

HW-FM series foam cutting machine

Instruction manual

(MACHINERY SECTION)

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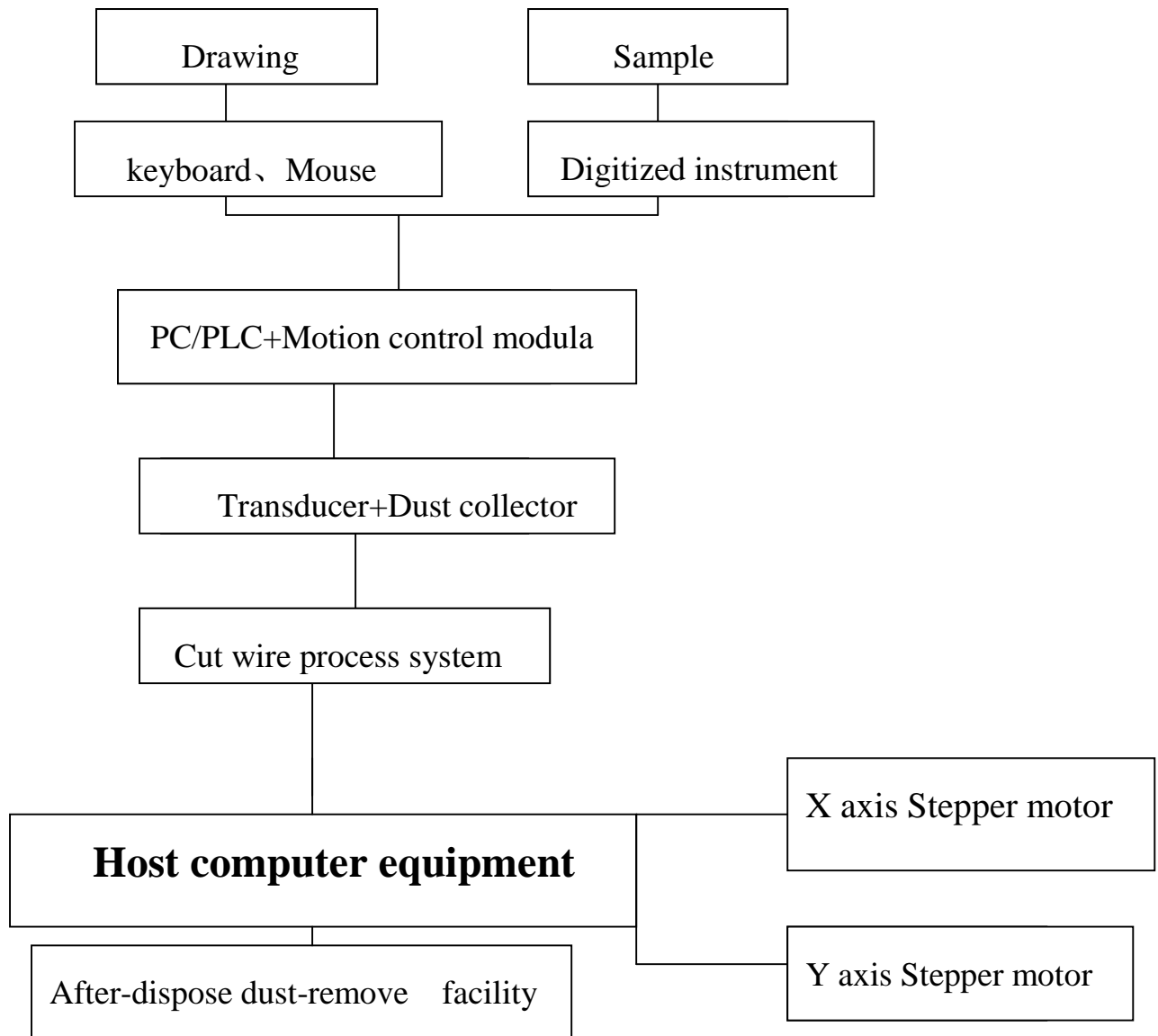
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Brief Introduction

Our Company's first patented products -----HW-FM series for the integration of foam wire cut machine tool, The Fast Wire Contour Cutter is abrasive copper wire with a high speed. Under the high-speed the material will be grinded to powder and absorb by dust collector. The computer controls the Conveyer Belt and Cutting Roller to run as what you draw on the AutoCAD. The cutting process is according to the reservation that the computer draw path. The detailed workflow is as follows:



Compared with Manual profiling cutter, there are lots of advantages of HW-FM series foam fast wire cutting machine making by our company:

1. Accurate intensity and repeatedly production needn't depend operator's technology.
2. The losses arising from operator's tiredness and his fault are totally eliminated.
3. efficient production
4. The expenses are greatly reduced because no need for making, repairing or storing models.
5. The computer's automatically arrangement for utilizing the material, reduces the waste.
6. Design, revision and model can be finished immediately.

Efficient, economic, and practical CNC cutter machine has already extensively applied to the foam products processing industry.

II Main technical parameter of cutter

Fast Wire Contour Cutter	
Cutter model:	HW-FM12AH
longitudinal travel (mm) X axis	2500
Cross Travel (mm)Y	1000
Works Table (mm)	5200*1350
Max. workpiece length(mm)	2500
Max. workpiece width (mm)	1200
Max. workpiece height(mm)	1000
Working voltage of controller	5V , 24V
Stepper motor drive voltage	110V
Controll precision(mm)	0.01
General Power	9KW
V/HZ	380V ,50HZ
Wire Size(mm)	φ1.0~ φ1.8*8030
Cutting wheel(mm)	φ300
Max. working speed (m/min)	6
Producing precision (mm)	0.5
Min. Arc Size of work piece(mm)	R2
G.W.	1850kg
Size (m)	5.2*2.5*2.5

Console	
CNC Type	PC/ industrial computer
Monitor	19" LCD
Control modula	Multi-axis motion control card
Operating System	Windows 7/EN or above
Programmable axis	X、 Y
Size units	inches and centimetres
Input	USB disk、 own programe、 Internet、 Digital instrument
Control mode	Programming control integration
Console Figure Dimesion (mm)	600*680*1600
Console Weight	80Kg
Control voltage	~220V

III. Main Structure of the Cutter and Transmission

HW-FM series of cutting machinery is mainly consisted of machinery, electricity and software control system. The dust-removing system and revolving table are the fittings available to select. (Electric and software control system parts are in other explanation).

Machinery part is consisted of as follow: gantry 1(Y axis stander), belt stander platform 3(X axle working table), safe gate 2 and dust blower 4. Chart as follows 3-1:

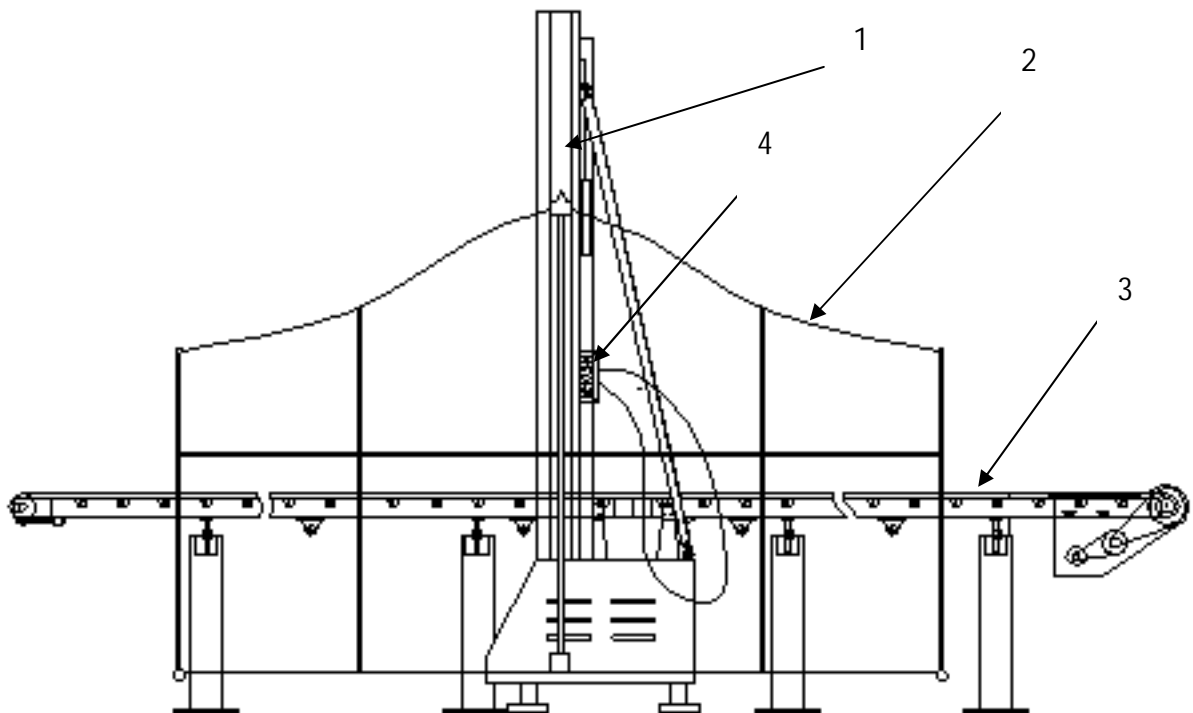


Figure 3-1

3.1 Gantry (Fig.3-1-1) is the main body of the Fast Wire Contour Cutter, under its left is motor using driving cut wheel, thread system of transport formed by linear

guide rail, slipper block, chain, steel wire and cutting wheel is in the middle, gear box of Y axle stepper motor is on the pedestal, the stepper motor drives the chain and steel wire through synchronous belt and synchronous wheel, which makes the two cutting wheel in the middle move on the linear guide. Two poles that are regulated by screw, guarantee the whole framework vertical and level support the back of. In order to regulate the equilibrium moving of wheels, there is counter weight iron at the left side of its back for upper and lower. A dustproof hair pair is installed in the inboard frame of the cutting shelf, Material dust are driven to the draught by cutting line and collected in the dust bag

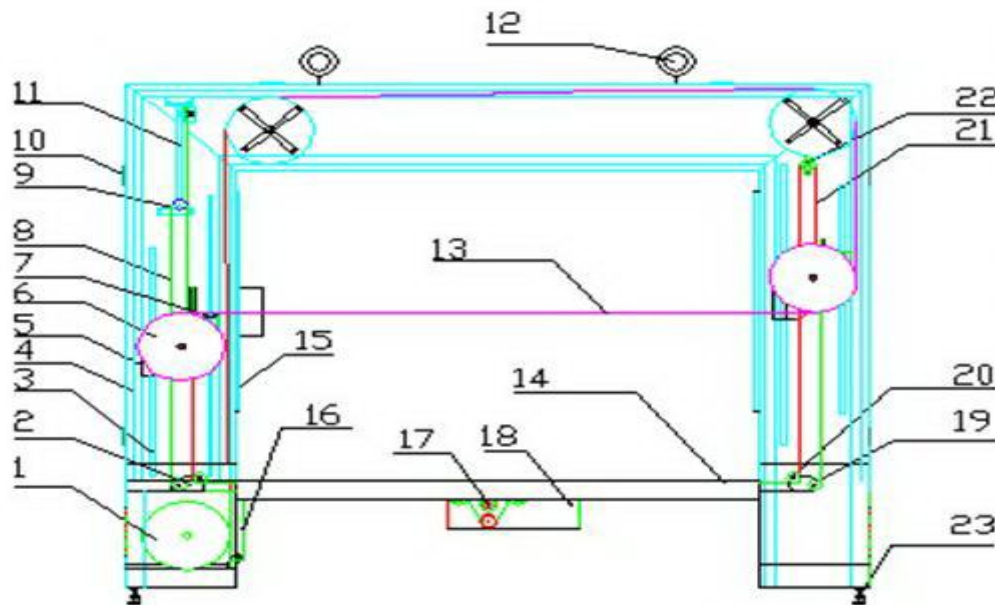
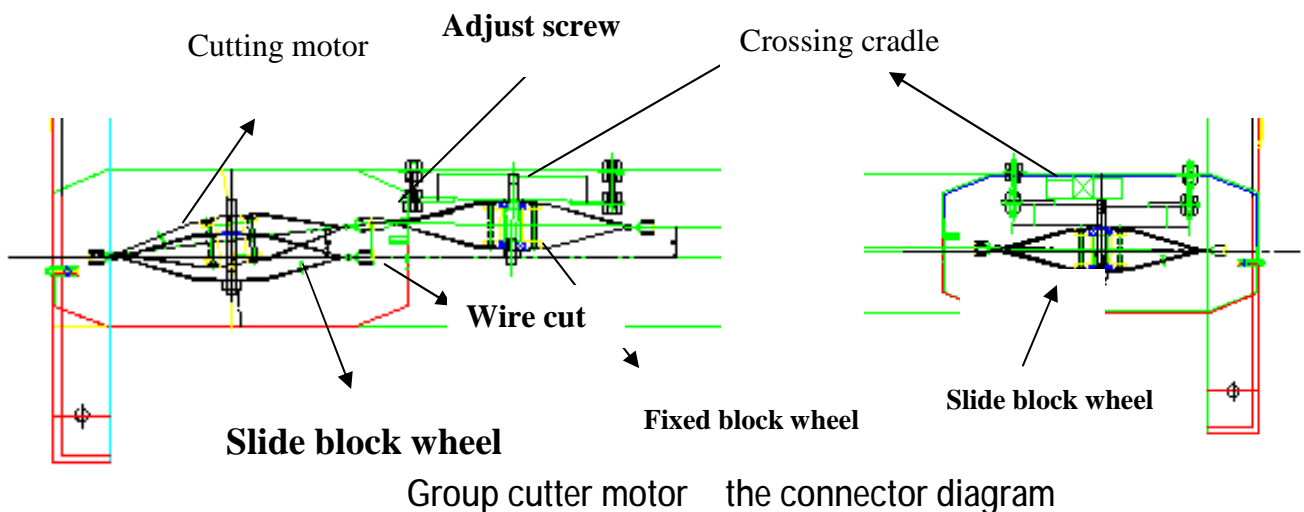


Fig 3-1-1

1. Cutting Motor 2. Fixed Board for Pulley 3. linear rail 4. Cutting Shelf 5. Slip Board 6. Guiding Wheel 7. Slip Lump 8. Steel Wire 9. Steel Pulley 10. Hinge 11. Bracket of Steel Pulley 12. Flying Rings 13. Cutting Wire 14. Shelf 15. Cleaner 16. Tighter 17. Chain Wheel 18. Y-axis Gear Box 19. Steel Pulley 20. Chain Pulley 21. Chain 22. Bracket of Chain Pulley 23. Adjustable Foot

The cutting line circles closely on a pulley block consisted of five cutting wheels when it works. Among them two cutting wheels slope into an angle and are fixed on Cutting shelf, and they are fixed by cross support fixes separately and by 4 Screws, and there are two cutting wheels in the middle are fixed on pulley-board. Liner guide, roller chain and steel wire are linked and adjusted by a regulation device set above them to adjust upper and lower height, which makes the cutting line circling on the cutting wheel moves up and down in the vertical direction. At the left under part of the cutting shelf, there is a initiative cutting wheel run by motor, one end of the motor is linked with the left of the cutting shelf, and another end is linked with the motor shelf which can adjust the tight intensity of the cutting line. In the middle, there is a lead line through both active cutting wheels, so that the cutting line can work with a high-speed circulation of five cutting wheels. At the same time, orbit that system establish parallel to move up and down on the liner guide according to the control order, the orbit established according to the computer-control system moves up and down on a liner guide



3.1.1 The drive of slide of the cutting wheel in the vertical direction include: a Step motor, an initiative sprocket which passes the wheel box. There is a roller chain on the initiative sprocket. One end of whose is fixed on the adjustable screw, the other fixed on the right cutting wheel track-tensioning device of the slide arm, the middle from the pulley-oriented; There is also a skateboarding tensioning device, the device includes a tension wire rope, fixed on the right side of their take-up skateboards The adjustment screw on the device, with the other side of the left skateboards tensioning device connected to the slide arm, from among several groups of the pulley-oriented.

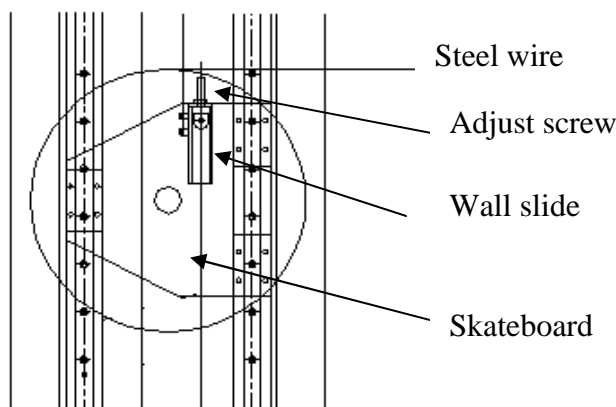


Fig. 3-1-1-1 Tension setup skateboard

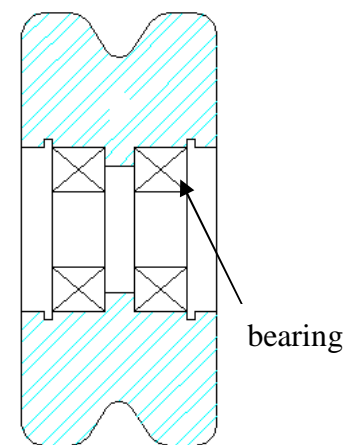


Fig. 3-1-1-2 Structure of steel pulley

The steel wire pulley and the chain block built-in Double bearing after the heat treatment, the precision work,

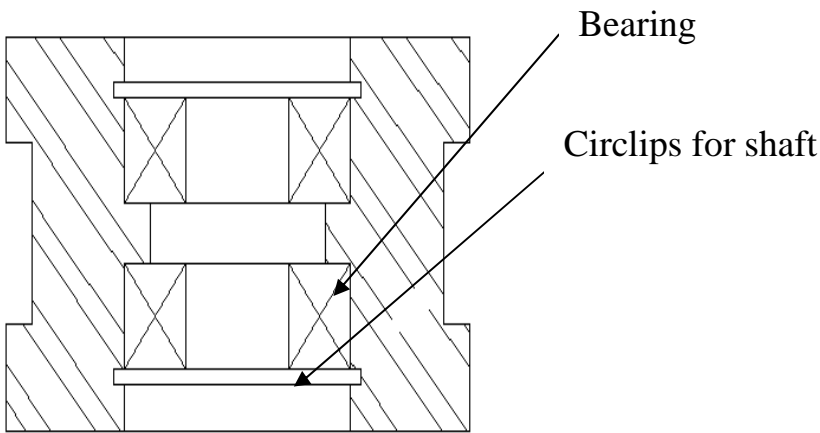


Fig. 3-1-1-3 Structure of the chain pulley

3.1.2 Y axle transmission case is an two-guides moderated device: the first moderate device includes the small synchronous wheel 2 on the main axle of motor 1, synchronism belt 3, and the big synchronous wheel 4 mounted on the second axle. The second moderate device includes the small synchronous wheel 5 mounted on the second axle, the synchronism belt 6 and the big synchronous wheel mounted on the third axle and sprocket 8 is mounted on the third axle.

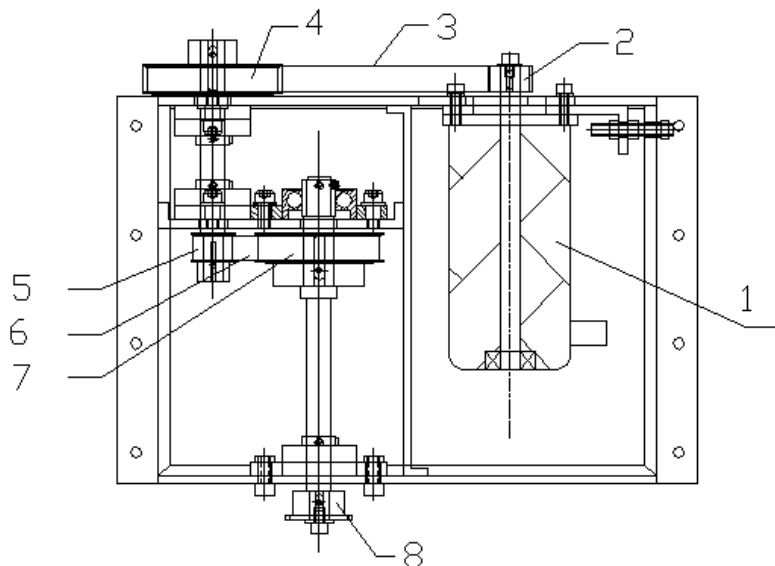
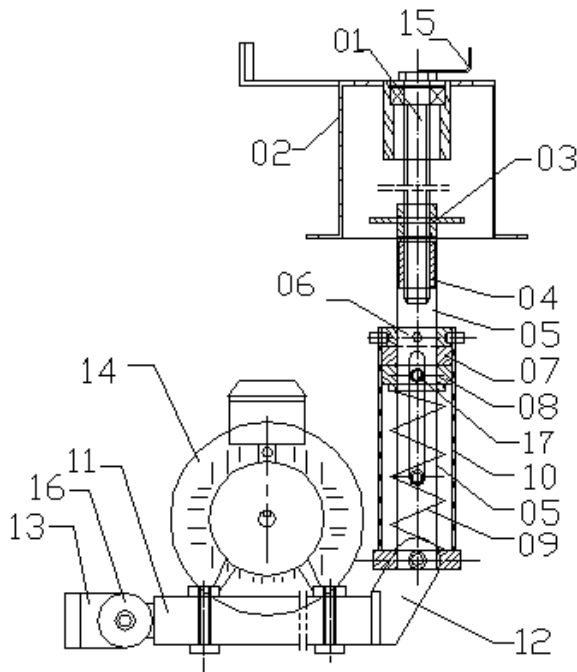


Fig. 3-1-2 Structure of Y axle transmission case

3.1.3 The driven motor of main cutting wheel is linked with tight shelf of motor. The tight shelf of motor includes: regulation spiral shell rope 01, nut 03/04, spring 09, waving arms 16 processing fittings. The front of the regulation spiral shell rope 01 is fixed on the containing positioning base 02 of the bearing, the containing positioning base 02 is linked with longmen shelf through fastener hookup, at the top of the regulation spiral shell rope 01, there is a shake 15, regulation spiral shell rope 01 is linked with activity nut 03 and round centre nut 04, the round centre nut 04 is linked with the tip of the round pipe 05. the round pipe 05 penetrates the two positioning plate 06, 08 of the cubic pipe, the rubber pad 07 and the pressing spring plate 14. the spring 09 is put in the cubic pipe 10, there are slippery troughs at both sides of the tip, the spring 09 is put in the cubic pipe 10, there are slippery troughs at both sides of the tip, the pressing spring plate 14 is linked with round pipe 05 through closely nailing screw 17 and then slips up and down in the slippery; the positioning plate in the bottom of the cubic pipe 10 is linked with retainer plate 11 at the base of the electrical machinery and lifinglug 12 through fastener. There are two waving arms 16 at one end of the retainer plate 11 of the electrical machinery, and are connected with two positioning plate 13 at the both sides of the longmen base with a activity pin, there are rolling bearings in two waving arms. There is a protection swith installed for line broken at the base or the tight shelf of the electrical machinery. Once the cutting line is relaxed or broken, the cutter will stop when the swith is touched.



No.	Name of part
01	Adjust screw
02	Positioning base
03	Activity nut
04	Central nut
05	Round pipe
06	Positioning board
07	Rubber cushion
08	Positioning board
09	spring
10	Suare tube
11	Postioning board of motor base
12	liftinglug
13	Fixed board
14	Spring bearing plate
15	handle
16	Swimming arm
17	Fixed screw

Fig. 3-1-3 Tight shelf of Motor

3.2 The work frame platform of the conveyer belt (Fig.3-2-1) is the process platform for products and it is welded by cubic pipe 1, The drive device is made up of X axle transmission 2 and conveyer belt 3, the conveyer is supported by big and small rollers, in front is voluntarily roller 4, the back side is driven roller 5 and the assist roller 6 is in the middle, the driven roller is fixed by slippery roller 7, voluntarily roller is supported by fixed arm 08, the conveyer adopts a interface without sewn and is lead by a lead bar. The front rooler and the one behind must be tight after the conveyer belt is installed, and adjust the conveyer belt's position so that the two conveyer belts will move in a horizontal direction parallels, The X transmission system is also driven by stepper motor and hold the voluntarily roller through the synchronous belt and synchronous wheel, so that the movement in front

and back direction of the conveyor belt is finished. The conveyor belt work frame is a kind of removable device, with a joint iron plate locked in the middle. The work frame platform is supported by the base of welded cubic.

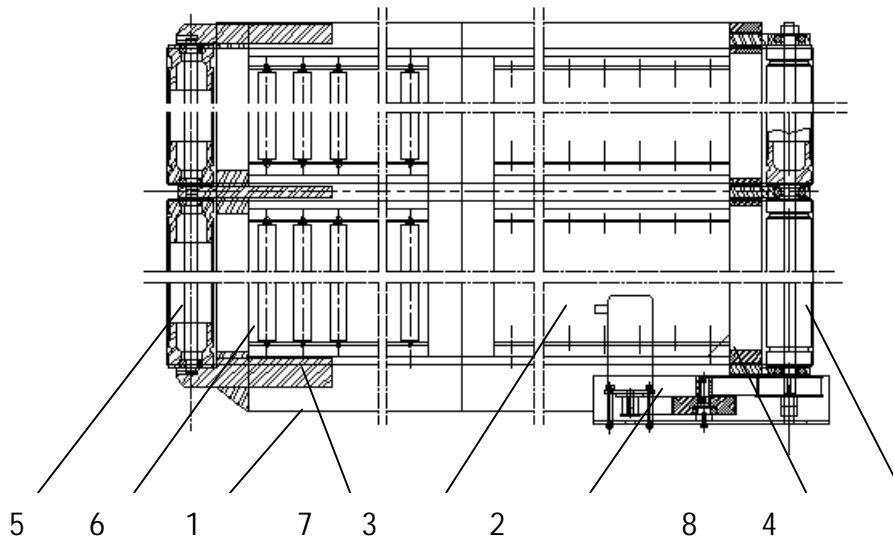


Fig 3.2.1 Structure Conveyor belt rack platform

3.2.1 X axle transmission case is also an two- grades moderated device, the first moderate device includes the small synchronous wheel 2 on the main axle of the electrical machinery 1, synchronism belt 3, and the big synchronous wheel 4 mounted on the second axle. The second moderate device includes the small synchronous wheel 5 mounted on the second axle, the synchronism belt 6 and the big synchronous wheel 7 mounted on the axle of the voluntary roller.

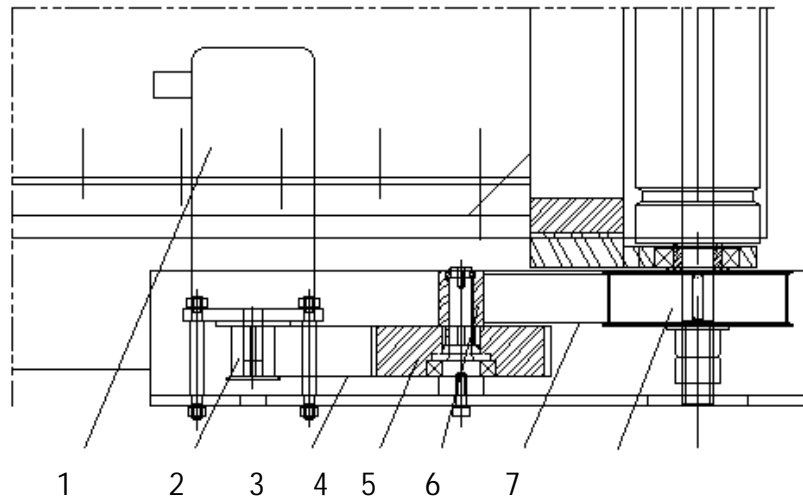


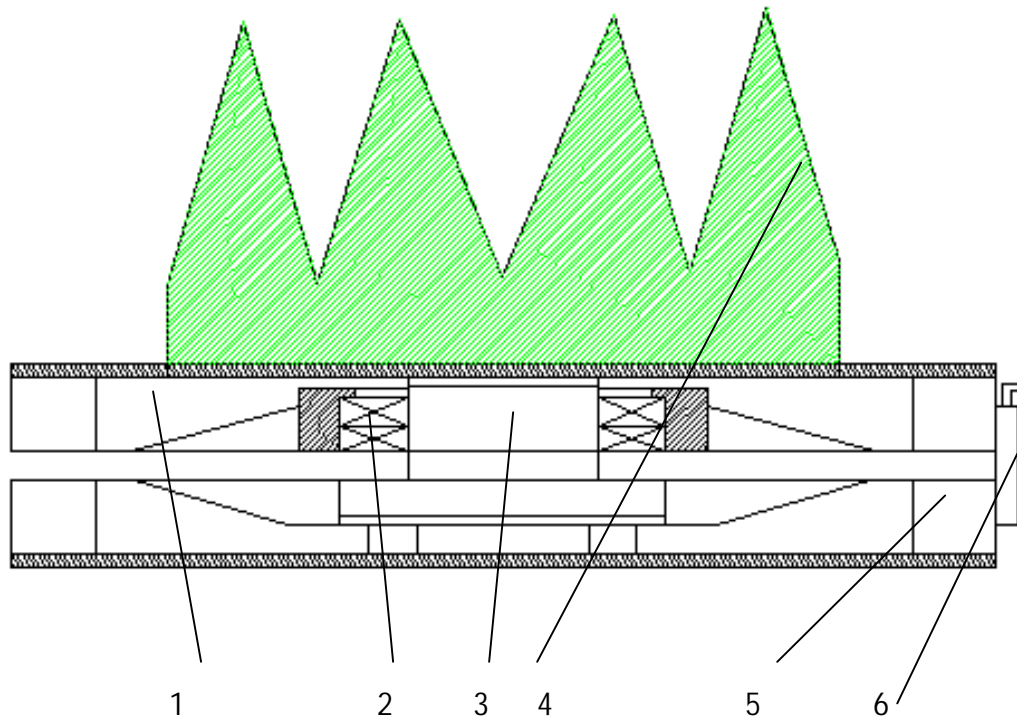
Fig 3.2.2 Structure of Y axle transmission case

3.3 The dust catcher is a simple structure device, it is consisted of a sucked tuber pipe, a sucked mouth, a dried motor with strength and a dust sack.

3.4 Two safety doors at both sides of the longmen set prevent the accident, the cutting job will stop when you open the safety door.

3.5 The dust removal system is the optional fitting, if has the special request for the user's product must remove dust, they may select the dust removal system, it is the removable device. When user finishes the cutting job, transposes the work piece to other machines (such as vertical section machine, circle cuts machine and so on) processes the finished product, move the finished product to the dust removal system excute dust removal job, meets the customer dust removal requirements.

3.6 The manual auxiliary turnplate also for may choose the fitting, may cause the work piece to make 90 degrees revolving, suit specially to some complex three dimensional shape's product, to reduce the artificial transporting, processing end product one-time.



1. Upper bed-plate 2. Bearing 3. Rotating axis 4. Foam floss
5. under bed-plate 6. Fixed pin

IV. Hanging and movement of the cutter and the trial preparation

4.1 The hanging of the cutter should be in accordance with the following requirement:

4.1.1 Before the cutter is packed and movement, each slippery block, guide rail and rolling body should be antirust protection, and daubed the antirust oil.

4.1.2 The packing box requires against dampness, shock. The longmen shelf of the cutter should be out on plastic sheath, and conveyer belt and hover pipe should be packed in polybags. Switch board and spare tool should be packed in packing box, baled, then unify packaging by cutter.

4.1.3 After the package at cutter, according to the outside marks of the packing box, it should be marked: resist shock, against moisture, Prevention of pressure, level place

4.1.4 While movement on the slope, the slope corner can't be more than 15 degree

4.1.5 While movement with rolling stick, the diameter of it should be smaller than 90mm.

4.1.6 It should prevent assaulting and fierce vibration while movement.

4.1.7 The top cover should be demolished firstly and then take apart the other four sides board, when it arrive the destination, the bolt of the fixed cutter should be removed firstly, mount lifting rods, then lifted the machine tool using crane or forklift. At this moment the bottom of the case was removed, eliminate shock absorber, the supporting screw can also be changed.

4.1.8 You should check the cutter's appearance situation after open the box, and check whether the attachment is completed according to the packing list.

4.1.9 In order to guarantee the cutting precision of the cutter and its stability, the working environment should be:

4.1.9.1 indoor temperature should be control $15^{\circ}\text{C} \sim 25^{\circ}\text{C}$ 。

4.1.9.2 The foundation of installment: the depth of the foundation: 300~500 mm, the ditch width of the resisting shock: 50~100mm, the supporting feet must be fastened with the foundation screw. The installat ground must be levelled, make the horizontal ground.

4.1.9.3 It should avoid that there is corrosive objects (such as acidic ,alkaline material) around the work place,keep the place dry and clean.

4.2 The steps of installation:

- 1) Choose the installing position to put Longmen shelf.
- 2) Put the working bench on both sides of the longmen set, then join the supporting feet, drill the leveling feet screw hole and lock the fixing screw.
- 3) install the conveyer belt,join the down roller ,workframe,and 10 supporting feet.Correct the conveyer belt level,install X axle transmission case.
- 4) join the workingbench and the longmen shelf together through join seats.
- 5) Adjust the leveling feet screw of the longmen set and the supporting rod,so that make Longmen shelf and workingbench vertical.
- 6) Adjust the tight set's position of main cutting wheel eletrical machine and tight the cutting line.Regulate tight device of slide with the special spanner,make cutting line and worktable parallel.After tightening the cutting line,then lock the orient nut of the tight shelf.
- 7) Install the dust catcher.
- 8) Install the satety door and switch.
- 9) Join the switch board and the shelf of the main machine.

4.3 The preparation before the trial.

- 1) After finishing the installment of cutter,open the door and unload the fixing lump.
- 2) Turn on the power and control system, settle the production data.

- 3) start the X, Y stepper motor, check whether the moving direction of workingbench and cutting line is correct, if incorrect, the three-phase power place should be changed, and the total power must be cut off when changed.
- 4) Check whether the switch of the safety door is in good condition.
- 5) Check the tight intensity of the cutting line.
- 6) Start the electrical machine of the main cutting wheel, check whether the operation direction of it is correct and adjust it if incorrect.
- 7) Install the rotatory platform or put the product.
- 8) Draw the appearance picture of the product, establish the cutting route, imitate the production and check the procession route.
- 9) Process the sample.

V. The correct operation steps and some attentive matters

5.1 The correct operation steps are as follows:

- 1) Put product on the worktable or rotator, and try to make the sides of the product parallel with the workframe or workingbench.
- 2) Close the safety door and check whether the switch it is in good condition
- 3) Start the controlling system, move the cutting line to the initial position.
- 4) Double click the icon Y cutHM on the computer desktop, start the Autocad to draw the appearance picture of product, establish the cutting route.
- 5) Start the controlling software YcutSP, set the production data, or transfer it from the data plan file.
- 6) Start the frequency converter, adjust running speed of the cutting line.

7) Start the procession power,enable the controlling board and the driver of the electrical machine to be electrical.

8) Click the procession button to begin the precession.

9) After finishing the procession,open the safety door,move the workingbench (the rotatory platform),unload the workpiece.Or rotate the platform for 90 degree to continue the production.

5.2 Some attentive matters while processing:

1) Remember the coordinate value of the starting point and the breaking point to avoid the return if there is any unfavorable factor(cutting bioken)in the processing.

2) As for the procedure and the size of the product that are not sure,small sponge samples can be used first.

3) Settle the production data and the operation speed of the frequency converter properly,the production data is adjusted according to the density of the sponge,the production speed should be slow if the density is high,Vice versa.

4) More time should be set up for corner stop if there is a product with a high density and a complicated shape.

5) In order to avoid the machine shut down in the midway or produce the bad product,try not to touch the safety door.

6) Listen to machine voice carefully at any time,if there is a loud noise or any unusually noise,the machine should be stop and checked.

7) In order to improve experience of processing and maintain level,the problems arose and the settlements should be written down in detail.

VI Lubrication,adjustment and maintenance of the cutter

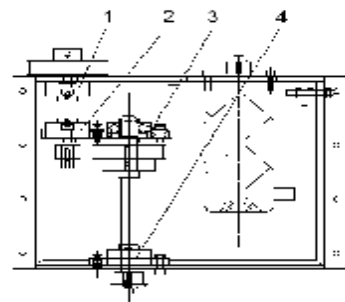
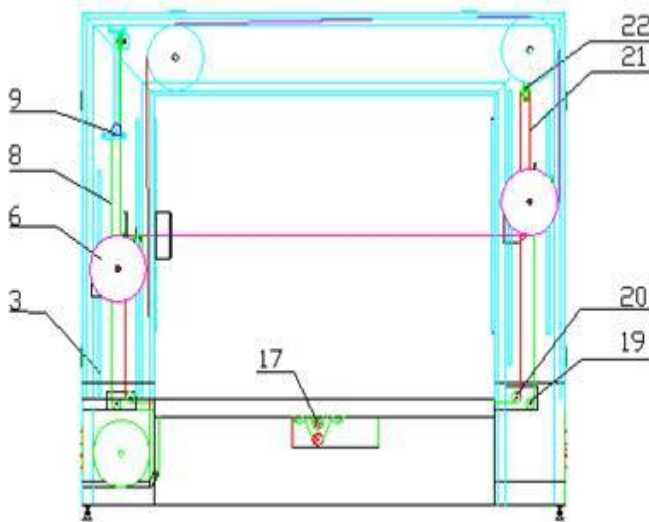
The lubrication of the cutter is lubricated regularly according to the regulation of the form below,a matter should be paid special attention is that the outer fringe of the cutting line wheel is packed with wear-resisting glue PU,so there is no need to add lubrican on the surface. This cutter is a special kind of processing apparatus, the moving part is easy to affix in an abominable processing environment with much dust,which will directly influence the machining accuracy and its life. Therefore,it is very important to pay attention to cleaning and maintaining constantly.

6.1 The lubrication of the moving line organization

The lubrication of the moving line organization includes:bearing of cutting line wheel,roller chain,steel wire,leading block,electrical machine bearing of main cutting wheel,straight line guide rail,slippery lump,sprocket and the bearing of the Y axle transmission case.In order to guarantee its precision and raise the life-span,the longmen must be opened in every 4 hours to clear up the dust on the cutting wheel and the bearing surface,dust on roller chain,steel wire,leading block,straight line guide rail,slippery lump and sprocket must be at least cleared up once every shift and poured into proper lubuicating oil.Y axle transmission case is moved by an organization of synchronous belt and wheel.The surface of synchronous belt and wheel needn't add any lubricant.There is a fuel-injection hole in the base of bearing seat,pour into lubricating oil once every week.

6.2 Lubrication of the transmission organization of the belt

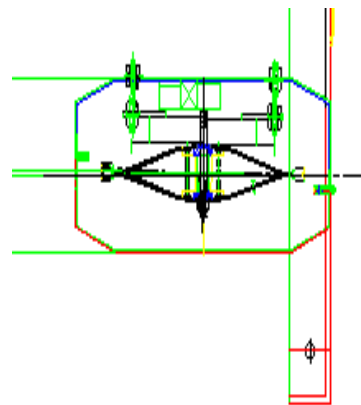
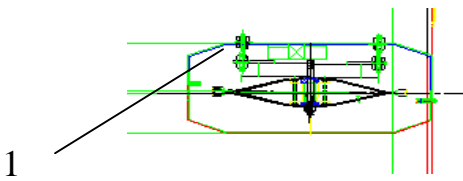
Lubrication of the organization of the conveyer belt includes the lubrication of the interior bearing of the big and small transmission roller. Rolling bearing at the both sides and in the synchronous wheel. X axle transmission case is also moved by an organization of synchronous belt and wheel, the surface of synchronous belt and wheel needn't add any lubricant.



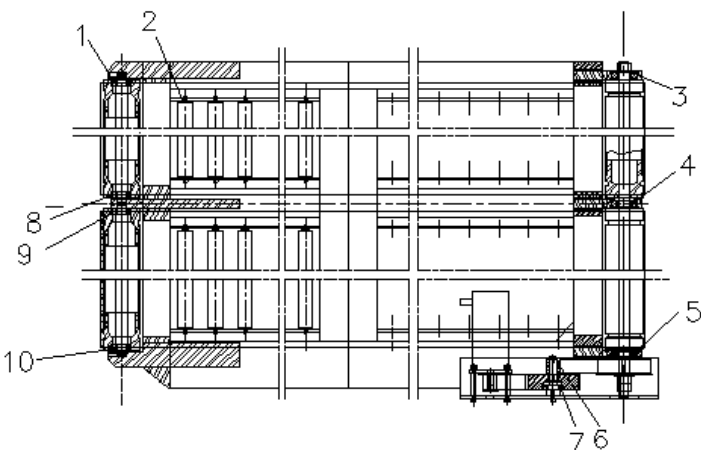
Y-axis gearbox bearing lubrication site diagram C

Gantry Sketch of a part of the lubrication diagram A

- 3.linear rail 6.Guiding Wheel 8.Steel Wire 9.Steel Pulley 17.Chain Wheel
- 19.Steel Pulley 20.Chain Pulley 21.Chain 22.Bracket of Chain Pulley



Cutting wheel bearings lubricated parts diagram B



VII The common troubleshooting and elimination

1. Wire-cut broke failure analysis and troubleshooting

Wire-cut broken is one of the common faults for CNC sponge WEDM, resulting in the failure of many factors, are as follows:

(1)When the beginning of the workpiece is cut ,wire-cut is disconnected

Causes:

Strain of Wire-cut is strong, meet the work piece resistance to strengthen, increase tension, thus break

The converter is instable caused mechanical resonance

Feed instability, started too fast Cut

The centre of cut-wheel offset, resulting in partial buffeting formidable line;

Knife round and has worn bearings or knife to the axle and a radial beating caused serious buffeting line

wire-cut linked to the row dust fans, or door frames

too many dust in round groove of wire-cut

Impurity and crusts on surface

Exclusion measures;

Adjust tension stand of motor and position of screw, make host cut- wheel up a point

Conditioning inverter panel potentiometer knobs, the wire-cut are round-speed operation, avoiding mechanical resonance points

Reset the computer, access control software interface, adjusting X, Y feed parameters

Adjust the position of the two fixed block wheel and host block wheel, so that it movement in the socket of five block wheel.

Replace block wheel or central bearing of block wheel.

Adjust screw of the position of fan for dust collection, make the centre of the wire cut cross mouth of arranging dust.

To remove the crust in surface of work piece or impurity

(1) wire break suddenly in the process of cutting

Cause:

Parts too hard, or impurities within the workpiece

Feed too fast

Water on the surface of workpiece

Some rubber-wear parts attrit severely, clip the cut-wire.

Cut-wire connector is not firm, there are signs from wire

Exclusion measures:

Replace parts, to remove impurities

Adjust feed parameter

Remove the water in the surface of workpiece.

Replace wheel-cut, keeping a gantry surrounding clean and remove dust in the groove of the wheel cut

Replace the wire-cutter

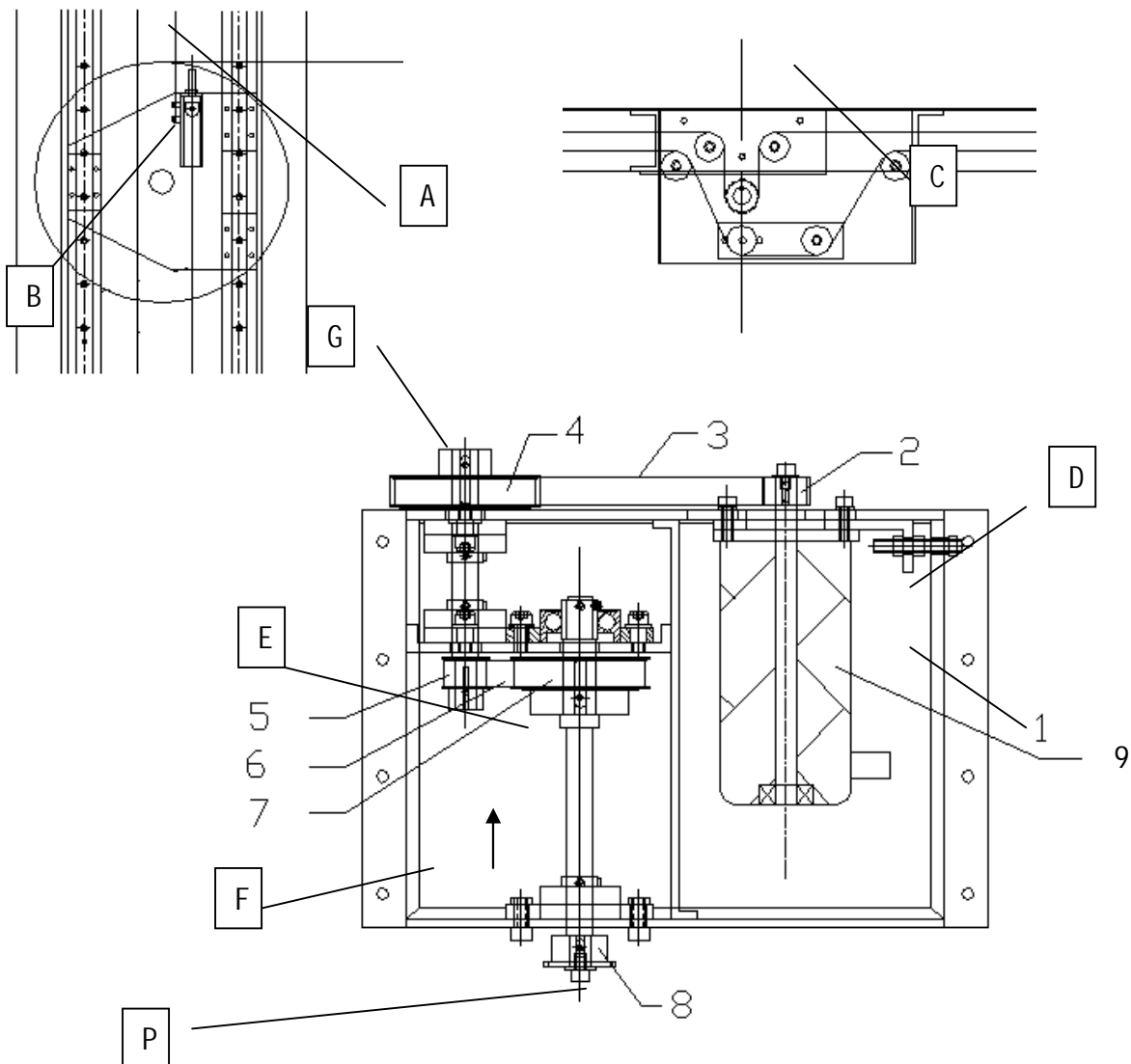
For large foam floss, we strongly recommend that users remove crust, which will greatly enhance the service life of wire cutter.

2. wire position and worktable with no parallel

use hexagonal wrenches for right-angle attached machine tool , according the location shown in Figure 3-1-1-1 to adjust tension screw, steel wire and chain position make the knife parallel lines and workstations parallel.

3. belt in Y axis chassis attrit and break

Replace the aging belt according to following chart (take Belt L165 as example):



1. Close power of machinery, open the door covered gantry, regulating motor-tension line position unloaded wire-cut ,release adjustment screw A on the skateboards of gantry, the screw and nut end of the alignment, the chain connected adjust stem and wire will be relaxed.
2. Open dust cap of Y-axis chassis, undocked from the chain B and steel wire, remove tight set screws connecting the chassis and rack, separate the chassis and rack. Pay attention don't hurt connections of the stepper motor when you remove it.
3. Release the fixed screws connecting skateboards D on the stepper motor and regulating screw-stem 9, moving forward about 20 mm, unloading Belt 3.
4. Release self-aligning bearing-box fixed D central axis and gear L32 synchronizing wheel and setscrew of it
5. Release the L165 belt, pinched Bearing Group
6. Strikes the central axis gently according to the arrow direction, causes the gear L12 synchronizing wheel and the central axis separation, unloads belt L165.
7. Exchanges the new belt, looped gear L12 synchronizing wheel, then strikes the central axis gently, according to the position the above expressed figure ,connect gear L12 synchronizing wheel and the central axis , adjusts gear L12 synchronizing wheel position, causes the trough in it and gear L32 synchronizing wheel parallel aligns, locks all set screw on the central axis

8. regulating pinched belt L165 pinched Bearing Group location, and make belt with it parallel. Flexible with their hands can easily turn gear L32 and belt 7.
9. Installs belt L275, adjust the slide of stepper motor to tighten belt L275
10. Start computer control software and the stepper drive power , press F12, use the mouse click arrow , causes the Y axis stepper motor operation of the pros and cons, observes two belts whether to have phenomenon off tracking, if has, may loosen M10 screw of self-aligning bearing-box on the central axis G and P e, move the bearing seat, locks the screw again, continues to revolve stepper motor, until eliminates phenomenon of tracking.
11. Close your computer, shut down the power
12. according to the original location ,stall Y axis chassis, chain, steel wire
13. The initial synchronization of tension Lo regulating stem left and right skateboards, tightening the chain and steel wire
14. Installs the wire-cut,adjust position of the motor tension to tighten wire-cut, regulate adjust rod of the left-right slide again, causes the wire-cut and the work table parallel.
15. Installs dust-proof cap the Y axis box, closes Dragon Gate
16. switch on power to restart the cutting process

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