Double Pinch Hydraulic 3 Roll Plate Bending Machine  
Model AK325

This is the ultimate evolution in the plate bending field with two dragging rolls with hydraulic pinching allowing a steady and precise material dragging. This plate bending machine is the easiest, most versatile, quickest and precise the market can offer.

All parts are selected among the best brands in the world to allow precision, long life and versatility.

MAXIMUM LINE VOLTAGE 220/440, 3PH/60Hz

**DETAILS**

<table>
<thead>
<tr>
<th>Technical data</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed power</td>
<td>20 HP</td>
<td></td>
</tr>
<tr>
<td>Top roll diameter</td>
<td>14.6”</td>
<td></td>
</tr>
<tr>
<td>Side rolls diameter</td>
<td>13.8”</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Working length</td>
<td>122”</td>
<td></td>
</tr>
<tr>
<td>Max. rolling thickness</td>
<td>1”</td>
<td></td>
</tr>
<tr>
<td>Max. pre-bend thickness</td>
<td>3/4”</td>
<td></td>
</tr>
</tbody>
</table>

**Standard equipment:**

- Movable console
- Hydraulic system for opening the machine and removing the tube.
- Safety system to conform to EC Rules.

**Structural characteristics:**

- Electro welded monolithic structure normalized and machined on the new generation CNC boring machines
- Exclusive integrated hydraulic system developed for high performance
- Parallelism control by means of massive torsion bars to guarantee high precision also where the newest hydraulic systems may fail.
- Permanent lubrication system
- Planetary movement of the rolls to avoid any kind of friction and to guarantee high precision for the machine life.
Size

<table>
<thead>
<tr>
<th>Size</th>
<th>Width</th>
<th>Total length</th>
<th>Height</th>
<th>Working height</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>80”</td>
<td>206”</td>
<td>84”</td>
<td>56.1”</td>
<td>22,000 LBS</td>
</tr>
</tbody>
</table>

The max performances are referred to shells of diameter equal or larger than 3 times the top roll diameter and with material with a yield point 36,000 PSI

PERFORMANCES

Performances are referred to working of materials with a yield point equal or lower of 39,200 PSI.

Increasing the material yield point, machine bending and pre-bending capacity will decrease, as you can see in the K factor chart (see chart).

<table>
<thead>
<tr>
<th>Yield point</th>
<th>Tensile strength</th>
<th>Factor “K”</th>
<th>Example:</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSI</td>
<td>KSI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50,000</td>
<td>75-95,000</td>
<td>0.84</td>
<td>Machine with a pre-bend capacity of 12 mm.</td>
</tr>
<tr>
<td>70,000</td>
<td>95-115,000</td>
<td>0.70</td>
<td>Material yield point 41,000</td>
</tr>
<tr>
<td>100,000</td>
<td>115-140,000</td>
<td>0.60</td>
<td>Change the yield point to 70,000 the pre bend capacity reduces by ‘K’ factor of 0.70 pre bend capacity reduces to 5/16” [If in doubt ask]</td>
</tr>
<tr>
<td>130,000</td>
<td>175,000</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

Material Strength:

This is by far the most important consideration when selecting a set of plate rolls.

Material specifications state the minimum yield strength that the material will be produced to, but in general there is no maximum limit, steel arriving at your works is likely to be above the specification stated minimums.

A commonly used steel is BS EN 10025:1993 – S275, this steel has a stated minimum yield Of 275N/mm2 , yet it often arrives at works gates with yields of 360N/mm2 this increase in yield strength will reduce the pre bend and roll capabilities of a machine by 16%.

The ‘K’ factor chart above shows how a change in steel yield strength will effect pre bend & roll capabilities

Closing of the longitudinal seam edge

To produce a perfect closing of the longitudinal seam, the ‘bending rolls’ have to be manufactured with a correctly calculated compensating top roll camber, specific to a material thickness,
At point of order, the manufacturer will require to know, at which material thickness top roll camber is to be calculated, this is generally the material thickness at which most of your production is done.

