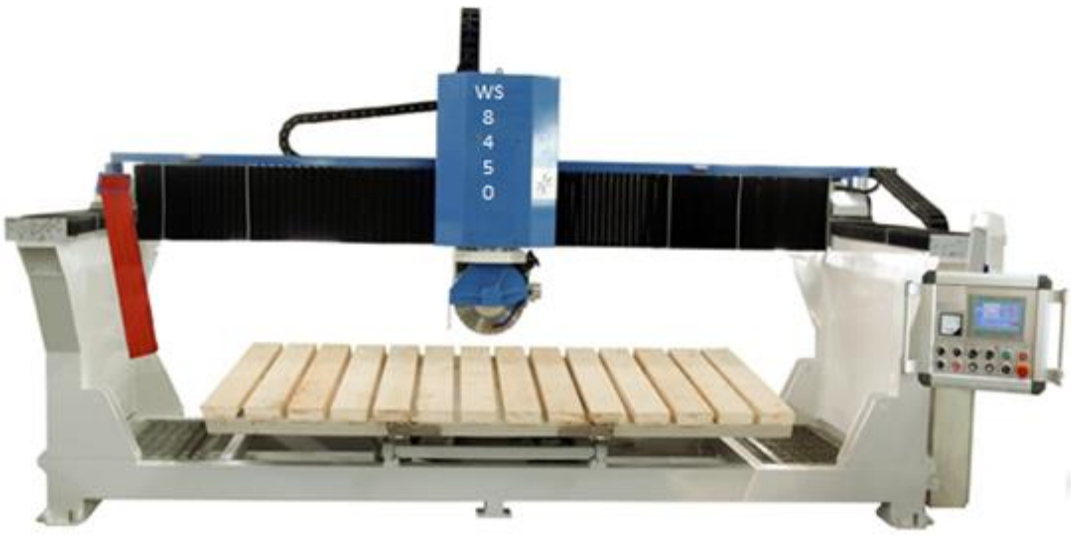
WS-8450 Bridge-Saw
Operation Manual



Contents

1.Safety and Health Precautions

1.1 CAUTION

- The instruction manual contains warnings clearly highlighted by symbols. These warnings call your attention to particular situations that may be hazardous for your safety. Read the warnings with greatest attention.
- Use of the machine and access to it must be consented only to specialized operators.
- The machine must not be used by an occasional operator, but by an operator who has acquired a certain experience and training in the use of this machine. It is specified that “OPERATOR” is defined as the person or persons assigned to install, run, adjust, service and clean the machine.
- The following personal protective devices are recommended during the installation, operation and servicing of machine: safety glasses with, ear plugs or ear muffs, safety gloves, safety shoes, safety overalls and breathing mask.
- Any equipment which is not related with the current operation should be out of the operating area.
- When all the settings necessary to switched to another working condition, it must be carried out by professional person.
- This manual describes the application of the machine.
- Keep this manual in a safe place.
- Willy Industries reserves the right to make variations to the production and the manual.
- Failure to comply with the safety prescriptions or the improper use of the machine may cause damage to those articles in the operating area.
- Keep hands or any other parts of your body away from moving element of the machine.
- During the exploitation, the water may be splashed and the blades may be dangerous to people.

1.2 Graphic Symbols

WARNING SIGN	SAFETY INSTRUCTIONS
	Operate by authorized people only.
	Risk of crushing one's hands if this operation is not performed in compliance with safety regulations.
	Risk of electric shock if operation is not performed in compliance with safety regulation.
	Recommended use of safety work gloves
	Recommended use of safety goggles
	Recommended use of protective ear muffs.
	Spindle rotating direction.
	Keep ground wire connected.
	Inside oil bath.

