

HRB-4

FULLY HYDRAULIC 4-ROLL BENDING MACHINES

**HRB-4 1504
1500x 3-4 mm**



HRB-4 2510 showing

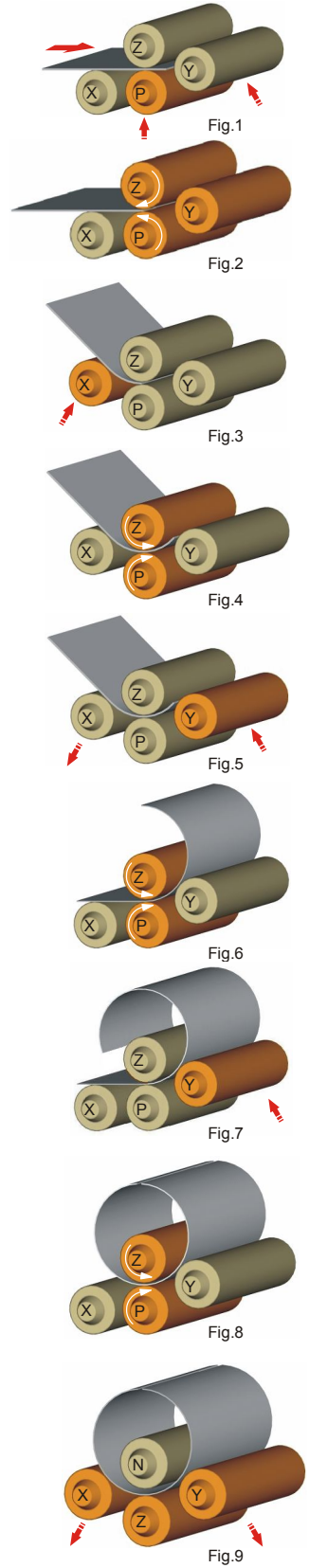
BENEFITS OF 4 ROLLS PLATE ROLL BENDING MACHINES

4 roll machines are more precise, faster, more productive and safer plate roll benders by its user friendly operations without dependence to operator competence.

- The most accurate, ease of operate, the fastest bendings are acquired with 4 rolls machine. In principal, the sheet is hold in between top and bottom rolls and by side rolls upright movements and turnings bending is realised.
- The bottom roll which is positioned with the same axis with top roll tighten the sheet from the edge and creates perfect pre-bendings. By this way, the flat zone of the sheet edges is minimised.
- The side rolls positioned right and left of bottom rolls, are independent axes. These axes contributes to perfect bendings.
- The sheet is controlled by tightening of top and bottom rolls. This operation does not allow the sheet is skid and fall down. The machine can also be installed below the ground.



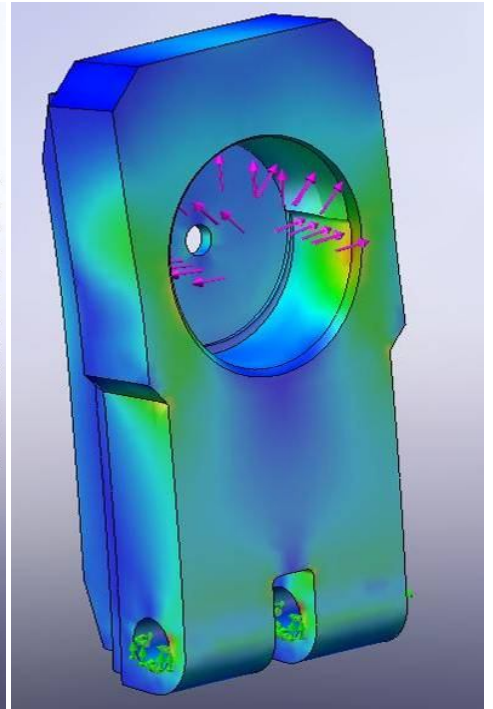
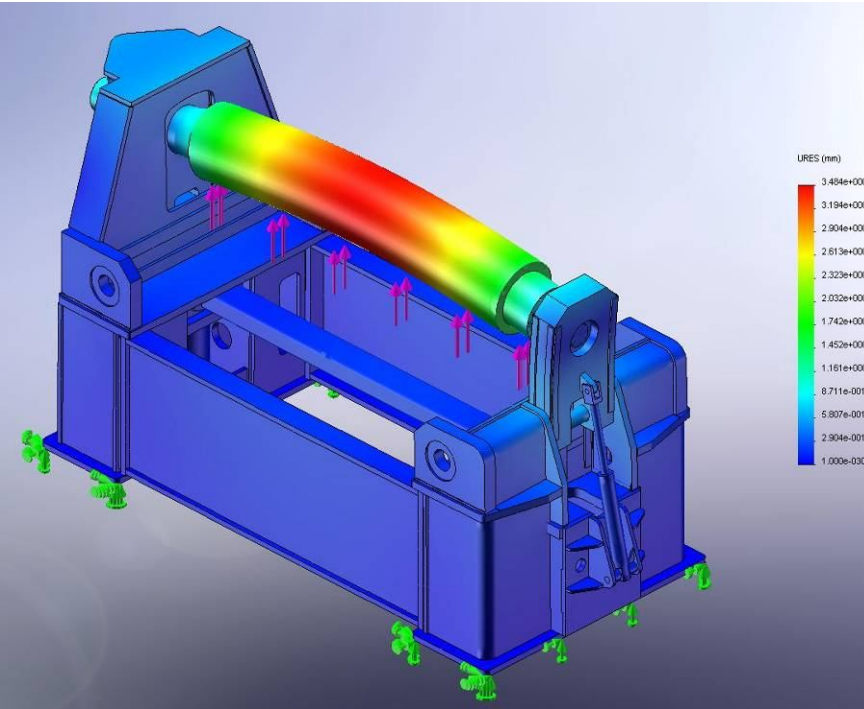
- The paralelism of the sheet can be assured by support of side roll middle position at the rear.
- Forming the sheet by controlling it in between top and bottom roll is also the most suitable bending operation for CNC applications. Difficult bending shapes like poly-centric or elliptic workpieces can also be acquired easily with CNC 4-Rolls machines.
- 4 rolls does not require to remove and then flip and then try to acquire the paralelism of the worksheet after the prebending comparing with 3 rolls machine. Which means 4 rolls are %50 more efficient than 3 rolls.



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.

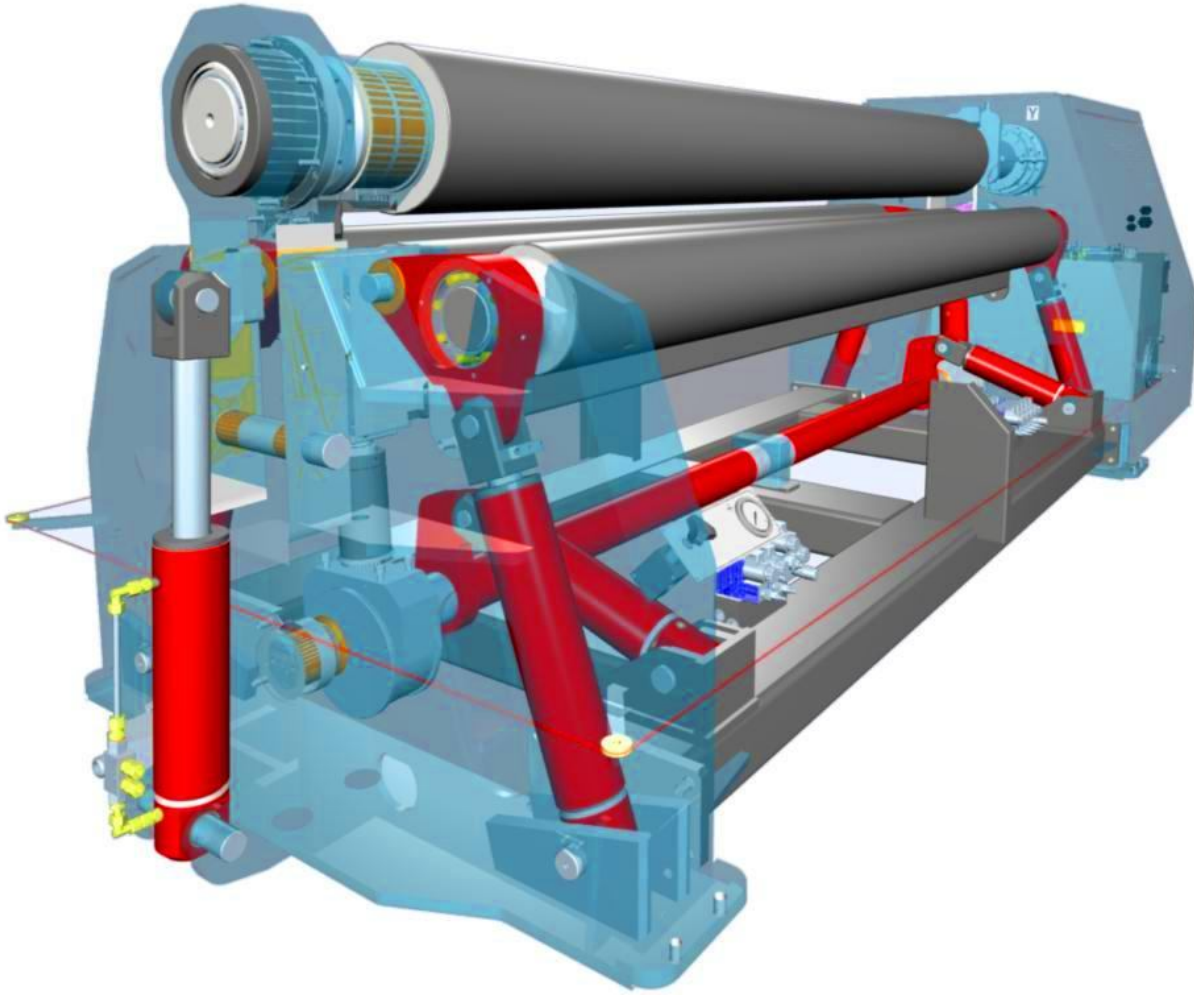
All mechanical, hydraulic, and electronic systems are designed and tested by Durma electrical and mechanical engineers. Only following lengthy tests and evaluations are the machines authorized to be manufactured in serial production.



Stable and Robust Machine Body

Machine body is strengthened 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 stress 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 critical 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.



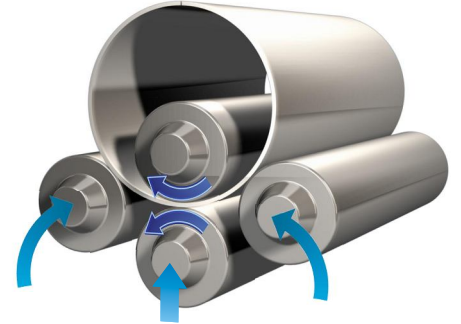
Rolls

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

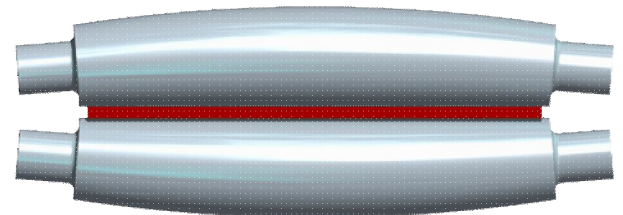
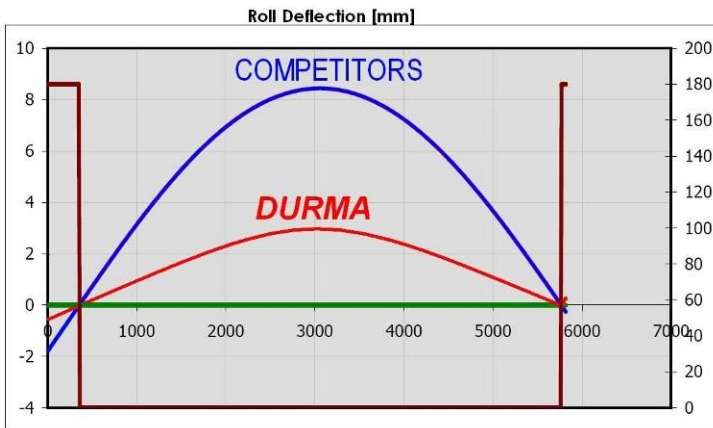
Durable Rolls and Crowning System

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±2 and hardness tests are done from different points. 1,2 times diameters are acquired easily.

Rolls are machined as crowning shape to compensate the deflections on the rolls during the bending. Special Crowning for other materials can be applied free of charge when ordering.



Hardened Rolls



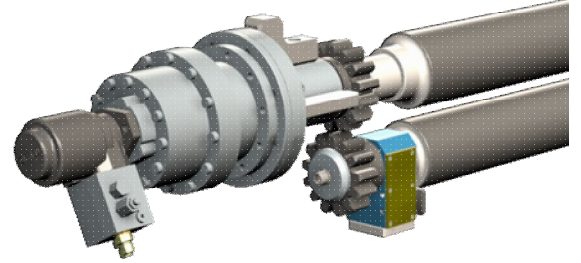
DURMA Roll Crowning System

High Torque Roll Triggering

By its high torque, Durma machines bend the sheet with less steps. Top and bottom rolls are triggered by high torque hydromotor, planet gearbox and gear system.

Trigger system is positioned on the same axis with roll and high torque is transferred to the sheet without any lost.

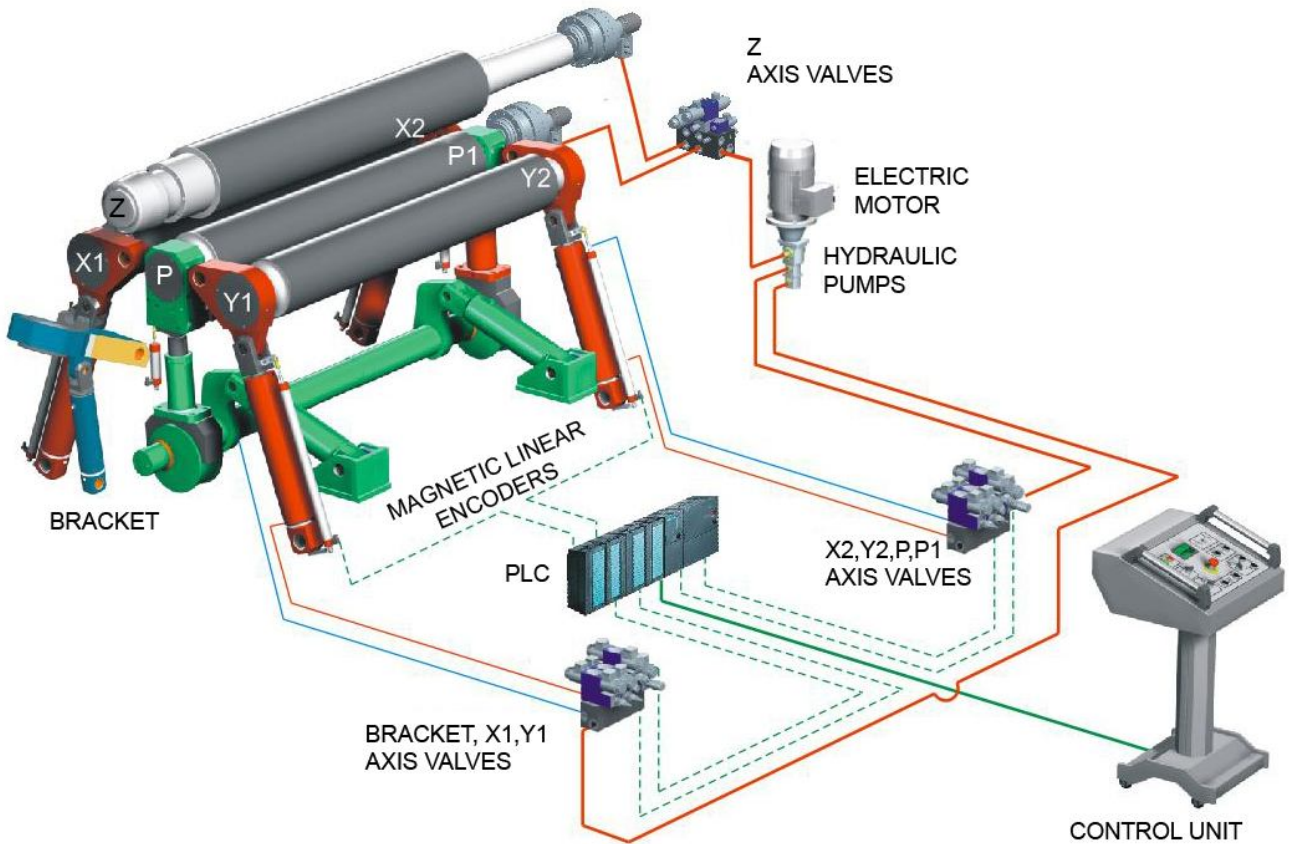
Strong Hydraulic Brake : Especially during the pre-bending, system does not allow the sheet to slip back which may create safety problems. Pressure safety valves are protecting the hydromotors and other components from overloads and peak pressures.



Precise Roll Positioning System

Side rolls are triggered by 4 different strong hydraulic cylinders. Synchronisation between the rolls are acquired by magnetic ruler measurement and PLC's responds within milliseconds. 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.



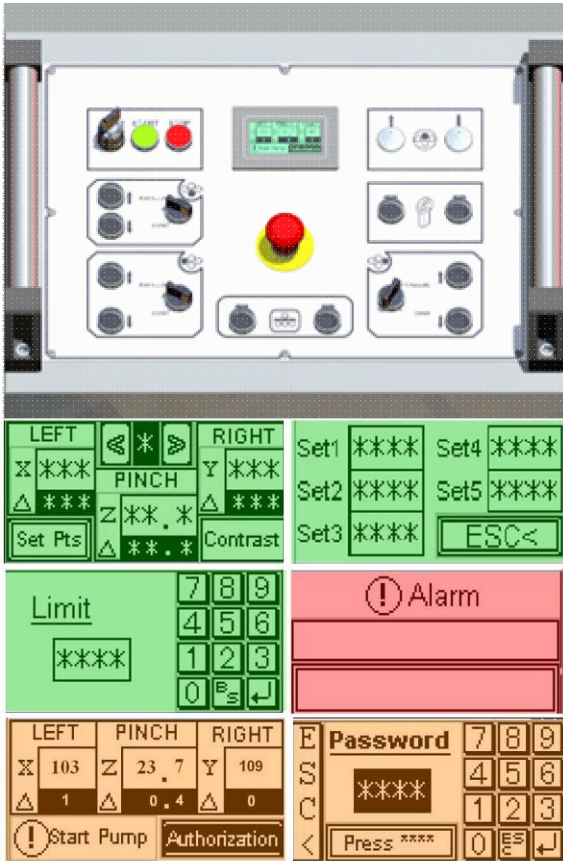
PLC Control System (Standard)

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

Temperature -20 / 60°C

Software

Manual working mod,

Standard 6 axes (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)

Graphic color 7" lcd tft display (800 x 480 pixels resolution).
128 MB silicon disk.

51 keys ip65 keyboard (33 general purpose keys plus + 18 function place on the near of the display).

4 fast counting circuits for line drive 0-5Vdc differential encoders or npn/push pull.

The encoders are powered at 5Vdc (max 200mA per channel).

4 analog outputs(±10V) with 13bits + sign resolution.

4 digital inputs for the zero micros.

4 analog inputs, 12 bits resolution, ranges 0÷10V, 0÷5V.

2 general purposes analog outputs, 0÷10V (8 bits resolution).

32 digital inputs (24Vdc).

32 digital outputs (24Vdc, 0,7A max.) protected against overload and short-circuits.

2 serial port rs232.

1 Can port with 9 pins subd f connector.

1 ethernet port 10/100 Mbit (lan connection)

2 USB (2.0) ports.

24Vdc power supply.

Software

Manuel, teach-in and automatic working modes,

Standard 7 axes (X1,X2,Y1,Y2,P,P1,Z),

Conic and parallelism control

Slow and fast speed by key

Adjustable rolling speed by keys,

Adjustable bending speed by keys,

X-Z / Y-Z axes interpolation,

100 step, 2500 program memory,

Automatic rolls referancing

User friendly program editor,

USB port for programs and parameters backup ,

Part pcs programming,

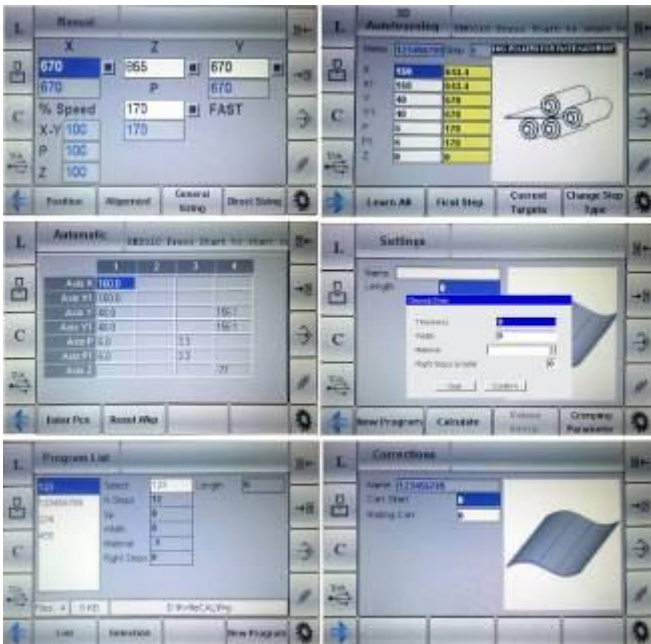
Working hours counter,

Metric / Imperial system,

Turkish, English, German, French, Spanish, Italian, 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

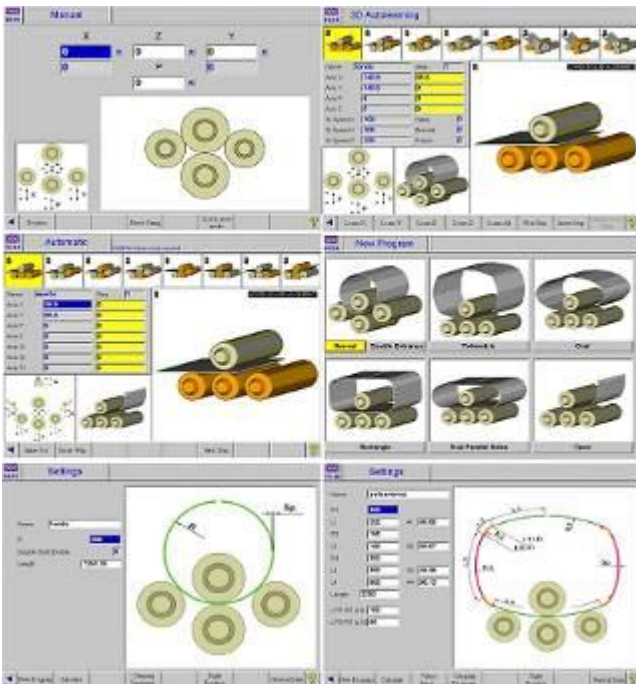


CNC Control Unit (S500)

CPU AMD Geode ETX-LX800 500Mhz with 128Mb of RAM
 FPGA integrated logics, surface mounting, fiber optic
 24Vdc 100W max power supply
 15" TFT XGA colour display with antiglare screen
 Ergonomic alluminium housing, with a panel suitable for machine operational selectron-switches and push-buttons
 Dedicated scratchproof, oil-proof IP65 keyboard with 28 keys
 Silicon hard disk (flash disk)
 Preset for standard pc keyboard
 2 serial ports rs-232
 2 USB port for memory stick
 1 ethernet port
 1 can open port
 Fiber optic interface
 Local area network

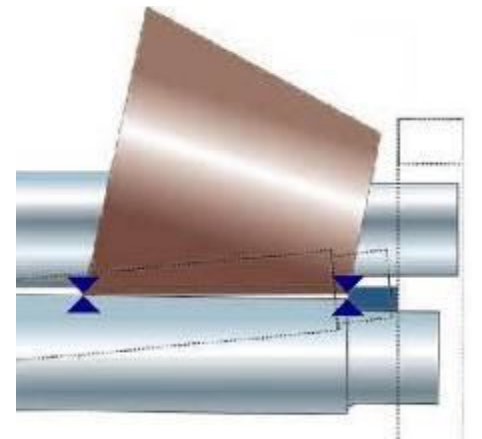
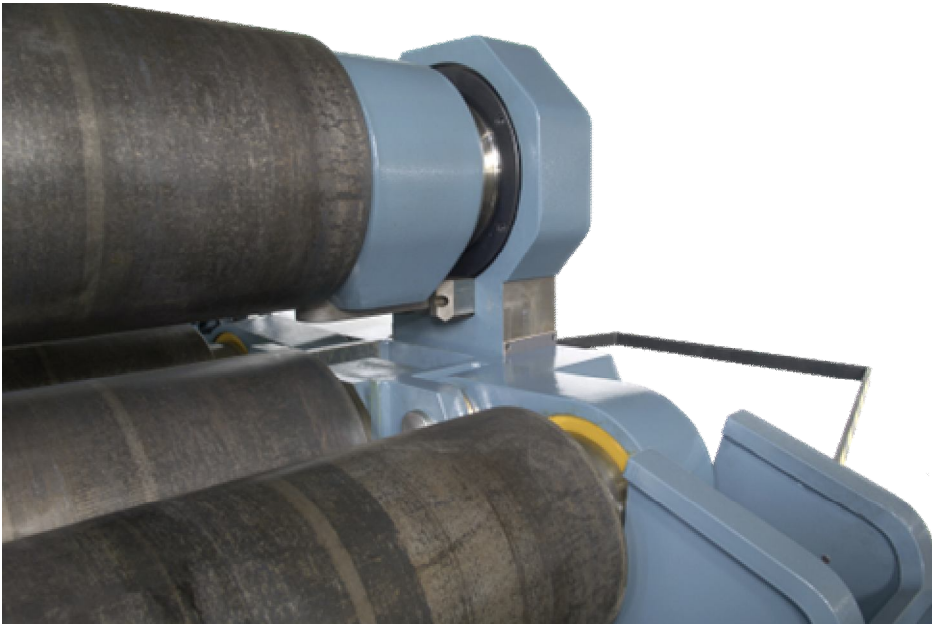
Software

Manuel, teach-in and automatic working modes,
 Standard 7 axes (X1,X2,Y1,Y2,P,P1,Z),
 Optional up to 21 axes
 Conic and parallelism control,
 Slow and fast speed by key
 Adjustable rolling speed by hand wheel,
 Adjustable bending speed by keys,
 X-Z / Y-Z axes interpolation,
 User friendly program editor,
 Automatic rolls referancing
 Automatic; cylindrical, polycentric, oval, oval parallel sides, rectangular and arc bending sequence calculation,
 Mildsteel database,
 New database creating,
 US USB port for programs and parameters backup ,
 100 step, 30000 programs memory,
 Program editing,
 Part pcs programing,
 Working hours counter,
 Metric / Imperial system,
 Stand by programming,
 Turkish, English, German, French, Spanish, Italian, Russian, Polish, languages.
 Alarm list.



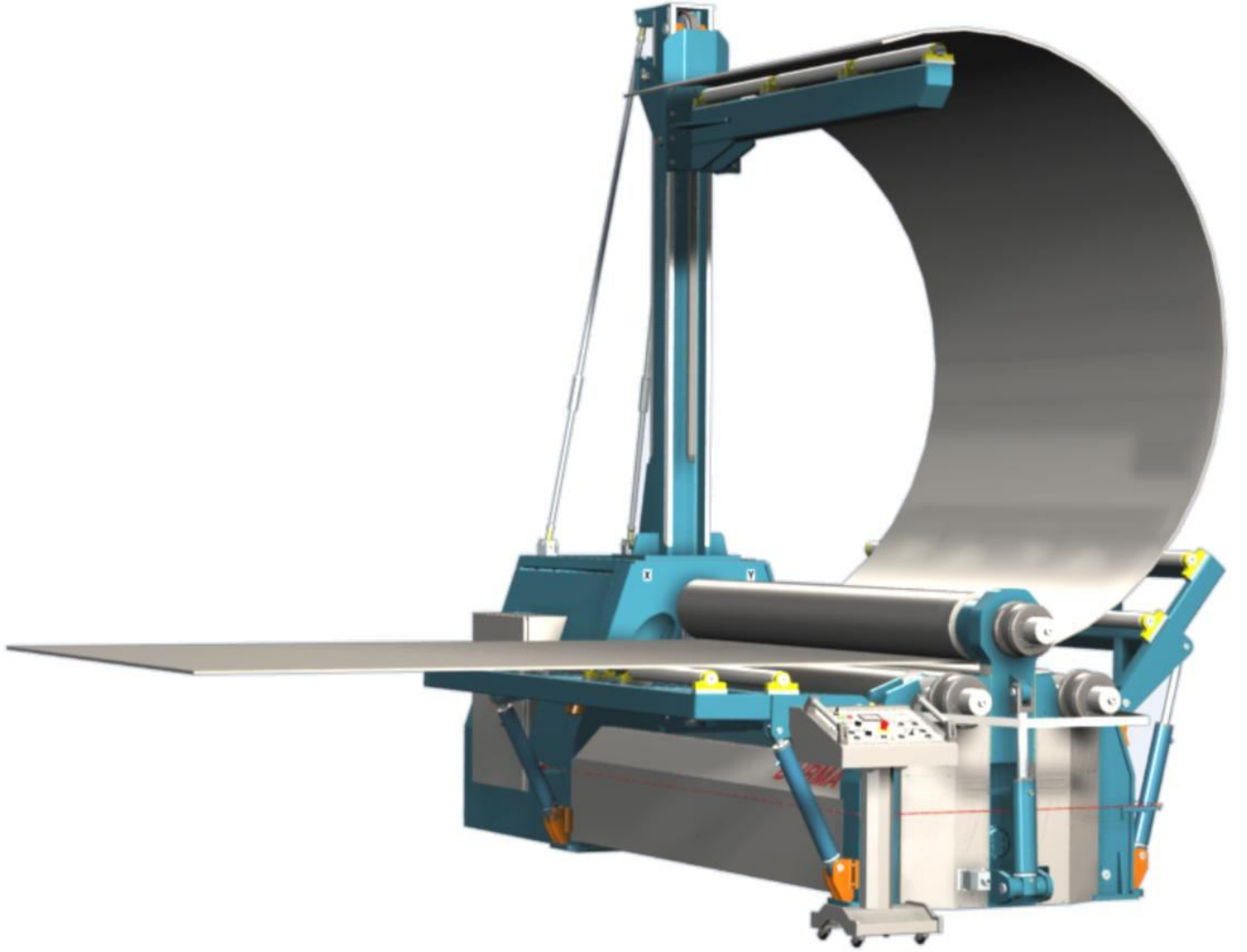
Conical Bending System

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.

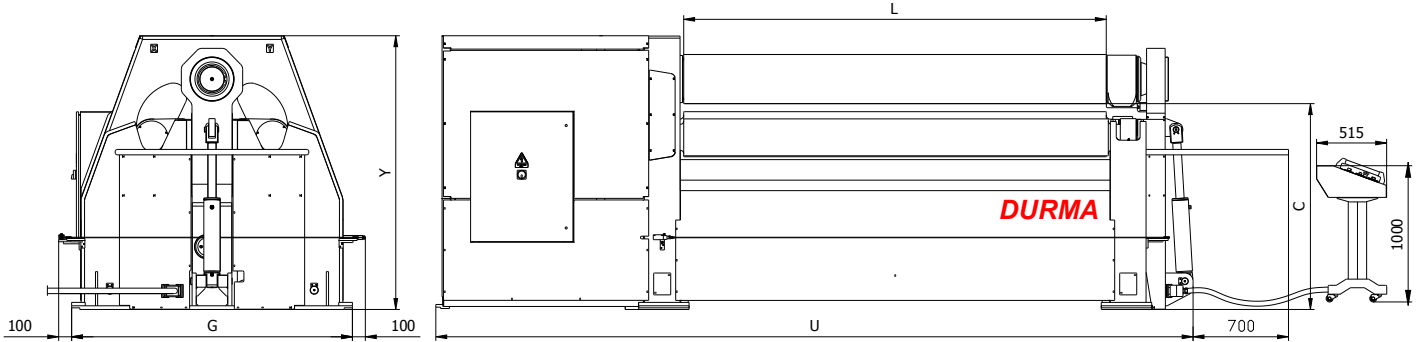


Optional Side, Vertical or Special Sheet Support System

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 $\varnothing 2000$ mm sheet. It can produced according to different tonnage and height.



HRB-4 1504 TECHNICAL DATA



TYPE		HRB-4 1504	
Number of rolls	Pcs.	4	
Rolls Length (L)	mm	1550	
Pre-bending capacity	mm	3	
Bending capacity	mm	4	
Top roll diameter	mm	140	
Bottom roll diameter	mm	130	
Side rolls diameter	mm	130	
Length (U)	mm	3040	
Width (G)	mm	970	
Height (Y)	mm	1140	
Weight approx.	Kg	~ 2370	
Motor power	kW	4	
Working height (C)	mm	880	
Max. Pass Through	mm	12	
Power supply		400V / 3 Phase / 50 Hz (Or other)	
Bending speed	m/min	4,2 (NC-CNC models; 1- 4,2 adjustable)	
Oil Tank Capacity	lt	90	
Feeding rolls	1 planetary gear box, hydraulic motor and gear system		
Rolls housing	Spherical roller bearings and bronze housings		
Rolls material	High tensile carbon steel C45		
Rolls hardening	Induction hardened 54±2 HRc		
Rolls positioning	One speed electronic synchronous (NC-CNC models; Proportional speed)		
Rolls calibration	Manual (NC-CNC models; Automatic)		
Pinching	Adjustable hydraulic pressure		
Control unit	PLC control system, moveable control unit (NC-CNC models; 7 axes geometric control)		
Conical bending	Conical bending device by manual		
Lubrication	Manual		

* All datas given according to 240 N/mm² yield point.

* All bending capacities decreases upto 50% in wide angle conics.

* Ideal pre-bending range is between 2-3 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 with gears
- 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
2 TON (2,3,4 mt)
 - Hydraulic side supports
- NC included side and vertical supports (S500)
- Oil cooling
- Oil heating
- Automatic centralized lubrication system
- Welding possibility on the machine
- Plate feeding platform with alignment unit
- Special plate support systems
- Loading, unloading systems

Plate Bending Innovation

