W12CNC-50×3000 Four Roller Rolling Machine

- The machine belongs to four roller bending machine, used for cylinder pressure vessel manufacturing industries, it has function of roll round, pre-bending, correct the circle, with coarse leveling function.
- The upper roller is the main transmission, leading the lower roller and the side roller move by friction between the sheet plate and the upper roller, meanwhile, the upper roller provides torque for rolling rollers.
- The upper roller is the active roller by hydraulic transmission, lower roller and the accessories, both sides turn plane and supporting roller lifting are driven by hydraulic pressure.
- The lower roller use vertical lifting, the side roller use tilt lifting, so the synchronization precision error is less than 0.15mm.
- To make prebending, the lower roller rising and clamping the sheet plate, the side roller inclined upward, plate end pre-bending done.
- According to the arrangement of the side roller to adjust the position of the two sides, four roller rolling machine can do symmetric or non-symmetric bending, so the machine can be a rolled ideal very small arc straight edge into theory of surplus. If compared with the symmetrical three roller bending machine, four roller rolling machine do not need to use pre-bending plate press any more.
- The lubricating point of the machine use cut-up arrangement.
- The four-roller rolling machines’ control system adopted Japan OMRON intelligent high-speed PLC industrial control machine, the system can control lower roller, and the other roller accessories.
- The lower roller and the two side roller’s displacement sensor using encoder, so the action design of the sensor is reasonable, which can guarantee the service life.
- All bearings used in the four-roller rolling machine are required to adopt the
most advanced technology, the most well-known manufacturers of leading products.

► Hydraulic cylinder with accuracy manufacturing, good sealing effect, so the cylinder reduce the pressure relief and leakage of sealing device, in addition, all sealing accessories imported from abroad.

2. Main specifications of the four-roller rolling machine.

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>50x3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bending thickness</td>
<td>50mm</td>
</tr>
<tr>
<td>2</td>
<td>Max. Bending width</td>
<td>3000mm</td>
</tr>
<tr>
<td>3</td>
<td>Roller working length</td>
<td>3100mm</td>
</tr>
<tr>
<td>4</td>
<td>Min. Rolling diameter</td>
<td>T50<em>B3000</em>min1000mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(σs≤245MPa)</td>
</tr>
<tr>
<td>5</td>
<td>Upper roller DIA</td>
<td>Φ610mm</td>
</tr>
<tr>
<td>6</td>
<td>Lower roller DIA</td>
<td>Φ580mm</td>
</tr>
<tr>
<td>7</td>
<td>Side roller DIA</td>
<td>Φ510mm</td>
</tr>
<tr>
<td>8</td>
<td>Side roller slant angle</td>
<td>25°</td>
</tr>
<tr>
<td>9</td>
<td>flat edge</td>
<td>1.5-2 times thickness</td>
</tr>
<tr>
<td>10</td>
<td>Pressure of hydraulic system</td>
<td>≥19.5Mpa</td>
</tr>
<tr>
<td>11</td>
<td>Hydraulic motor power</td>
<td>50KW</td>
</tr>
<tr>
<td>12</td>
<td>Rolling speed</td>
<td>3.5m/min</td>
</tr>
<tr>
<td>13</td>
<td>Source of power</td>
<td>Hydraulic</td>
</tr>
<tr>
<td>14</td>
<td>Driving model of roller</td>
<td>Hydraulic motor and planetary transmission</td>
</tr>
<tr>
<td>15</td>
<td>Voltage and frequency</td>
<td>380V, 3 phase, 50Hz</td>
</tr>
<tr>
<td>16</td>
<td>Side roller adjust speed</td>
<td>80mm/min</td>
</tr>
</tbody>
</table>

3. Main structure of the four-roller rolling machine.

This equipment is composed with machine frame, upper roller device, main
driving device, lower roller device, side roller device, balancing device, a tilting device, hydraulic system, electrical system, display system and lubrication system, etc.

► Machine frame.
The machine frame is composed of base, fixed side frame and the overturned side frame, all sections of the machine are connected with plate welding structure. Both of the side frame are fixed with bolts on the base seat, and are connected with connecting beam, to guaranteed good rigidity of the whole machine. The side frame has motion guider rail for all rollers, and the fixed side frame has semi-closed base for upper roller. Besides, the overturned frame also has holding device. The acting force will be fade away by the side frame. The base of the machine not only hold the weight and guaranteed the precision of itself, but also balance the torque between main drive and also connected the whole machine.

In addition, for the traditional four roller rolling machine, the main frame and the main drive are installed separated.

► Upper roller device.
The upper roller is drived by main transmission device to rotary motion, and both ends holds by SP - 1 sliding bearing. The driving end connect the main
transmission by flat key and open gear for transmission torque. The overturned end equipped with steel sleeve. The upper roller made of superior alloy steel of 42CrMo, thermal refining with HB260-300.

► The main transmission device.
The main transmission device use hydraulic motor, planetary reducer to transmit torque to the upper roller. In addition, there also equipped a electrical hydraulic push rod brake on the high-speed bearing of the speed reduction gear.

► The lower roller device.
The lower roller holding on aligning bearings, also, the bearing seat is arranged on the two sides of frame rail, and the bottom connected with piston of the cylinder. Bearing seat can be rise or drop on guide rail by effection. Thrust of the piston can be operated by hydraulic control system at will according to the request of force to clamped she sheet plate with upper and lower roller.

► The side roller device.
Side roller holding in the bearing seat, and the bearing seat arranged on the two sides of frame rail, and the bottom connected with piston of the cylinder. Bearing seat can be rise or drop on guide rail by effection. Thrust of the piston can be operated by hydraulic control system at will according to the
request of force to clamped she sheet plate with upper and lower roller.
Thermal refining with HB260-300.

Balance device using tensioning screw climbing mechanism, when the overturning frame come away from the upper roller bearing, the upper roller will dropped due to the action of gravity on the end of roll, to make the upper roller in a horizontal position, the fixing side outer end of the tail rod is provided with a balancing device and is fixed on the base with bolt.

The overturned device.
The overturned device use the oil cylinder, the hinge to drive the overturning frame overturn disengaged from the upper roller bearing, so that products can be take out.
Lubrication system.
The main reducer and side roller drive reducer used oil tank splash lubrication, natural cooling, when the environment temperature fit -10°C to 0°C, please use N46 or N68 oil, when the environment temperature fit 0°C to 40°C, please use N68 or N100 or N150 or N220 oil. The other lubrication points using the manual grease gun to lubricating. The working medium is grease ZGN40 - 1(for winter use), and ZGN40 - 2(for summer use), every one or two times of lubricating in one working day.

4. The hydraulic system.
Introduction.
The hydraulic system consists of gear pump, valve group, fluid connectors, hydraulic auxiliary parts, etc. Besides, we choose superposition valve series for the hydraulic valve. Simple pipe arrangement, make it convenient to maintenance and debugging. The hydraulic system is composed of three kinds of circuit, there are over
pressure protection and pressure regulating circuit, synchronization loop, and speed loop components. The pressure regulating circuit system works through the main relief valve pressure. The system working pressure is 19.5Mpa. Synchronous circuit through the shunt throttle valve on roller rise and fall of coarse step shunt synchronization, throttle exam up and down regulating displacement sensor detection, and the upper roller synchronous positioning accuracy is 0.15mm. The speed loop control overturning side machine overturned, reset, and adjust circuit with throttle speed through the throttle valve. ► Various of protection measures. There are overflow valve to protect limited rise and fall of upper roller.

5. The electrical system.
► The four roller rolling machines’ electrical control system consists of an electric control cabinet, console, and hand held button box operation. Power supply 380V / 50Hz. The main switch has overload protection function and short circuit protection for the main motor. Reversing of motor is controlled by the AC contactor, the control circuit use PLC programmable controller system, less relay, operation reliable, and own long service life. The control cabinet is provided with a finished product rolling process of all the control button and indicator, to master machine operation control and working state control.

6. Advantages of 4-roller rolling machine.
► Liner guideway system, reliable and endurable.
► Electronic balance synchronization control system(accuracy ± 0.15mm).
► Double power roller with 2 gearbox and 2 hydraulic motor.
► Surface of roller with heat treatment, which hardness can be HB260-300.
► Hydraulic system to prevent overload.
► Automatic lubrication system.
► Lower voltage control system.

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7. Advantages of 4-roller rolling machine.

► Liner guideway system, more reliable and more endurable.
► Large size axis bearings, make the whole structure more stable.
► All moving parts use hydraulic power, more reliable and more endurable.
8. Photo for your reference.