1.3 Technical Data

	Willy WS-8450	
Max. work piece length	3300	mm
Max. work piece width	2000	mm
Max. work piece height	100	mm
Blade diameter	400--450	mm
Max. spindle speed	2900	rpm
Blade rotate angle	0、90	degree
Blade tilt angle	0-90	degree
Table tilt angle	0-85	degree
Table rotate angle	0-360	degree
Power supply voltage	400	V AC
Power supply frequency	50	Hz
Spindle power	15	kw
Total power	23	kw
Overall L×D×H	5510×3260×2765	mm
Weight	≤13000	lb

2.Installation

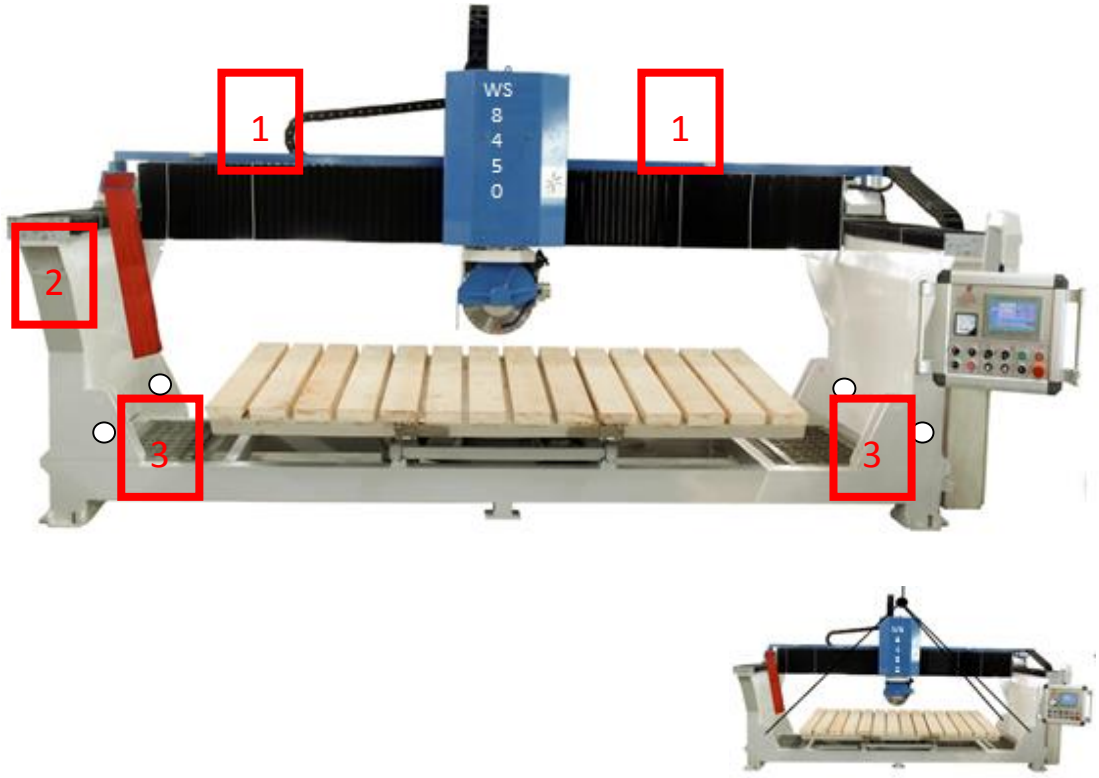
2.1 Lifting and Moving the Machine

Check that the equipment and accessories used to lift the machine (belts, cables, hooks) are capable of supporting the weight of the machine as indicated on the identification plate.

Bring the machine down onto the floor with the greatest care avoiding sudden drops and hazardous jerks.

Never hook belts directly onto the mobile beam **(1)** or to the machine base **(2)**, to avoid irreparable damage to the structure. Use the four lugs **(3)** provided for lifting.

The lifting equipment should be inserted by skilled persons to avoid damaging the machine and to prevent the load from sliding.



2.2 Machine Leveling

This machine does not need a foundation, but an industrial floor with a thickness of concrete of at least 100mm must be provided.

It is necessary for the machine to be correctly leveled. Remove the protection covers on both supporting shoulders of the mobile gantry. Place the spirit level **(1)** on the guide on the right side support shoulder. Adjust the leveling screws located on the support feet **(2)** at the base of the machine.

Repeat the same operations for the left side support shoulder.

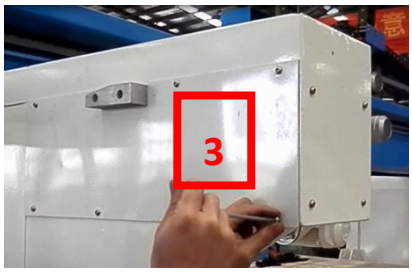

1
2

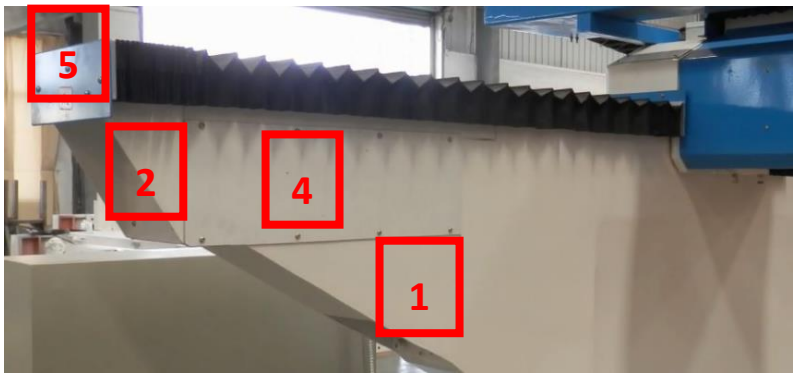
2.3 Bridge installation

We remove some parts from both sides of bridge when shipping. The instructions bellow will inform how to install these loose parts:

- Shoulder extended part **(1)**.
- Protection cover connection part **(2)**.
- Metal sheet **(3)(4)**.
- Protection cover **(5)**.

Important: The Y+ limit block is installed at metal sheet **(3)**, so don't initiate work on the machine before installing this part.

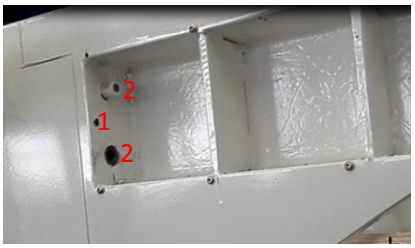


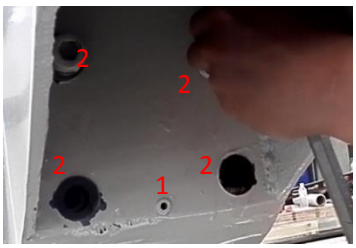


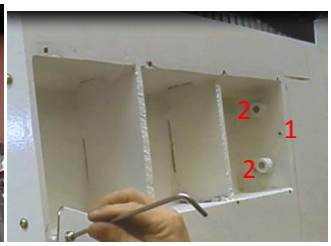
2.3.1 Installation of shoulder extended part:

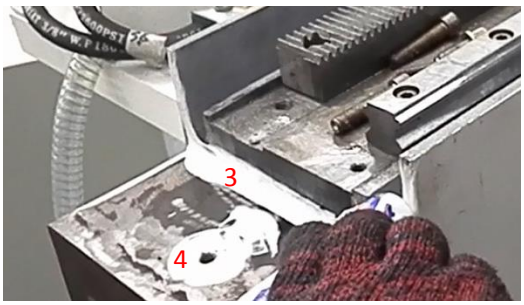
Install 3 locating pins **(1)** and 8 screws **(2)**.

Add sealant on the surface **(3)** connected to the machine body, screw **(5)** and screw hole **(4)** when installs.





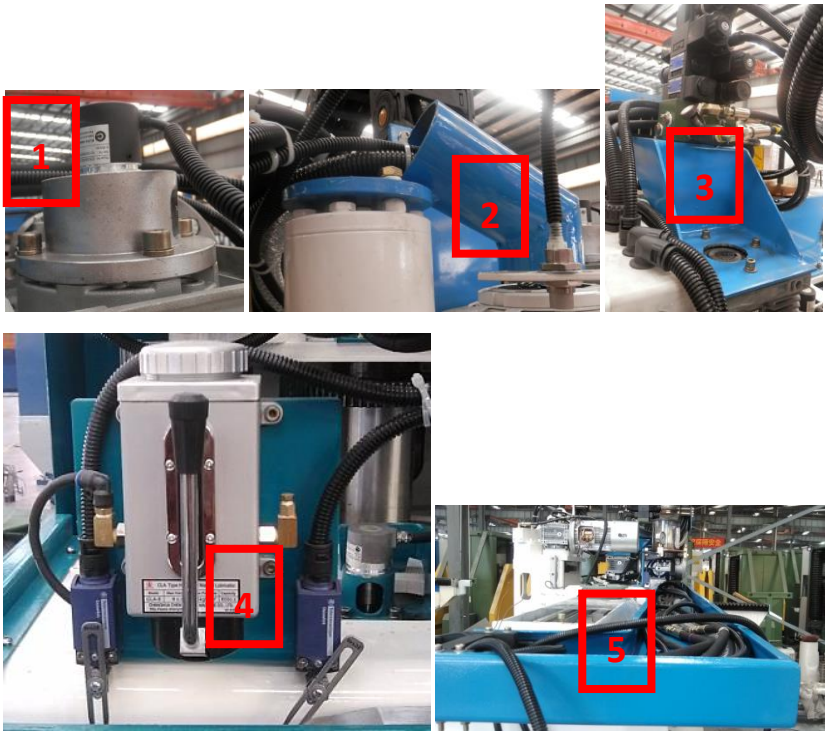




2.3.2 Other parts.

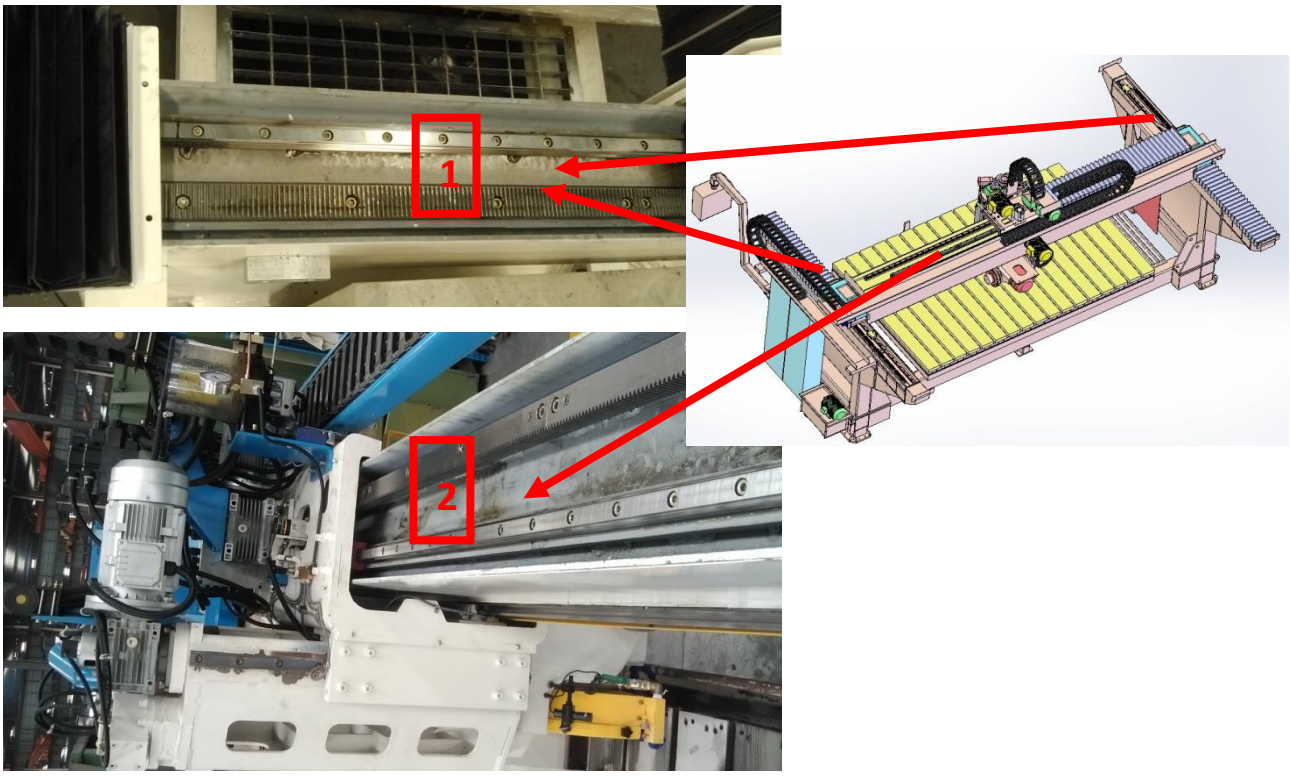
We removed the following parts when shipping. You have to install them before using machine.

1) Encoder **(1)**.
2) Pipeline **(2)**.
3) Hydraulic **(3)**.
4) Manual Grease **(4)**.
5) Cable trough **(5)**.

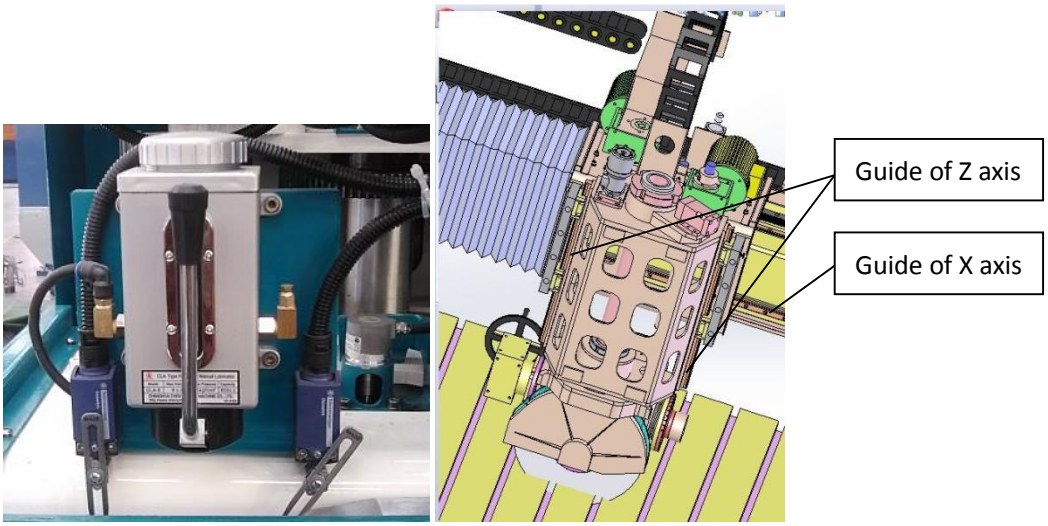


2.4 Lubrication

Both sides of bridge **(1)** and Beam **(2)** will need be lubricated in the **oil bath**. Oil level must be higher than linear guide and rack. Usually it uses **engine oil or rail oil**. After machine has been installed, please take dust cover off, then pour oil inside to lubricate the gear and guide of the X axis and Z axis.

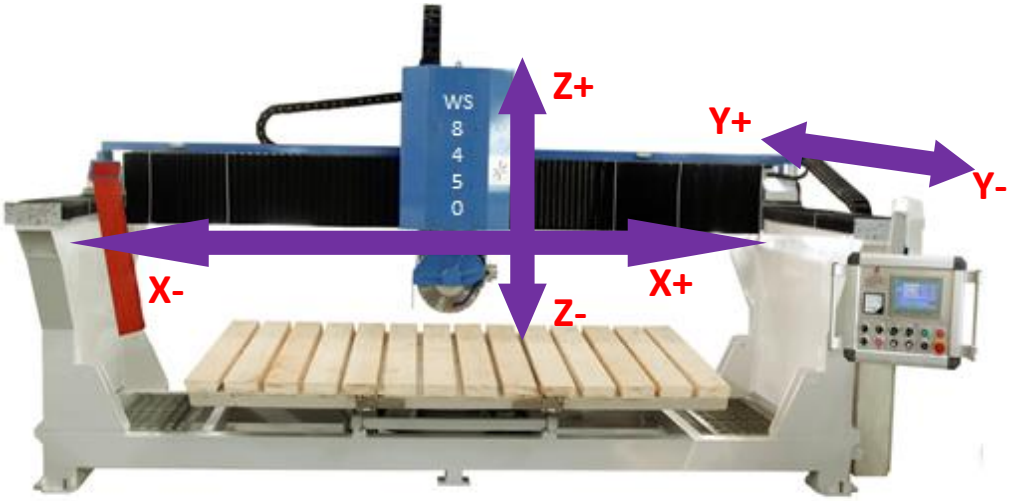


Add **Semi-fluid grease** on the grease pump. Grease is used to lubricate the guide of the Z axis and one of the X axis guides.



3.Operation

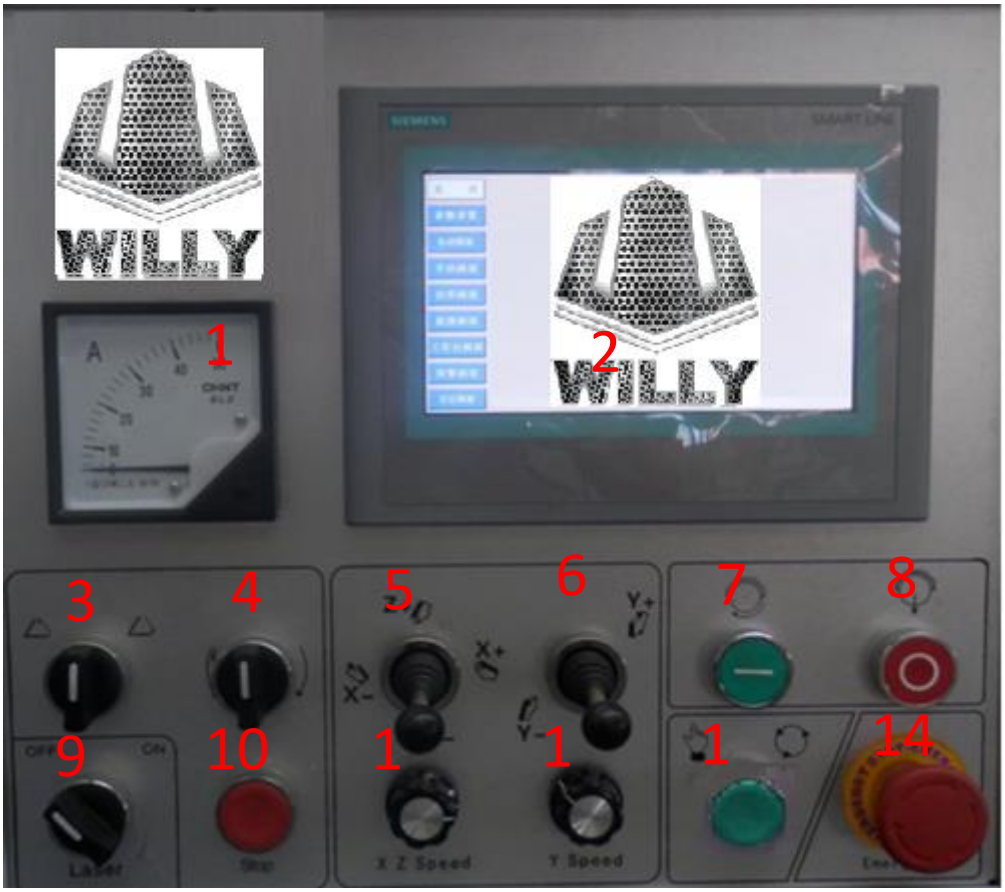
3.1 Axis reference



3.2 Turn on the machine

1. Turn on main power. 
2. Turn on the emergency switch. 
3. Press the ‘Start’ switch. 

3.3 Panel



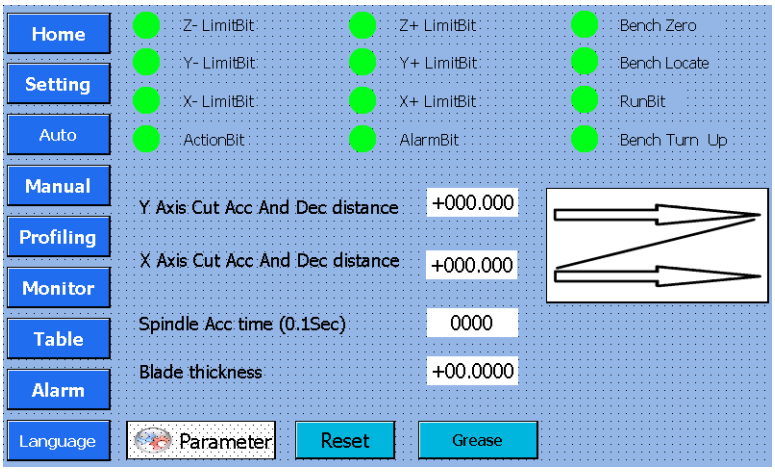
Number	Picture	Name	Function
1		Touch screen	
2	 	Ammeter Voltmeter	Current of the spindle motor. Voltage of main power
3		Table flip switch	Left: Turn up table. Right: Turn down table