For avoidance of doubt Material rolled above or below the specified material thickness to be used in the camber calculation, is likely to suffer from ‘barreling’ or ‘hour glass’ effect’s, to what degree we cannot be specific.

TECHNICAL AND STRUCTURAL FEATURES

Below you can see the step-by-step working process:

A) Automatic simultaneous balancing: bending roll parallelism controlled by massive TORSION BARS working in symbiosis with sophisticated valves controlling the oil flow. This system allows the complete and steady parallelism without resetting.

B) Planetary movements: bending rolls planetary movement that reduces frictions to minimum, frictions very common on traditional movement machines, such as diagonal or horizontal sliding guides.
C) **Permanent lubrication:** All machine components are pre-lubricated and sealed following a unique system allowing lubrication for the Life of machine. By using auto-lubricated bearings it will be enough only to grease the parts during the assembling. MG plate bending machines maintenance will not be necessary, only a periodical refilling of the oil will be necessary and of course cleaning the mill scale off machine occasionally.

D) **Direct drive:** Replacing of all low efficiency components (gears, bushings, mechanical gear boxes, transmission belts, sliding guides...) with the most efficient *epicyclical gear boxes* DIRECTLY COUPLED on the rolls, bearings and hydraulic motors, this way all machine strength is focused on the material to bend (positive strength) with consequent Energy saving. This system conforms to the “International High efficiency and Anti-Pollution” standards.

**Rolls Cambering**

A good part of MG technology is the application variable cambering on the rolls on the basis of material thickness. Each MG machine is different from the others even among same models because the rolls do not have the same cambering. Furthermore, during the bending work a particular phenomenon takes place, a phenomenon that is not always visible: the rolls are subject to deflection, but, thanks to the cambering, they do not reach the breaking point, and allow a very good result in their bending performance.

**FEATURES**

- Electro-welded steel frames worked on CNC working stations.
- Rolls movement at variable speed from 0 to 100% (this does not include machines with electro-hydraulic controls and Lynx controlled).
- High performance Hydraulic motors, with energy saving, no secondary transmissions such as chains, gears, belts.
- Immediate stopping of all moments by over center valves.
- Variable speed shaping side rolls (this does not include machines with electro-hydraulic controls and Lynx controlled).
- Bending rolls by massive torsion bars.
- Hydraulic opening system for pipes ejection.
- Top roll automatic balancing (for machine opening).
- Rolls mounted on high load double row bearings.
- Machine wholly hydraulic.
- Pre-bending, bending and pipe closing in one pass (within suggested parameters)
- One operator only for all bending operations.

**STANDARD COMPONENTS**

- Integral hydraulic system, with all hydraulic protections at EC norms.
- Electrical systems complete with all “overload” protections at EC norms.
- Mobile control console for a secure and correct position of the operator.
- Hydraulic machine opening for the pipe removal.
- Multiple stop system that grants the best security.
- Side rolls that can be used for material squaring.

**TOP ROLL CONTRAST TO EJECT PIPES**

When the machine uses conical bending device, it does not allow the finished shell to be taken off. MG uses a unique system called contrast to eject the pipe. This particular system is utilizes a piston mounted on the back side of the roll. This piston monitors the yoke position; when it’s completely down, the piston moves and lifts the top roll to let the operator eject the pipe.

The monitoring is made by a valve, called a sequence valve that “senses” the pressure increasing in the hydraulic circuit when the yoke opens, transferring it to the contrast piston that, consequently, lifts the roll.

**IMPORTANT CONSIDERATION**

**FLAT PART**

If the choice of the machine has been made properly, the minimum flat part you get will be 1.5 or 2 times the plate thickness. Even in this case, the plate thickness and its yield point, relating to the machine capability makes a difference.

**CONICAL BENDING**

Conical bending with conicity over 4 degrees reduces machine performances. This is due to the unbalanced load on the top roll and its bearings. The more the cone tilts the more the machine performance will decrease, for a maximum of a 50% in length and in bending thickness.

**ACCESSORIES**

**CENTRAL SUPPORT**

MG Vertical Support has been developed to support the plate in every phases of the bending process. This helps us to keep the material stable without changing of the radiuses due to the weight of the plate.

