



How do you use a section bending machine?

Operation Manual Of PBH Series Angle Roll

- I. Purpose and basic parameters of PBH section bending machine
- II. Overview of the structure and performance of the PBH section rolling machine
- III. Performance of PBH series angle rolls
- IV. Bending process and universal mold
- V. Lubrication of PBH Section bending machine
- VI. Hydraulic system
- VII. ANALYSIS AND ELIMINATION OF COMMON FAULTS IN HYDRAULIC SYSTEMS
- VIII. Machine installation and commissioning
- IX. Safe operation and maintenance

Purpose And Basic Parameters Of PBH Section Bending Machine








Purpose

Working video of PBH-200 [Angle Rolls](#)
How to bend angle iron? angle roll...








[PBH Series Section Bending Machine](#) is a three-roller [profile bending machine](#) (aka, [Angle Roll](#), Angle Ring Roller) with an arc-down type, which is used to be used to roll profiles into circular, curved, spiral and other shapes for shipbuilding, hydropower, metal structure, and

PBH SERIES SECTION BENDING MACHINE TECHNICAL PARAMETERS

Model	PBH 120	PBH 140	PBH 200	PBH 300	PBH 360	PBH 450	PBH 500	PBH 550
Max.Section(mm)	80×10	100×25	120×25	150×30	175×40	200×50	250×70	250×70
 Min.bending DIA(mm)	Φ800	Φ700	Φ1000	Φ1500	Φ1500	Φ2500	Φ3500	Φ3500
Max.Section(mm)	180×20	200×35	250×30	250×40	350×50	400×60	450×70	500×80
 Min.bending DIA(mm)	Φ1500	Φ600	Φ1000	Φ1000	Φ900	Φ2000	Φ1000	Φ1200
Max.Section(mm)	50×50	60×60	70×70	80×80	110×110	130×130	145×145	165×165
 Min.bending DIA(mm)	Φ500	Φ600	Φ800	Φ1500	Φ1600	Φ2000	Φ2500	Φ3000
Max.Section(mm)	Φ76×4	Φ102×4	Φ140×4	Φ170×6	Φ219×6	Φ245×8	Φ325×8	Φ400×8
 Min.bending DIA(mm)	Φ700	Φ1000	Φ1800	Φ2000	Φ2500	Φ3000	Φ4000	Φ8000
Max.Section(mm)	65x65x6	90x90x5	100x100x6	120x120x8	150x150x8	180x180x10	200x200x10	250x250
 Min.bending DIA(mm)	Φ1000	Φ1500	Φ2000	Φ3000	Φ5000	Φ6000	Φ8000	Φ10000
Max.Section(mm)	80x80x10	100x100x12	120x120x12	140x140x14	160x160x20	180x180x12	200x200x20	200x200
 Min.bending DIA(mm)	Φ1000	Φ1200	Φ1500	Φ1500	Φ1800	Φ3000	Φ4000	Φ4000
Max.Section(mm)	80x80x10	100x100x12	120x120x12	140x140x14	160x160x20	180x180x12	200x200x20	200x200
 Min.bending DIA(mm)	Φ1500	Φ2000	Φ2000	Φ2500	Φ3000	Φ4000	Φ4500	Φ6000

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Operation Manual of PBH Section Bending Machines

	Max.Section(mm)	120	140	200	300	360	450	500	550	
	Min.bending DIA(mm)	Φ600	Φ600	Φ1000	Φ1200	Φ2000	Φ2500	Φ3000	Φ4000	
	Max.Section(mm)	120	140	200	300	360	450	500	550	
	Min.bending DIA(mm)	Φ600	Φ600	Φ1000	Φ1200	Φ2000	Φ2500	Φ3000	Φ4000	
	Max.Section(mm)	80x80x9	80x80x10	100x100x10	130x130x15	150x150x20	180x180x20	200x200x20	250x250	
	Min.bending DIA(mm)	Φ700	Φ800	Φ1000	Φ1500	Φ2000	Φ3000	Φ3000	Φ4000	
	Max.Section(mm)	120	140	200	300	360	450	500	550	
	Min.bending DIA(mm)	Φ600	Φ600	Φ1000	Φ1200	Φ2000	Φ2500	Φ3000	Φ4000	
	Max.Section(mm)				120	160	200	240	320	400
	Min.bending DIA(mm)				Φ4000	Φ6000	Φ9000	Φ15000	Φ32000	Φ35000
Sectional modulus cm ³		10-20	16-45	45-75	75-140	140-180	180-250	250-320	320-400	
Motor power		5.5	11	11	15	18.5	22	30	37	

Overview Of The Structure And Performance Of The PBH Section Rolling Machine

Overview Of The Structure

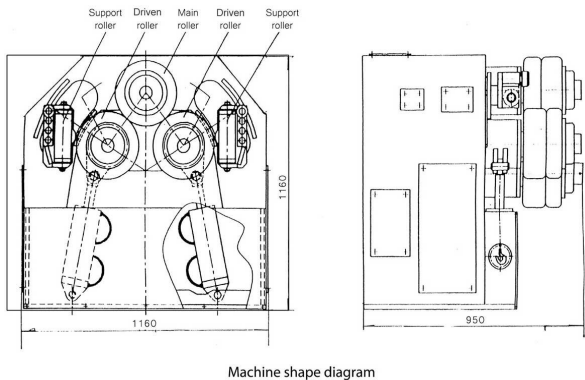


Figure 1

The PBH Section Bending Machine is a double-pinch [3-roll bending machine](#). In the shape of the machine (see Figure 1), the body is welded with a steel plate.

Important notes: All the PBH section bending machines we produce can be installed both in horizontal and vertical positions.

Rotation Transmission Mechanism Of PBH Section Bending Machine

The main roller performs a rotary motion by the power transmitted by the hydraulic motor, the gear, and the sprocket. The two side rollers can move in an arc around the central shaft. The power transmitted by the hydraulic motor and the gears is rotated simultaneously with the main shaft. The support rollers are mounted on both sides of the side rollers so that the support rollers can do arc motion with the side rollers. Lifting movements can be made through the respective lifting cylinders. Transmission diagram (see Figure 2).

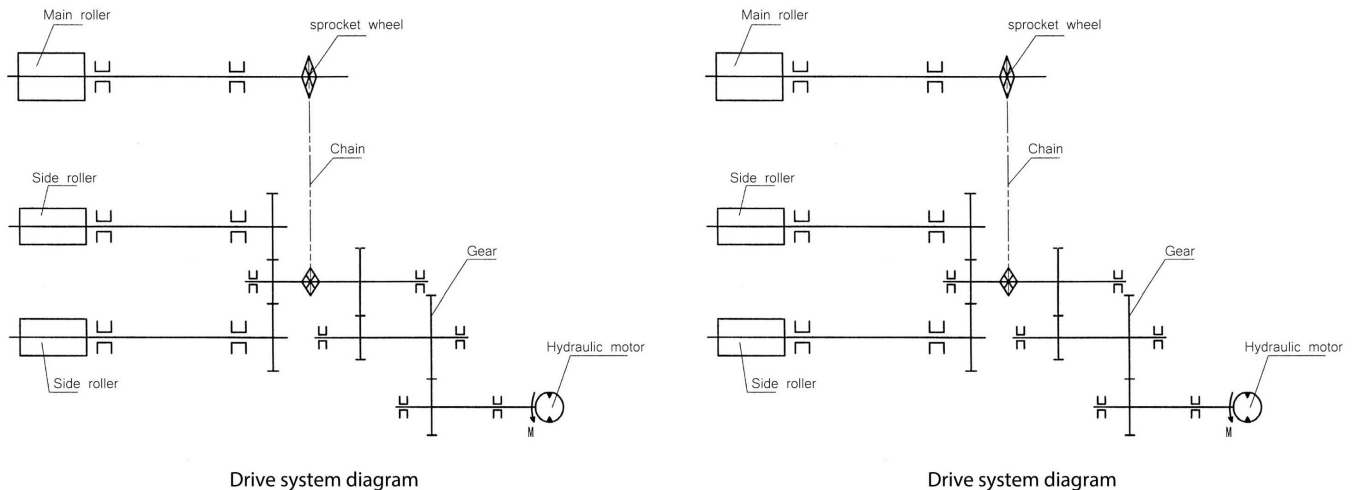


Figure 2 Transmission diagram

Performance Of PBH Series Angle Rolls



Working video of 3D guide roll of PBH [angle iron roller](#)

The three rollers of the section [bending machine](#) are all driving rollers. The end of the profile can be pre-bent during angle rolling, and the distortion of the profile during angle rolling can be corrected by adjusting the guide roll. All of the above movements are achieved by button operations on the electrical control cabinet.

Note: During the angle rolling process, the rotary motion of the three rollers and the lifting movement of the side rollers cannot be performed

at the same time to avoid malfunction. After the three rollers are installed, the side rollers can be lifted and moved. After the mold of three rollers is installed, the side rollers can be raised and lowered.

Pre-Bending And Bending Of The Machine

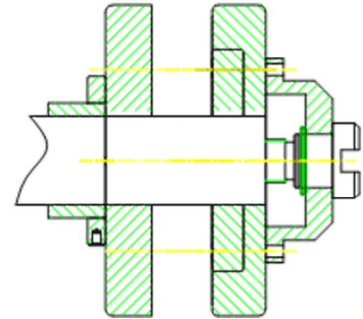
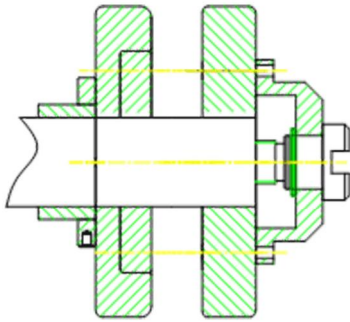
Operations can be divided into symmetrical bending and asymmetric bending (Figure 2):



Figure 3: Symmetric bending (L) and Asymmetric bending (R)

Universal Rolls





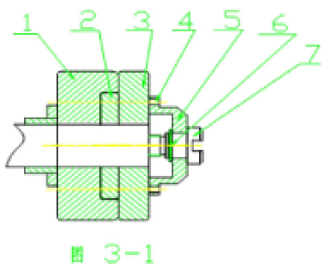
Universal Mold Combination of PBH Angle Rolls

Figure 4: Universal Mold Combination of PBH section bending machines

PBH profile bending machine's universal rolls are designed to bend the most common commercial profiles (like flat bars, square bars, H&I beams, channels, tees, angle irons, etc..) but for some profiles (tubes and profiles with particular geometry) special rolls are required.

Notes: Should put forward the required bending profile specifications and varieties when ordering, in order to prepare special rolls.

The Composition Of The Universal Roll



1. small standard roll
2. drive roll
3. large standard roll
4. bolt for the drive roller
5. chuck

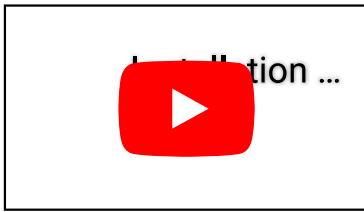
Figure 3-1

6. clamping ring

7. screw

INSTALLATION OF MOLD





Bending Process And Universal Mold

Section Bending Method

There are three types of section bending methods, as shown in the figure.

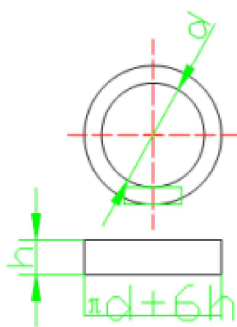


Figure 3-5 Section bending methods one

Method One

Figure 3-5 is suitable for heavy workpieces, cutting the remaining straight edges after bending into a circle or when the section bending to a certain arc.

Method Two

Figure 3-6 is suitable for medium and small profiles, or single-piece angle rolling. The angle must be cut before section bending, end bending adopts asymmetric bending.

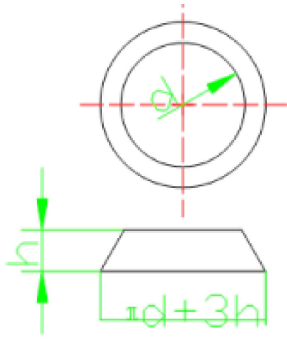


Figure 3-6 Section bending methods two

Method Three

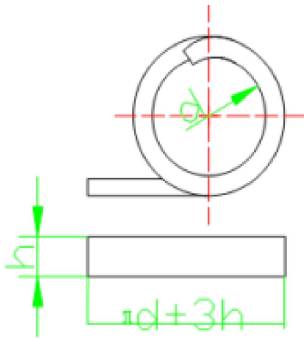
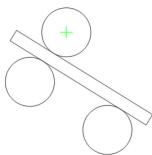


Figure 3-7 Section bending methods three

Figure 3-5 is suitable for heavy workpieces, cutting the remaining straight edges after bending into a circle or when the section bending to a certain arc.

Pre-Bending

Step One



Step one

The right roller is in the lower limit position, and the left roller moves to the contact workpiece, and clamps the workpiece with the main roller.

Step Two



The right roller slowly rises and begins to roll, pre-bending between the main roller and the left roller.

Step Two

Step Three



The left roller is down, while the right roller is up, send the material to the left side, and three rollers began to roll, pre-bend between the main roll and the right roller.

Step Four



Section pre-bending and section bending end.

FLAT BAR OR SQUARE BAR

SECTION BENDING METHOD OF STEEL BAR

Flat steel and square steel are symmetrical profiles, which are easy to roll, and the pre-bending adopts asymmetric bending. A certain degree of distortion is unavoidable, if one or fewer times roll, the distortion can be reduced. If the workpiece is rolled in multiple passes, it is necessary to increase the gap of the molds.

When section bending, please follow the basic parameters. [Click here.](#)

The friction clutch should be adjusted to a loose state.

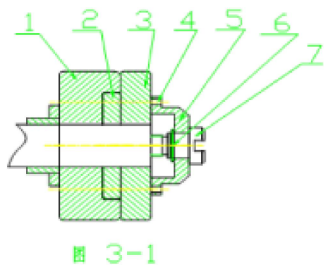


Figure 3-1

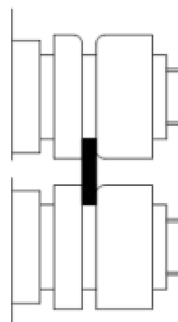


Figure 3-8

FIGURE 3-8
MOLD
COMBINATION

Use the form of Figure 3-1. It is suitable for profiles with large section roll and high

height. When section bending, the roll retains at least a 0.5mm gap.

FIGURE 3-9 MOLD COMBINATION

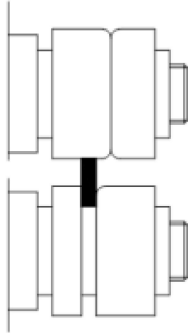


Figure 3-9

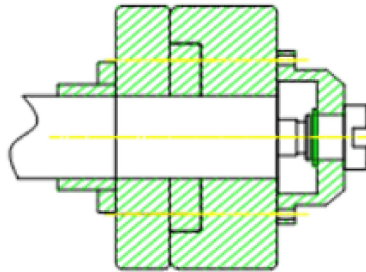


Figure 3-2

The upper roller is in the form of Figure 3-2 or Figure 3-3, and the two lower rollers are in the form of Figure 3-1. It is suitable for the angle rolling of profiles with large section modulus and small

height, small square steel also adopts this combination for bending.

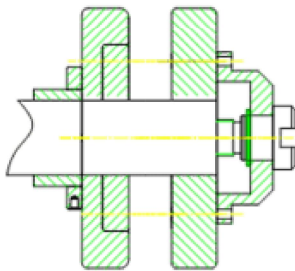


Figure 3-3

Warning

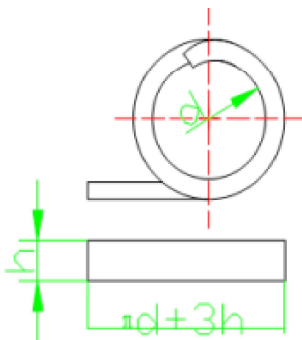


Figure 3-7 third spiral rolling method

As shown in FIG. 3-8 and 3-9, the third spiral rolling method (Figure 3-7) is not allowed.

What is the third spiral rolling method for bending steel bars?

FIGURE 3-10 MOLD COMBINATION

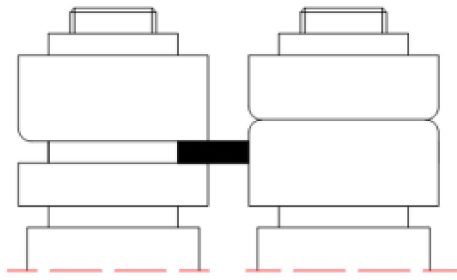


Figure 3-10

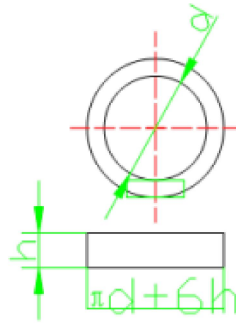
first section rolling method

Figure 3-10 is suitable for small profile mold combinations. Rolling is performed as shown in the first or second method as shown.

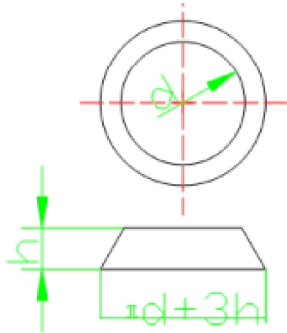
second section rolling method

Figure 3-11 Mold Combination

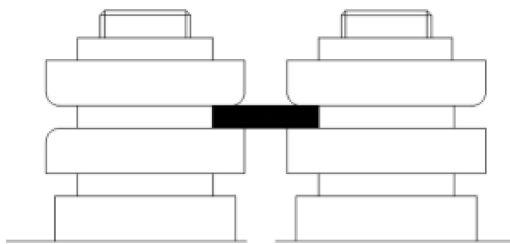


Figure 3-11

Figure 3-11 is suitable for a combination of the roll with a large section. As shown in the figure, three rolling methods can be adopted, especially the third method.

Figure 3-12 & 3-13 Mold Combination

Figure 3-12 applies to the combination of profile molds with small section height.

As shown in the figure, and the rest are the same as shown in figure 3-11.

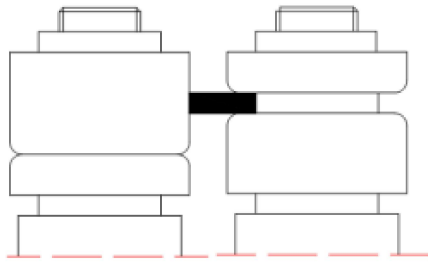


Figure 3-12

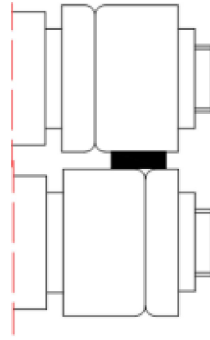
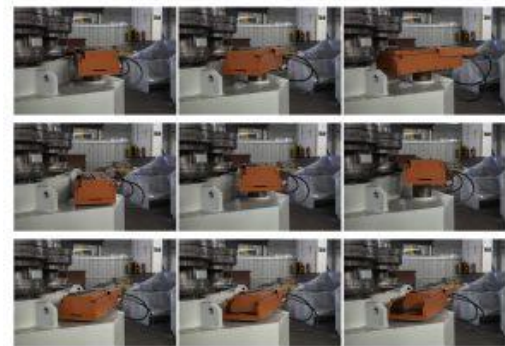


Figure 3-13

How To Section Rolling Of Steel Bar



3D guide rolls

The flat bending of the steel bar and the

bending of the square steel bar can choose any combination of angle roll.

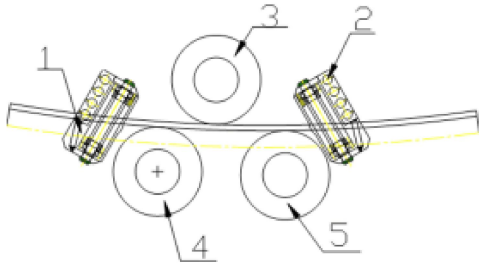
The steel bar's section rolling process uses an asymmetrical bending, put the 3D guide rolls are raised slowly in the roll bending process, otherwise the material would be distorted.

Before the roll bending process, must be adjust the guide roller to the same distance, and the steel bar has the correct angle relative to the roller axis, which is suitable for bending small workpieces with small bending stress, which will cause slippage during the bending process. Mainly due to the low friction during feeding, increasing the roller clamping force can eliminate slippage.

The steel bar can be bent into a circular workpiece with a diameter slightly larger than the die diameter, and the friction clutch should be adjusted tighter.

Bending Angle Iron Method Of Angle Iron Roller

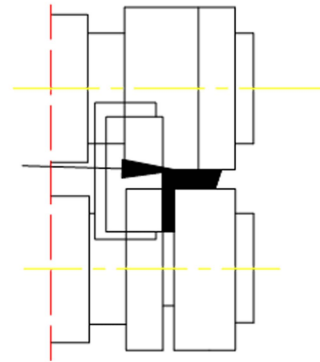
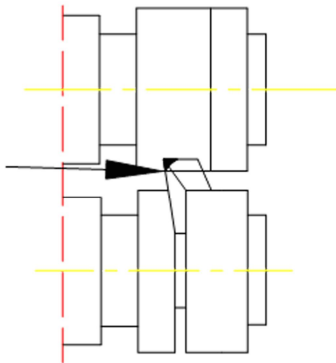
Bending Angle Iron – Leg Out

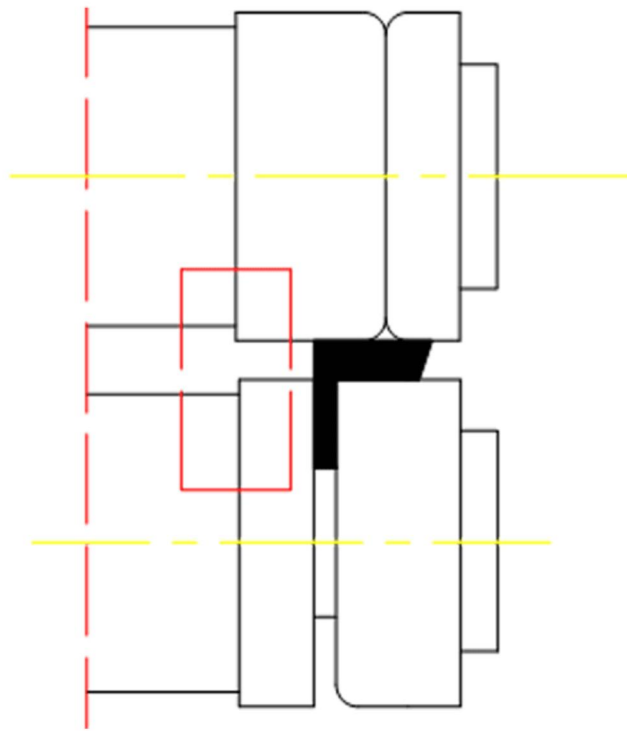


1. 3D guide roller
2. Small guide roller
3. Main roller
4. Left roller
5. Right roller

bending angle iron (leg-out) method of [angle roller](#)

BENDING ANGLE IRON OUT ROLLING (LEG-OUT) METHOD





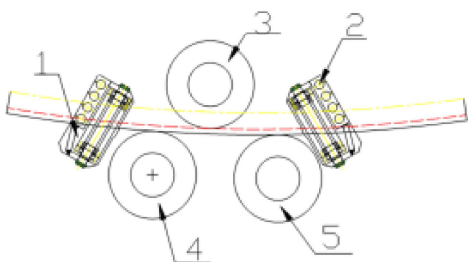
Bending angle iron out rolling (leg-out) method of angle rolls

Bending angle iron outer rolling process for section rolling machine

The angle iron is an asymmetric profile, and it is often twisted during rolling, so the guide roller needs to give the angle steel an external force against deformation during rolling, so that it can be corrected and reduce deformation.

The 3D guide rollers must be adjusted slowly to prevent the angle from twisting outwards. The mold combination is shown in the picture above. The pre-bending is asymmetrical, the rolling is symmetrical, and the friction clutch should be loosened.

Bending Angle Iron Inner Rolling(Leg-In)



1. 3D guide roller
2. Small guide roller
3. Main roller
4. Left roller

bending angle iron (leg-in) method of angle 5. Right roller

iron roller

Bending Angle Iron Inner Rolling (Leg-In) Method Of Angle Rolls

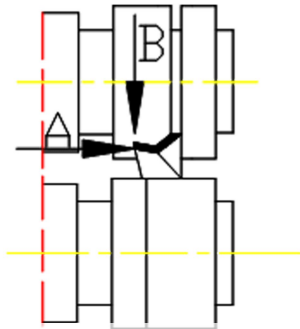


Figure 3-19

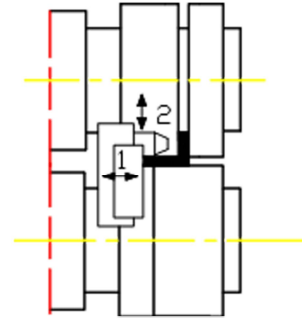


Figure 3-20

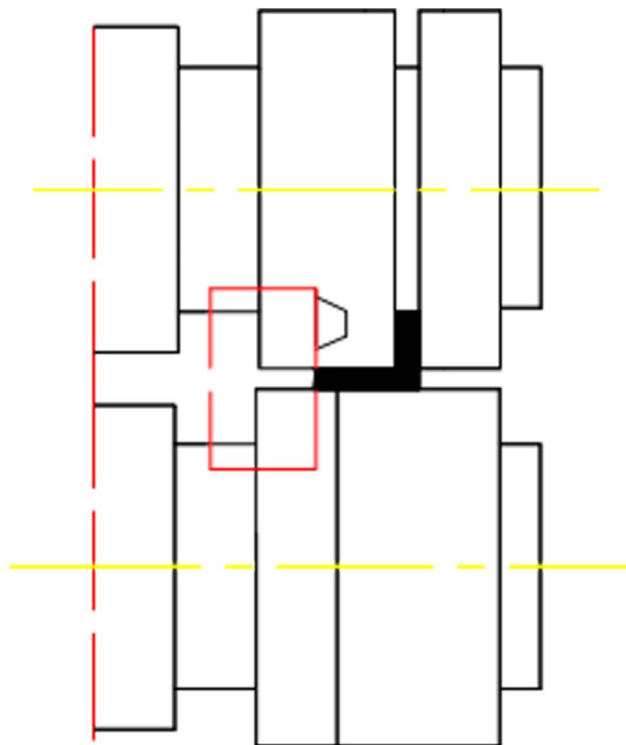


Figure 3-21

The inward bending process of the angle iron is similar to the outward bending of the angle steel flange workpiece. As shown in Figure 3-19, there will be two directions of distortion during the bending process.

Therefore, 3D guide rollers (1) (Figure 3-18) and small guide rollers (2) are used. To provide the force, the small guide roller (2) is adjusted by twisting the idler.

Since the angle steel is easily deformed when it is bent inward, the diameter of the bent workpiece is larger than that of other profiles when the angle steel is bent inward.

Bending Angle Iron Method

1. Symmetrical adjustment
2. Start bending the workpiece with one end of the 3D guide roller, adjust the side roller and feed the workpiece to the end of the small guide roller, adjust the guide roller so that the workpiece can be rolled back normally, the 3D guide roller will touch the flange end of the workpiece, which guides the workpiece to be rolled out from the machine.
3. If the adjustment of the small guide roller is too large, the workpiece will be twisted inward.
4. When rolling the workpiece, stop immediately when the other end reaches the middle of the 3D guide roller, and repeat the rolling of the other side in the opposite direction. Be sure to adjust the guide to the correct position, then bend as above until it forms a circle of the desired diameter.

T Sections Bending Process Of Angle Rolls

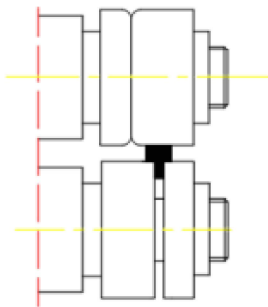


Figure 3-22

Outer Roll Bending Of T-Section Steel

The mold combination is shown in Figure (3-22), adopts asymmetric bending, the side roller close to the main roller should not be too stressed, as this may cause twisting of the inner side during the bending and the friction clutch is tightly adjusted.

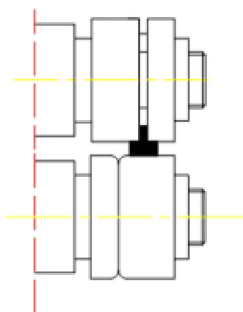


Figure 3-23

Inner Roll Bending Of T-Section Steel

The mold combination is shown in Figure (3-23). The bending method is the same as above, and the friction clutch device is tightened, which is especially important for bending small diameter workpieces.. The friction clutch is tightened as above, which is especially important for bending small diameter workpieces.

H-Beam Roll Bending Process And U-Channel Roll Bending Process

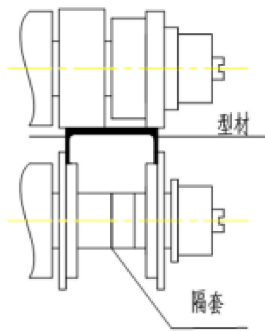


Figure 3-25

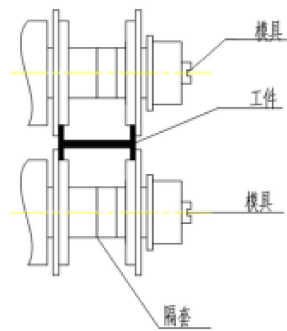


Figure 3-24

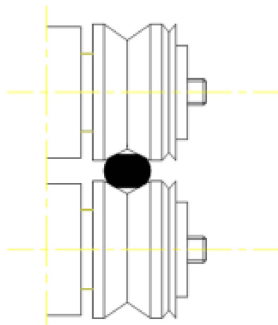


Figure 3-26

Round Bar Roll Bending Process

- Special molds adopts one or more v-shaped grooves.
- Adopts symmetrical bending.
- Adjust the friction clutch slightly.

TUBE ROLL BENDING PROCESS

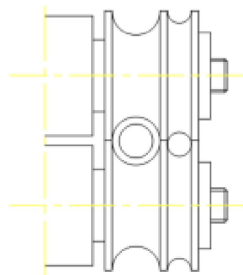
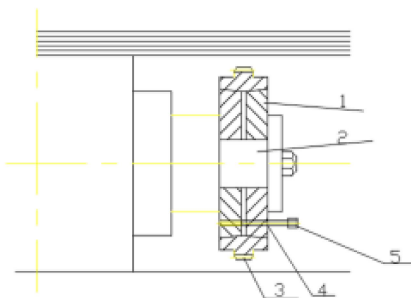


Figure 3-27

Adjustment Of Friction Clutch Of Section Bending Machine



- Adjustment of friction clutch
- After opening the cover, adjust the friction clutch.
- The power transmission is adjusted by tightening and loosening the adjustment screw.

Figure 3-28 No.: 1, Upper roller shaft 2, Friction block 3, Sprocket 4. Adjustment screw 5, Butterfly spring

- The friction clutch is set to a low power transmission state at the factory.
- Note: The friction clutch cannot be tightened too tightly.

Lubrication Of PBH Section Bending Machine

Reasonable lubrication of the section bending machine is an effective measure to reduce power consumption and improve the life of the machine. Therefore, it is necessary to select a reasonable lubricating material and establish the necessary lubrication system.

Lubrication method The lubrication of this section bending machine is relatively simple, using oil cup lubrication and manual oiling. Lubrication of the oil cup and the surface of the transmission gear are required to be lubricated once a week. The remaining sliding surfaces and pin shafts of each other are manually filled with lubricating oil.

Other mutually moving sliding surface and pin shaft, each shift to manually add lubricating oil.

Selection Of Lubricating Oil

- For manual lubrication, use 40# mechanical oil. Oil cup lubrication point and gear surface, No. 2 calcium-based grease is used in summer, and No. 1 calcium-based grease is used in winter.
- **Lubrication system and precautions** The user should establish a specific lubrication system according to the specific system, load and operation of the profile bending machine.
- The lubrication points must be well lubricated before starting the machine.
- When the section bending machine is in continuous operation, the interval between lubrications should be shortened.
- The entire lubrication system of the section bending machine is cleaned once a year.

Hydraulic System

W24S series Section bending machine is fully hydraulically driven. The motor of the hydraulic system is Y132M-4 with a power of 11KW. The motor drives a double gear pump with a displacement of 25ml/rev and 10ml/rev. The hydraulic system has a maximum working pressure of 20 MPa and a rated working pressure of 16MPa. The oil pump with a displacement of 25ml/rev provides power to the main drive system (rotation of the work rolls in the

forward and reverse directions), the oil pump with a displacement of 25ml/rev auxiliary drive system (each oil cylinder) provides power.

The hydraulic system is in the form of switch control. The electromagnet's electric power makes the electromagnetic reversing valve work to perform the corresponding action. For the working condition, refer to the hydraulic system diagram (Fig. 6) and the solenoid valve action sequence table.

Hydraulic Oil

The working medium of this system is No. 46 anti-wear hydraulic oil. After being filtered by the fine oil-filtered vehicle, it is injected into the fuel tank, the tank level should reach the upper limit of the oil level gauge. After starting the motor and checking its rotation direction, starting up and turn on the action of each actuator several times, if leakage, shock, vibration, etc. occur, stop in time and check. After the oil has fully entered the pipeline and the oil cylinder, the oil should be replenished to the fuel tank again so that the oil level of the tank always reaches the upper limit of the oil mark.

When the oil pump starts or stops, the system should be in the unloading state. Once the set pressure value of the overflow valve is adjusted and determined, the lock nut of the overflow valve should be tightened, beware of accidents caused by section bending machine vibration or artificial random operation.. After a period of no-load test, the gas in the pipeline can be fully drained and the oil is fully filtered. After the movement of each actuator is stable and reliable, it can start load commissioning.

The oil temperature of the system should be appropriate, and the oil temperature of the fuel tank should not exceed 60 °C. Considering the specific environmental conditions, if the section bending machine is working in a hot environment, the user may choose a hydraulic oil with a higher viscosity; in order to ensure a better working condition and a longer service life, the oil contamination should be minimized. Clean or replace the filter cartridge regularly. Check the degree of deterioration of the oil every six months. If it exceeds the limit of use, replace it in time.

ANALYSIS AND ELIMINATION OF COMMON FAULTS IN HYDRAULIC SYSTEMS

Fault phenomenon	Cause	Method of exclusion
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		Replace or clean the oil filter;
		Increase the suction pipe diameter;
	A、 The oil suction filter is blocked; the inner diameter of the suction pipe is too small; the oil temperature is too low; the oil viscosity is too high, etc.	Warming the oil;
		Use a hydraulic oil of appropriate viscosity.
		Fuel the oil tank;
1、 Noise	B、 The oil level is too low; the oil suction pipe leaks and the air enters the system by other means to cause the oil foam.	Replace fittings, tubing or seals; Venting the system;
		Exhaust.
	C、 The transmission center line is not correct; the coupling is loose; the vibration of the pipeline causes mechanical vibration	Align the center; tighten the screws; add pipe clamps to reinforce the pipe.
	D、 Pump or motor damage	Replace the oil pump or motor
	E、 Overflow valve instability	Change the valve

2、Insufficient or no pressure	A、Wrong rotation of oil pump, inhaling air	Correct the turn direction
	B、Oil pump damage	Replace the oil pump
	C、The pressure adjustment method is not appropriate;	Correctly adjust the pressure;
	There are dirty things in the overflow valve;	Cleaning the relief valve;
3、Pressure disorder, flow or pressure fluctuations	Poor sealing inside the cylinder causes leakage from the high pressure side to the low pressure side.	Check and replace damaged parts or seals.
	D、Coupling or motor is faulty	Check and replace
	A、Oil pump suction empty	
	B、Oil bubbles	See fault1
	C、Mechanical vibration	
	D、Uneven oil transfer from oil pump	Repair or replace the oil pump
	E、The system is mixed with air	Exhaust

	A、 Empty oil pump	See fault 2
	B、 Oil bubbles	
	C、 Oil pump wear	
4、 Flow is too small or noflow	D、 Leakage of the high pressure side to the low pressure side of the cylinder	Repair or replacement, see fault 2
	E、 Wrong rotation of oil pump	Correct motor wiring
	A、 System pressure is too high	Correctly adjust the pressure
5、 The oil temperature is too high	B、 Too little oil	Add oil
	C、 The oil pump is damaged	Replace the oil pump

Machine Installation And Commissioning

Machine Installation

The installation of profile bending machine requires that the floor of the workshop be leveled, and the installation should be leveled with a diagonal iron. The horizontal deviation should not exceed 0.5 mm per meter.

The installation of the machine requires the floor of the workshop to be flat, and the horizontal deviation shall not be greater than 0.5 mm per meter.

Test Run

- Preparation before test run
- Check that all fastening joints are reliable;
- Check that each oil cup lubrication point and manual refueling point are adequately supplied with oil.
- Check if the circuit of the electronic control system is good and the grounding is proper.

No-Load Test

- After checking and confirming the normal condition, the operator can be tested by the operator who is familiar with the performance of the machine. The test procedure is as follows: The air running test of the main drive and the lift drive alternates in a discontinuous manner, one cycle every 15 minutes, in each cycle The single-stroke running time ratio of the main drive and the lifting movement is 2:1..
- When making a single main drive operation, it is advisable to make the main roll mold contact the side roll mold to make it rotate, and the positive and negative times take half of the time.
- During the single auxiliary transmission time, the lifting is repeated..

Test Requirements

1. The maximum temperature of rolling bearings shall not exceed 80°C
2. The working mechanism and operating mechanism of the machine should coordinate with each other and operate flexibly without abnormal noise or jammed shut.

Load Test

The load test can only be carried out after the no-load test is normal. The general procedure is as follows:

- According to the relevant profile parameters specified in the basic parameter table, after processing, press and press, pre-bend sheet ends at specified diameters.
- Roll into a circular workpiece of the specified diameter according to the proficiency of the operation.

Load Test Requirements

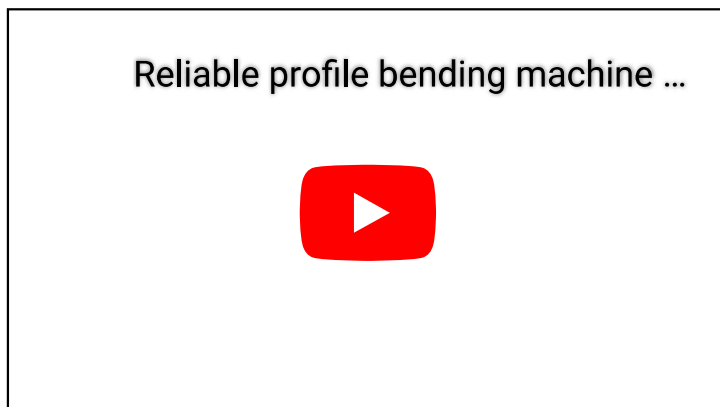
- The load test should meet the relevant performance requirements in the basic parameters.
- During the loading and loading operation, the transmission system should be stable, no impact, no abnormal noise, the working system and operating system should be flexible, accurate and reliable, the rollers should not swing, and the temperature of each shaft must not exceed the above regulations.
- There must be no slippage between the mold and the profile during the rolling process.

Safe Operation And Maintenance

Safety Operations

- The operator should understand the structure and performance of the machine, be familiar with the operation method of the control system and the bending process of the workpiece, and strictly observe the safety operation.
- All buttons of the electronic control system must be placed in the original position before driving and parking.
- During the use, the oil supply of each lubrication point should be checked frequently.
- In the course of operation, if irregular noise, impact, and swing are found, stop and repair immediately.
- During the use process, the transmission mechanism and the link parts should be checked frequently to maintain no looseness or damage.
- During the bending process, the profile must move with the roller. Slippage is not allowed.
- During the rolling process, the side rollers must be lifted and lowered before the main drive is stopped.
- Unloading work is to remove the workpiece after the machine has stopped and lower the side roller.

Machine Maintenance



A small metal bending company procures 3 section bending machines from BIT

Proper use and reasonable maintenance can extend the life of the machine and reduce repair costs. The maintenance work of this machine mainly has the following points:

- The machine must be operated under normal operation and good lubrication, and the lubrication system must be strictly implemented.
- Develop a regular inspection and repair system.
- All vulnerable parts should be replaced in time if there is excessive wear or loss of original performance requirements. If the parts are damaged, they should be replaced in time.
- During the use, attention should be paid to the temperature of each part. The temperature of the rolling bearing must not exceed 80 °C.
- The electrical system should be regularly repaired and dedusted, and the damaged components should be replaced in time. The machine tool should be properly grounded.
- The work site is not allowed to stack the materials casually, and the oxidation should be cleaned up in time.

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CONTACT US

Tel:+86-513-888-121-17

Mob/WhatsApp: +86-177-5130-0713

E-mail:borisbang@163.com

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