**1﹒Machine Main Applications and Usage Scope**

W12 four rollers plate rolling machine is produced for metallic plate bending and emendation, which specially suits for metallic plate figuration work. Cylinder and arc work-pieces can be bent after feeding. Besides, extensive emendation is also available. W12 four roller plate rolling machine is widely used in shipbuilding, boiler, aviation, bridge, hydroelectricity, chemical industry, metal structure, and machinery producing industry.

**2﹒Machine Main Structure**

2﹒1 Main Structure

The machine is a four-roller plate rolling machine, its structure is shown in drawing 1. Upper roller is the active roller, bottom roller and side roller are the driven roller. Upper roller position is fixed, bottom roller and side roller can move up and down. Upper roller and bottom roller are hydraulic transmission, and the rotation of side roller is driven by the friction force between the steel plate and each roller. Bottom roller and side roller are raised and lowered by the oil cylinders of both ends. The turnover and reset of the front bearing body of upper roller are carried out by the oil cylinder. Each roller’s bearing body and oil cylinder are mounted on the left and right ends of the frame.

 Left and right machine framework are the main parts of whole machine, which is totally steel welded, installed on the welded base, and all operations are finished on console.



（Drawing 1）

Compared to three roller plate rolling machine, four rollers plate rolling machine can finish edge pre-bending without other device or mold, and surplus straight edge is little; compared to asymmetric three roller plate rolling machine, four roller plate rolling machine can complete bending without plate turning around. In this way, user can improve work efficiency, guarantee the work piece quality, besides, four roller plate rolling machine has simple craft, convenient operation, and reduce the intensity of labor.

2﹒2 Main Driven Structure

The four roller plate rolling machine’s upper roller is the active roller, hydraulic motor drives the upper roller through the arc gear wheel type reducer, to promise the upper roller roll at 4.5m/min speed, and complete the feeding action.

2﹒3 Assistant Driven Structure

The four roller plate rolling machine’s bottom roller and side rollers’ lifting, overturning and reset are driven by hydraulic device. Bottom roller and side rollers can simultaneously do up and down movement, also can separately go up and down.

2﹒4 Support Roller Device

The left and right supporting bracket device is used to support both sides of the cylinder when rolling the large-diameter cylinder to prevent the cylinder from shaking left and right. The supporting bracket can move up and down, controlled by the oil cylinder, and has the function of feeding table at the same time.

The top support bracket device is used to support the cylinder when rolling the large diameter cylinder. The displacement is controlled by the oil cylinder and can be adjusted up and down according to the cylinder diameter. When the top support bracket is not in use, it can be disassembled and placed flat to save height space and facilitate handling and storage.

2﹒5 Bending Craft works

Four roller plate bending machine provides various bending craft works. User can choose according to needs. The following one is for reference, shown as drawing.

|  |  |
| --- | --- |
|  | 1. Operate bottom roller to rise so that the distance between upper generatrix of bottom roller and down generatrix of upper roller is slightly greater than the working thickness. Then operate side roller of the feeding side to make its upper generatrix and upper generatrix of bottom roller on the same horizontal plane, and then operate the other side roller to rise between the upper and the bottom roller.
2. Feeding material: horizontally feed the metal plate to make plate end touch with front-side roller wholly, then lower the front side roller to original position.
 |
|  | 1. Clamping plate tightly and start pre-bending.
 |
|  | 1. Use front-side roller to pre-bend the other side of plate, after finishing pre-bending the left side, then lower the back side roller to original position; then operate the upper roller to bend the plate to the right position shown on drawing, then stop the upper roller, then operate the front-side roller up to pre-bend the other side of plate.
 |
|  | 1. Initial bending: adjust front and back side roller to appropriate position, operate the upper roller to do initial bending.
 |
|  | 1. Figuration bending: adjust front and back side roller to appropriate position, operate the upper roller to do figuration bending.
2. Take out the work piece: after finishing whole bending, lower the bottom roller to the lowest position, then work-piece gradually lower with the two side rollers to an appropriate position, overturn the drop end, lift the work-piece, remember to keep same level with upper roller to discharge the work-piece.
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**3﹒Hydraulic System**

The four roller plate rolling machine’s bottom roller and side rollers as well as drop end device and reset are driven by hydraulic oil cylinder, and controlled by electromagnetic directional valve switch.

**3﹒1**  Hydraulic System Adjustment:

3﹒1﹒1 Pump Fountain Adjustment:

3﹒1﹒2 First operating or re-operating after a long time, user should let the oil pump empty work for 5 minutes, then do other actions. When starting or stopping operating, user should let oil pump unloading.

3﹒1﹒3 Flooding valve 10 and 12 pressure should be 20Mpa, when adjusting flooding valve 10, 1DT and 2DT should be electrical powered or use hand-spike to withstand the electromagnetism valve’s fault check button; when adjusting flooding valve 12, user should adjust the motor with loading, if motor empty works, the pressure will be 0.

**3﹒2**  Down Roller and Side Roller Adjustment:

**3﹒3** Total 3 pairs of oil pumps, each pair can work together or separately. The synchronization accuracy should be less than 5%; pressure reducing valve range is 4-15Mpa; if any creeping phenomenon happens when the oil pump firstly works, that must be caused by air in pump. The solving way is come-and -go operate the oil pump to eject the air.

**3﹒4** Support Roller and Overturn Oil Pump Adjustment:

3﹒4﹒1 Oil pump working speed should be 1-2m/min, work steadily.

**3﹒5**  Precaution:

Before starting, user should check the oil tank, the hydraulic oil should be occupied the 80% of tanks volume, the hydraulic oil should use N46 anti-rust oil.

**3﹒6** After debugging, as the oil is full of the pipes, the level of oil gets lower, at this time, user should make up the oil in case of pump suction.

**3﹒7** Change the hydraulic oil per half year, timely clean the oil inside wall and straining core.

**3﹒8**  Common Faults:

|  |  |  |
| --- | --- | --- |
|  故障 | Possible Reasons | Method |
| Noisy Vibration | Oil strainer was jammed , oil pumpgot suction. | Clean or change oil strainer. |
| Low oil temperature, oil pump got suction. | Improve working environment, to warm oil. |
| High viscidity oil, oil pump got suction. | Choose right viscidity oil. |
| Oil pipe got vibration. | Use pipe filter |
| Oil pump heat much | Oil pump got broken | Repair or change |
| System pressure can’t set up | Poor contact, the electromagnetic valve act up | Check the electrical system |
| Electromagnetic valve act up | Clean or change |
| Overloading | Hydraulic unilateralism valve broken | Clean or change |

**4﹒Machine Installation and Debugging**

4﹒1 Machine Installation

4﹒1﹒1 After the machine is qualified, then pack machine for shipping. Customer counts according to the packing list. All parts shall be intact and free from damage

4﹒1﹒2 Make a construction according to the base drawing. If user’s local geologic compression resistance is less than 2×10²Pa, user can make self-design. The net distance between machine foundation and workshop column base is generally not less than 1 meter.

4﹒1﹒3 When installing machine, use inclined iron to make leveling. On the base freely direction, the horizontal deviation should be less than 0.5mm per one meter. Then install the foot bolts, and make second casting.

4﹒1﹒4 Firstly install the main body, then install the main drive part, lastly install hydraulic system and electrical connection.

4﹒1﹒5 Once finished foot casting, then screw down the foot bolts, then debugging.

4﹒2 Run-in Machine

First run-in, then operate the plate bending.。

4﹒2﹒1 Preparation before Run-in:

1. Check the all tighten part, connection part.
2. Check the lubrication part.
3. Check the hydraulic piping system, fastness, no breakage, no leakage.
4. Check the electrical piping, power, pressure and tie-in.

4﹒2﹒2 Empty Run-in:

Procedure

1） Start oil pump, after going into normal situation, and good lubrication, operate bottom roller and side rollers rise and fall within their own 1/2 journey. If the cylinders at both ends of the roller can make the roller rise and fall at the same time, then carry out the lifting test of the full travel range.

2） Test of side roller inclined lifting.

3） Overturn and reset of the drop end device

4） Positive and negative rotation test, emergency stop test of upper roller.

Run-in Check

1. Check the equal distance between the bottom and side rollers relative to the upper rollers.
2. Check bottom roller and side rollers if they can work flexibly and steadily.

**5﹒Machine Lubrication**

 Reasonably lubricate the driven parts and slide surface. It is the right way to reduce power consuming and increase the machine working life .

5﹒1 Lubrication Way

 Box type lubrication, timely infusing lubrication and self lubrication axletree. Shown as drawing a.

 Drawing a

Axis pin 1, infusing oil per week.

Upper roller main initiative gear wheel type reducer 5, coat with lubricating fat per half year.

Overturn axis 2, upper roller axis neck 3, balance bearing 6, slide part’s guiding surface 7, use self lubrication axletree, when installing or repairing, infuse some lubricating fat.

5﹒2 Choose right model lubrication oil.

5﹒2﹒1 Preparation before Debugging

Roller’s steel back bearing is lubricated by Calcium lubrication fat（GB491—65）。

5﹒3 Precaution:

 Before working, do good lubrication.

 After 150 hours, clean all lubricating system, then do whole cleaning per year.

**6﹒Safe Operation and Maintenance**

6﹒1 Safe Operation Item

6﹒1﹒1 Operator should be familiar with machine structure, performance, use way of control system and bending process, obey to the safe operation items.

6﹒1﹒2 Before start or stop, all electrical system should reset to original position.

6﹒1﹒3 During working, check frequently the lubricating part to make sure enough oil kept.

6﹒1﹒4 During empty run-in, if any noise, punching, vibration or leaking, operator should stop to check.

6﹒1﹒5 During using, check the driven part and connecting part, keep tight and make sure no broken.

6﹒1﹒6 Not allow to directly bend the plate which weld joint is not been shoveled or plate self is not been leveled.

6﹒1﹒7 The plate should keep perpendicularity with roller center line.

6﹒1﹒8 During bending, plate should keep synchronization with roller’s rolling, no slide.

6﹒1﹒9 During bending, bottom roller and side roller are not allowed to rise and fall at the same time

6﹒1﹒10 Not allowed to finish bending the radius by one time, especially for thick plate.

6﹒1﹒11 Ensure lower the bottom roller and side rollers to the lowest position, then overturn.

6﹒2 Machine Maintenance

 Correctly and reasonably maintenance the machine to expand the work life, and save the repairing fee. Remember the following points:

6﹒2﹒1 Strictly complement the lubricating rule, ensure good lubricating.

6﹒2﹒2 Make terminal check and repair plan.

6﹒2﹒3 All rapid wear elements should be timely changed after losing the basic requirement.

6﹒2﹒4 Notice the temperature, the oil tank temperature should be lower than 60℃.

6﹒2﹒5 Terminally check the hydraulic driven system, clean or change the disabled hydraulic parts. Keep suitable oil tank temperature, try to reduce the pollution of oil, check the hydraulic oil situation per half year.

6﹒2﹒6 Earthing all electrification parts in electrical system. Terminally check the main components, timely change the broken parts.

6﹒2﹒7 Not allowed to stack materials and oxidation plate.

**Note:**

**During the course of bending, after feeding the plate, the bottom roller begins to rise. Please stop the bottom roller’s rising immediately when the plate touches to the up roller. Or there will be damaged the up roller.**