The Central Beam is fully hydraulic and it is composed of a piston and two chains that control movements (UP and DOWN).
SIDE SUPPORT

MG Side Support has the function to support the plate during the bending process, in fact, during the rolling; it is possible to have problems due to the thickness and the weight of the plate. If the plate is very thin and we are going to roll a very wide diameter, the material is too weak to support itself, it will try to deform and thus change its radius. Using an MG Side Support, will solve this problem.

FLAT PRODUCED WITH PRE-BEND

There is a theoretical possibility of achieving a flat each side of the longitudinal seam of the plate approx 1½ to 2 times the material thickness. There are many variables that influence the ability to actually achieve this theoretical flat, the experience of the machine operator being a factor.

CONE ROLLING

When cone rolling, the machines capacity is reduced to ½ that of the pre bend capacity, i.e. ½ the thickness & ½ the length. When you pre bend a plate with the side rolls set parallel to the top roll, the bearing loading is equal at the end of each side roll. This loading changes when you tilt the side rolls to produce the cone, the side bearings at the drop end take approx 80% - 100% of the loading.

GAUGING

During and after the rolling you will have the need to measure the radii; how will you do this? The normal method is radii templates. Do you already have these? This method is ok for small diameters. The measuring of large radii with large templates can be difficult; we recommend the purchase of our ‘arch-meter’ for larger radii measurements.
COMMERCIAL AND DELIVERY TERMS

**Machine start-up:** The time to assemble a machine depends on its dimensions, while the training time will be of 1-2 days. On this we require customers the best availability in terms of tools and workforce during our technician visit.

**Note:** We reserve the right to invoice separately the loss of time our technicians have during their training caused by customer’s negligence and delays. Furthermore, we reserve the right not to proceed with assembling operations in case our technicians on site inform us they do not encounter all the necessary security means for the working.

**Material used for testing:** In case we are requested to run a pre-acceptance test at our plant, we will request customers to supply the material with proper certificates, or the same will be invoiced at the market value.

**Machine foundation:** Machine foundations will be supplied upon request after reception of Purchase Order. Unless otherwise specifically stated, preparation of floor foundations/civil work, if required, is not included in this quotation. We will quote to undertake this work at an extra cost if we are requested to do so.

**Insurance:** The risk of such goods will pass to you when the machine is loaded on a truck of your designation.

**Off-loading & positioning in works is the purchaser’s responsibility.**

**Please note!** If the machine is dismantled for shipment (possibly into 3 pieces or more), please consider sizes and weights as detailed on this quotation to understand the facilities required to off-load & position within your works.

**Supply of services:** It is the purchaser’s responsibility.

**Hydraulic oil:** The machine is supplied without hydraulic oil. Please see charts on the operation manual to select the best oil for your needs.

**Materials for testing and training:**

Should materials be used during machine operator training, such materials are to be supplied by the purchasing company at their cost. Material supplied is to be accompanied with mill test certificates.

C Marshall Fabrication Machinery, Inc. (CMF) shall not be responsible for delay of performance resulting from *Force Majeure*, including acts of war, compliance with governmental laws and regulations, acts of God, and labor disputes, including strikes.

**WARRANTY:** Twelve months from date of receipt of machine for the repair or replacement, at the manufacturer’s option, of defective parts at no charge F.O.B. Fossano, Italy and the return of
the defective parts freight prepaid to Fossano, Italy 30 days from date of shipment. This does not include labor. All electrical items carry the warranty of the manufacturer from whom they were purchased, which on some items is 30 days. No reimbursement will be made for repairs of any kind unless prior authorization is given. Urgency will not be accepted as an excuse. The warranty will cover the normal wear and tear. The warranty will NOT cover problem due to accident, abuse, neglect, vandalism, act of God or the installation, use, repair, or modification contrary to specifications or instructions supplied by Seller.

On December 16, 2011 MG was awarded the Quality Certificate ISO9001-2008. ISO 9001:2008 specifies requirements for a quality management system where an organization

- needs to demonstrate its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements, and
- aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements.