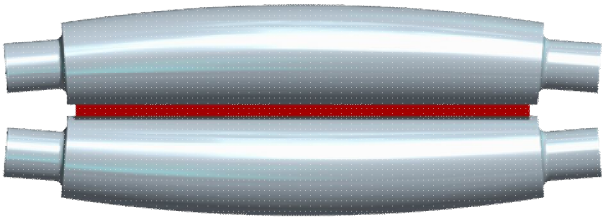
DURMA Planetary Rolls

Durable Rolls and Crowning System

The most important element of a plate roll bending machines are the rolls itself. Weak rolls in the market are deformed during the bending and minimum workpiece diameter reaches to 5 times of top roll diameter. Highly durable carbon steel (C45) rolls are machined by CNC Lathes with high precision without creating notch effect. Working surfaces of the rolls are induction hardened to HRC 54±4 and hardness tests are done from different points.1,2 times diameters are acquired easily.
Rolls are machined as crowning shape to compansate the deflactions on the rolls during the bending. Special crowning for different material can be applied free of charge.

Hardened Rolls

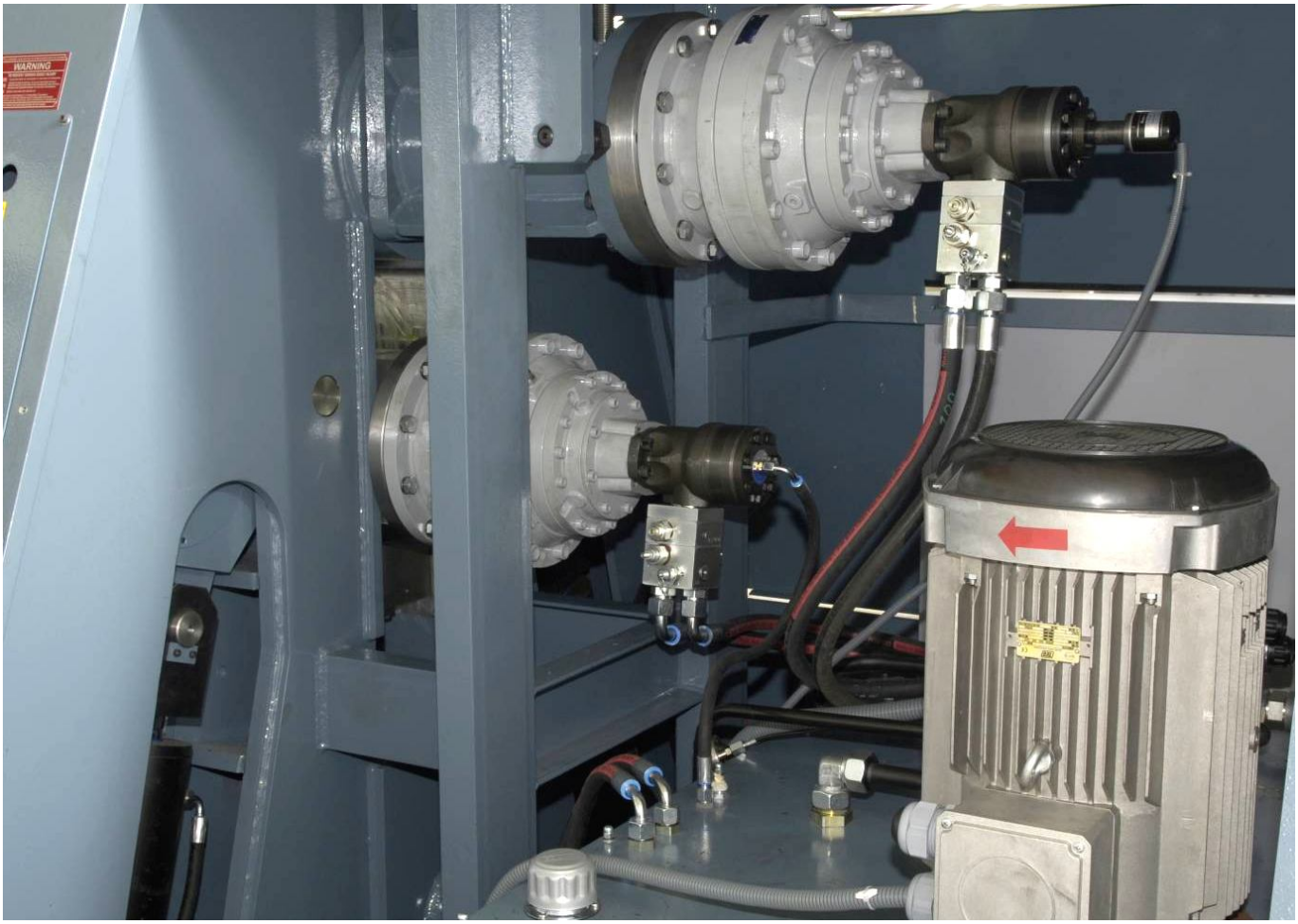




DURMA Roll Crowning System

High Torque Roll Triggering

By its high torque, Durma machines bend the sheet with less steps.
Top and bottom rolls are triggerred by independent high torque hydromotors and planet gears.
Trigger system is positioned on the same axis with roll and high torque is transferred to the sheet without any lost.
Strong Hydraulic Brakes : Especially during the pre-bending, system does not allow the sheet to slip back which may create safety problems.
Pressure safety valves are protecting the hydromotors and other components from overloads and peak pressures.



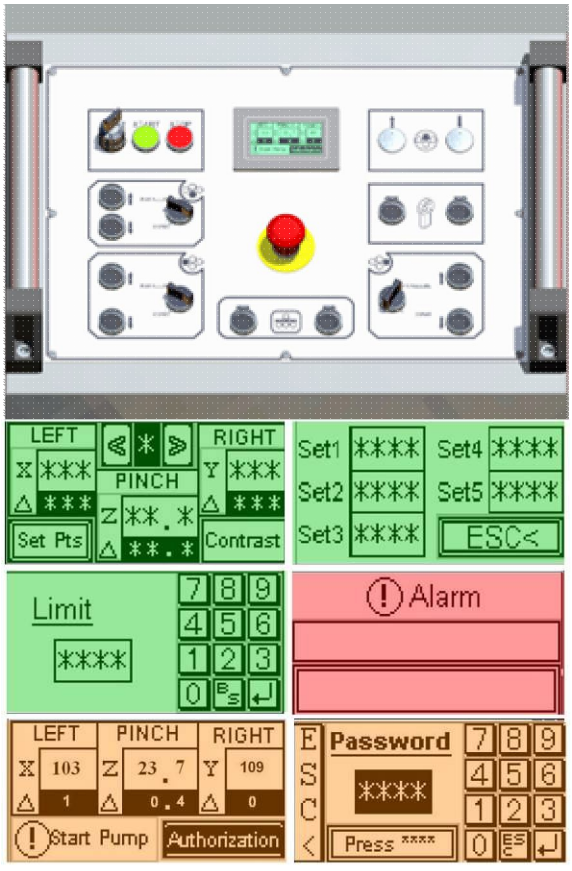
Precise Roll Positioning System

Side rolls are triggered by 4 different strong hydraulic cylinders. Syncronisation between the rolls are acquired by magnetic ruler measurement and PLC's responds within miliseconds.Thanks to high precision load holding valves.
Bottom roll tightens different thickness of sheets without deformation and taking to the consideration of its paralelism by hydraulic adjustable strong torsion bar.

PLC Control System (Standard)

PLC control system ensures the machine's bottom and side rollers' synchronous operation.
This process is provided via the PLC with 6-axis control and touch screen operator panel. In addition, prior experience, the circular bending with the facility for bending up to 5 steps of the program, is ease of use and saves time.

DURMA HRB-4 PLC



PLC Control Unit

• *Dedicated scratch-proof, oil-proof, acid-resistant IP65 sealed touch panel*

PLC
Panasonic 32 I/O
Memory
5 Mbyte
Display
Monochrome LCD 3" ekran
Resolution
128 (W) x 64 (H)
3 colors led backlight (green,red, orange)
Communication port 1 RS232C Seri Port
Temprature -20 / 60°C

Software
Manual working mod,
Standard 6 axies (X1,X2,Y1,Y2,P,P1),
3 colors display for machine situation
Conic and parallelism control
5 set point programing,
Contrast adjusting ,
Turkish,English, German, French, Spanish, Polish, Hungarian, Croation languages.
Alarm list.

NC Control System (Optional)

NC control system, in addition to the PLC control system, has the property to work manual, teach-in and automatic modes of operation. In manual mode, the use of all functions are provided by the operator. In teaching mode for the operator to twist all the steps are recorded respectively. In automatic mode all recorded movements are repeated, respectively by the machine. NC control system has the capacity to save 2500 programs consisting of Max 100-steps.

DURMA HRB-4 NC

NC Control Unit (S530)

Dedicated scratch-proof, oil-proof, acid-resistant IP65 sealed membrane push buttons with 51 keys
Fiberoptic communication lines.

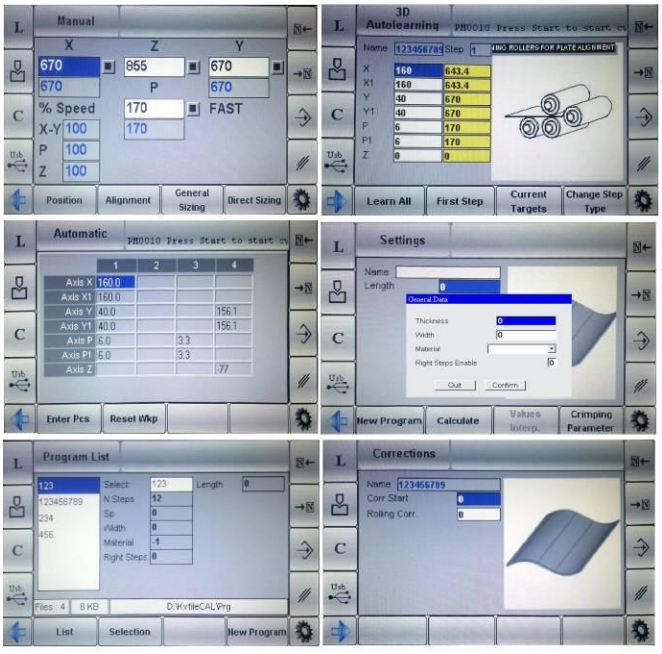
PLC
Esa/Gv

CPU
AMD Geode™ LX800 500MHz

Memory
256 Mbyte DRAM for CPU
1 Mbyte SRAM for parameters

Display
Color TFT-LCD 7" WVGA (16:9)
Resolution (800 x 480, (R.G.B)) 262,144 colors

Communication ports 1 Ethernet Port
1 CAN interface
1 RS232C Serial Port
2 USB Port, 1 VGA Out



Temprature -25 / 70°C

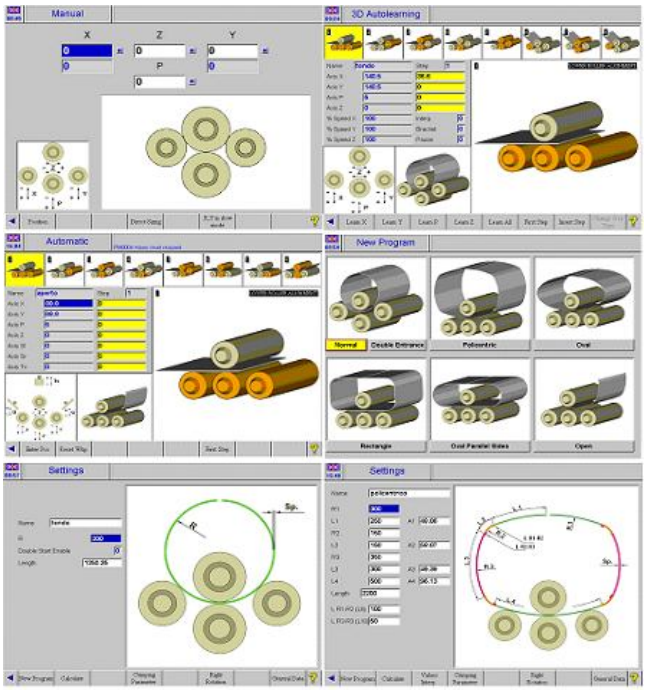
Software
Manuel, teach-in and automatic working modes,
Standard 7 axies (X1,X2,Y1,Y2,P,P1,Z),
Conic and parallelism control
Adjustable speeds,
100 step, 2500 program memory,
User friendly program editor,
USB port for programs backup ,
Part pcs programing,
Working hours counter,
mm / inch system,
Automatic turn off programing,
Turkish, English, German, French, Spanish, İtalian, Russian, Polish, languages.
Alarm list.

CNC Control System (Optional)

CNC control system, with its graphical control system allows the bending to be done step by step or automatically calculating the bending steps. Due to changes in the structure of the material, there must be entered correction for pre-bending and bending steps after the first bended plate to get desired bending form. Correction coefficients can be recorded to CNC control unit for using them in similar characteristic materials bending operations. CNC control unit allows to make bending step by step or automatically. Difficult bending parts can be bent easily with using bending shapes; like "Cylindrical, Polysentric, Ellipse, Oval Paralel Side, Rectangular, Oval and Arc". User-friendly CNC control unit system has interpolation capability due to proportional valves. CNC control unit can store up to 10000 program. For editing the recorded programs can be performed with easy-to-use editor page. Programs and the machine parameters can be backed up with USB Pendrive. During any problems, factory settings can be undone. The control unit can be connected to a computer with using ethernet cable. So Durma service center can be connected to using remote connection to PC. Lubrication system (offered as an option) operating times can be set at the control unit. Plate feeder, vertical and side supports (offered as an option) can be included as NC functioned (teachable) into Control Unit. So supports can be programmed in teach-in mode and provided automatically working during bending.

DURMA HRB-4 CNC

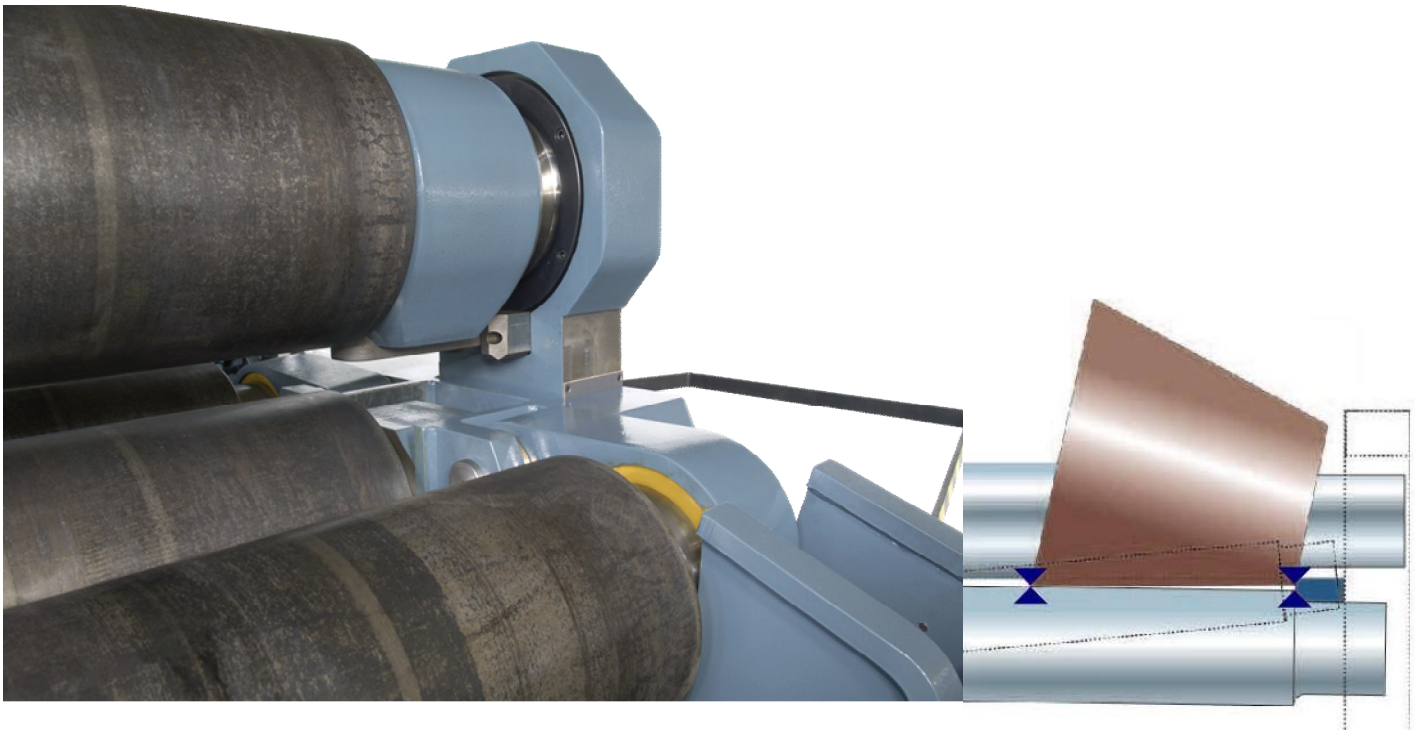
CNC Control Unit (S500)
Dedicated scratch-proof, oil-proof, acid-resistant IP65 sealed membrane push buttons with 28 keys
External industrial QWERTY keyboard with 88 keys.
Fiberoptic communication lines.
PLC
Esa/Gv
CPU
Intel Celeron M 600MHz
Memory
256 Mbyte DRAM for CPU
1 Mbyte SRAM for parameters
Display
Color TFT-LCD 15" XVGA (4:3)
Resolution (1024 x 768, (R.G.B)) 262,144 colors
Communication ports
2 Ethernet Port
2 CAN interface
2 RS232C Serial Port
2 USB Port
1 VGA out
1 PS2 Port
Temprature -25 / 70°C

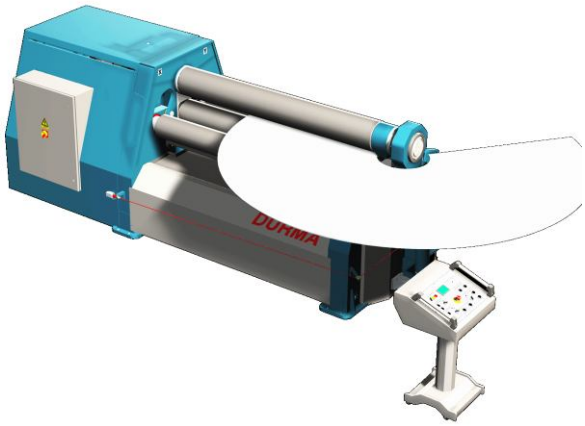


Software
Manuel, teach-in and automatic working modes,
Standard 7 axies (X1,X2,Y1,Y2,P,P1,Z),
Conic and parallelism control,
Adjustable turning speed by hand wheel,
X-Z / Y-Z axies interpolation available
User friendly program editor,
Automatic bending sequence calculation,
Cylindrical, polycentric, oval, oval parallel sides,
rectangular, arc bending shapes,
Material database entry available,
USB port for programs backup ,
100 step, 2500 program memory,
Program editing,
Part pcs programing,
Working hours counter,
mm / inch system,
Automatic turn off programing,
Turkish, English, German, French, Spanish, İtalian, Russian,
Polish, languages.
Alarm list.

Conical Bending System

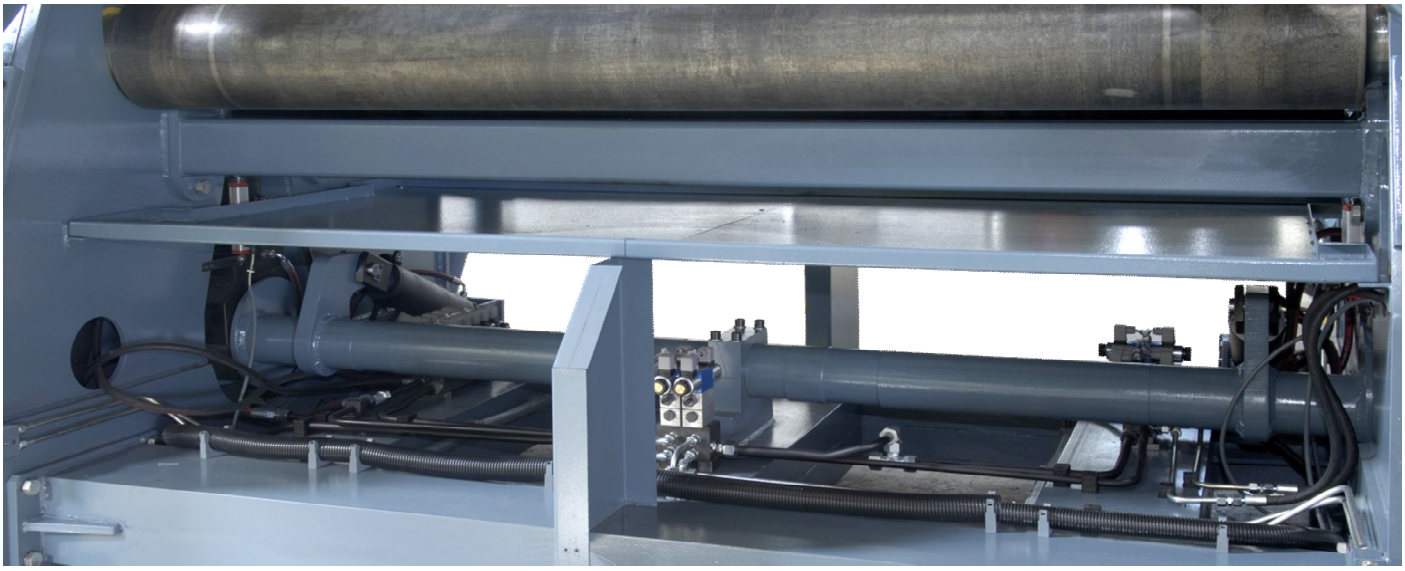
By strong body and angular bottom and side rolls, wide angle & small diameter conical parts are easily bent. While machines in the market is bending conical bendings of 3 times of top roll,Durma HRB-4 machines can bend conical bending of 1.5 times easily.





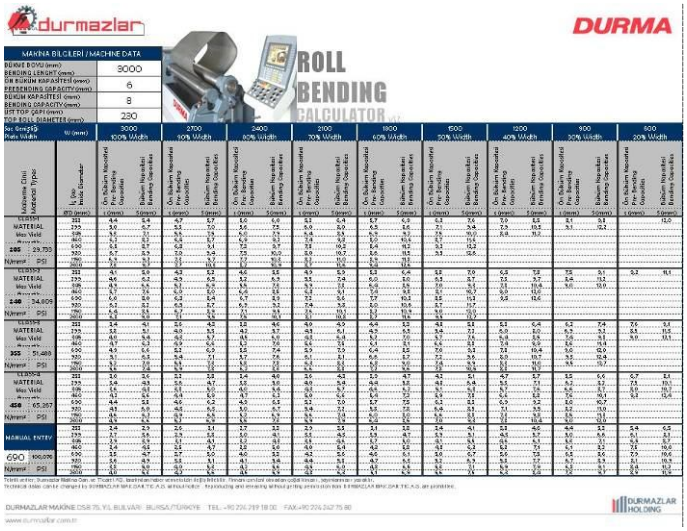
Hydraulic and Electrical System

Machine movements are trigerred by hydraulic components.The precision on the all axes are acquired by world leader Bosch Rexroth valves' high speed response ability. And pressure safety valves used against peak pressures and overload, provides protection for motors and other components.
Electrial system designed compatible with CE safety regulations.The system consists of well known electrical components such as Siemens, Schneider, Phoenix and Opkon.
The system is protected by current overloadings for its components', powersupplies, electronics and motors.
PLC Control Unit used from PANASONIC. NC, CNC Control Unit used from world leader ESA/Gv.



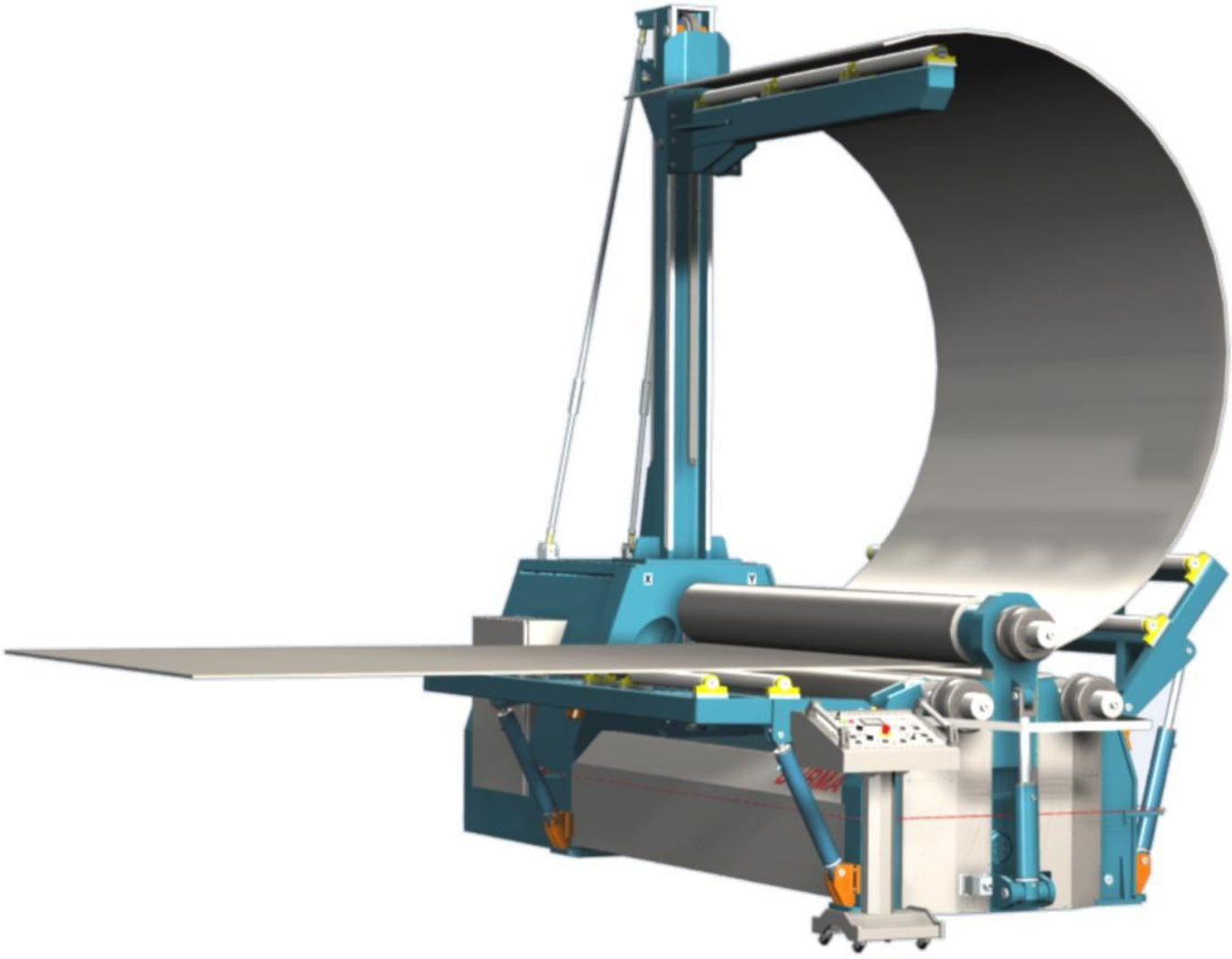
Bending Capacity and Calculation

Our machine capacities are defined for 240 N/mm² yield point sheets.
For different length and thick sheets you can use DURMA ROLL BENDING CALCULATOR.

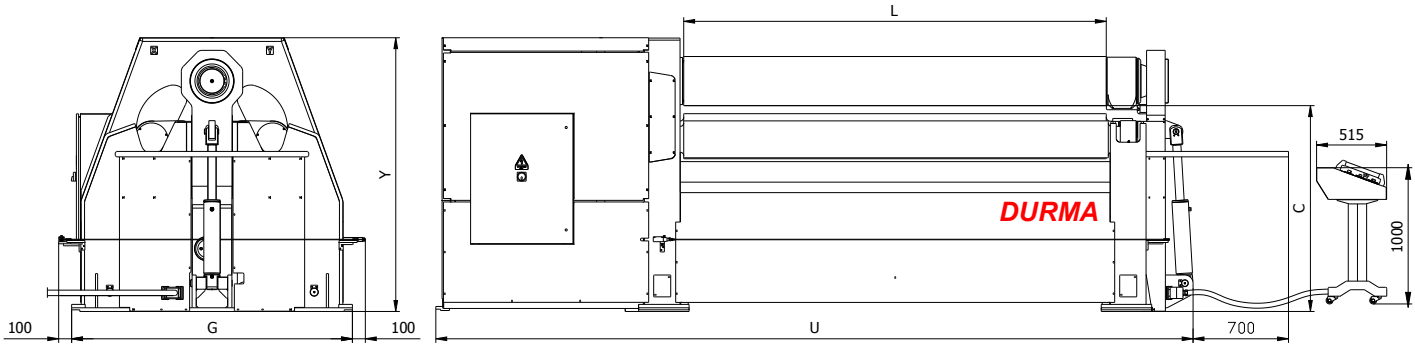


Optional Side, Vertical or Special Sheet Support System

Optional hydraulic side or vertical supports the sheet's stretch and prevent deterioration of the bending form in big shaped bendings. Moveable gauges with hydraulic double cylinders are produced from St52 steel construction. Vertical supports' capacity is to provide ø2000 mm sheet. It can produced according to different tonnage and height.



HRB-4 3016 TECHNICAL DATA



TYPE		HRB-4 3016
Number of rolls	Pcs.	4
Rolls Lenght (L)	mm	3100
Pre-bending capacity	mm	13
Bending capacity	mm	16
Top roll diameter	mm	330
Bottom roll diameter	mm	300
Side rolls diameter	mm	240
Length (U)	mm	5310
Width (G)	mm	1660
Height (Y)	mm	1590
Weight approx.	Kg	~ 13400
Motor power	kW	18,5
Working height (C)	mm	1125
Max. Pass Through	mm	50
Power supply		400V / 3 Phase / 50 Hz (Or other)
Bending speed	m/min	4 (NC-CNC models; 1-4 adjustable)
Oil Tank Capacity	lt	400
Feeding rolls	2 Independent planetery gear box and hydraulic motors groups	
Rolls housing	Spherical roller bearings and bronze housings	
Rolls material	High tensile carbon steel C45	
Rolls hardening	Induction hardened 54±4 HRc	
Rolls positioning	One speed electronic synchronous (NC-CNC models; Proportional speed)	
Rolls calibrationing	Manual (NC-CNC models; Automatic)	
Pinching	Adjustable hydraulic pressure	
Control unit	PLC control system, moveable control unit (NC-CNC models; 7 axies geometric control)	
Conical bending	Conical bending device by manual	

* All datas given according to 240 N/mm² yield point.
* All bending capacities must be reduced 50% for wide angle conical bending.
* CNC bending capacities must be reduced for one-pass bending.
* Ideal pre-bending range is between 8-13 mm with standard rolls crowning.

STANDARD EQUIPMENTS

- PLC control system
- Conical bending
- Induction hardened rolls
- Stress relieved steel construction body
- High tensile carbon steel rolls
- Sealed spherical roller bearings
- 2 rolls drive system
- Electronic synchronized rolls
- Adjustable pinching pressure
- Overload protection
- Safety wire around the machine
- Manual lubrication
- User manual
- CE

OPTIONAL EQUIPMENTS

- NC Control Unit (S530)
- CNC Control Unit (S500)
- Polished rolls
- Adjustable turning speed (NC,CNC Standard)
- Hydraulic vertical support
  4 TON (2,3,4,6 mt)
  6 TON (2,3,4,6 mt)
- Hydraulic side supports
- Hydraulic side supports with double joint
- NC included side and vertical supports (S500)
- Oil cooling
- Oil heating
- Automatic centralized lubrication system
- Hydraulic roll crowning system
- Welding possibility on the machine
- Plate feeding platform with alignment unit
- Special plate support systems
- Loading, unloading systems
- Seperate power cabin

Plate Bending Innovation