4		Table rotate switch	Left: rotate table anticlockwise. Right: rotate table clockwise.
5		Joystick axis motion XZ	X+, X-: Move X axis. Z+,Z-: Move Z axis.
6		Joystick axis motion Y	Move Y axis.
7		Spindle start	Start spindle.
8		Spindle stop	Stop spindle.
9		Laser	Turn laser on/off.
10		Power on switch	Turn on the power of the control system.
11		Potentiometer 1	Adjust the feed rate of X axis and Z axis.
12		Potentiometer 2	Adjust the feed rate of Y axis.
13		Auto mode start	Automatic cutting starts.

14		Emergency stop	Turn off the power of PLC.

3.4 HMI

3.4.1 Settings

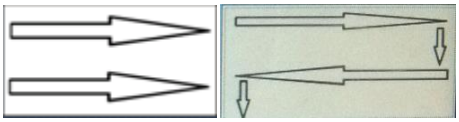


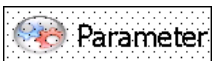
X axis cut Acc and Dec distance: Accelerate and decelerate distance at length direction when "**cut of X axis**". I is used when blade start to cut into stone.

Y axis cut Acc and Dec distance: Accelerate and decelerate distance at length direction when "**cut of Y axis**".

Blade thickness: set thickness of blade.

Spindle Acc time: Spindle accelerating time, Star circuit convert to delta when spindle start.


Select cutting process. The first type is cutting at single direction (forward direction), the second type can cut at double directions.

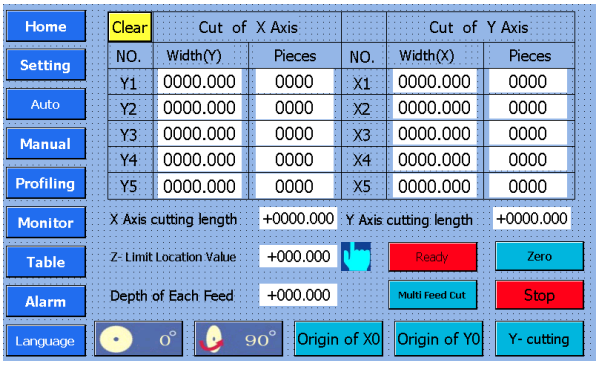


Set the precision parameter. After press the command, system prompts you to enter the user name and password. The user name is "**admin**", password is "**hl2223**". Press "**Parameter**" again, the screen should display all the parameters of machine page by page. Detail massage of "precision parameters" is explained in **attachment**.

Build up machine zero. Machine researches the specified limit switch in slow speed after this command be triggered.

Lubricate machine manually.

3.4.2 Auto



Cut of X axis: Blade cut along X axis when head at 0 degree.

Cut of Y axis: Blade cut along Y axis when head at 90 degrees.

Width: The distance between two adjacent cutting.

Pieces: Specify number of pieces to be cut and width.

X Axis cutting length: Set cutting length of X axis.

Y Axis cutting length: Set cutting length of X axis.

Z- Limit Location Value: Set Z value of wood top surface. Press  to auto measure.

- **This parameter is the virtual of Z- limit switch. Set the data to a large negative value before moving blade to top of wood.**
- This parameter is saved on the system, please set it when you use the machine first time. Adjust this value when diameter of blade changes.

Clear all the data on the table.

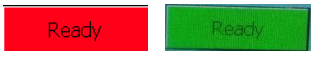
Rotate head to 0 degree.

Rotate head to 90 degrees.

Set current position as origin of **"cut of X axis"**.

Set current position as origin of **"cut of Y axis"**.

Choose single or multi feed at depth direction (Z axis).

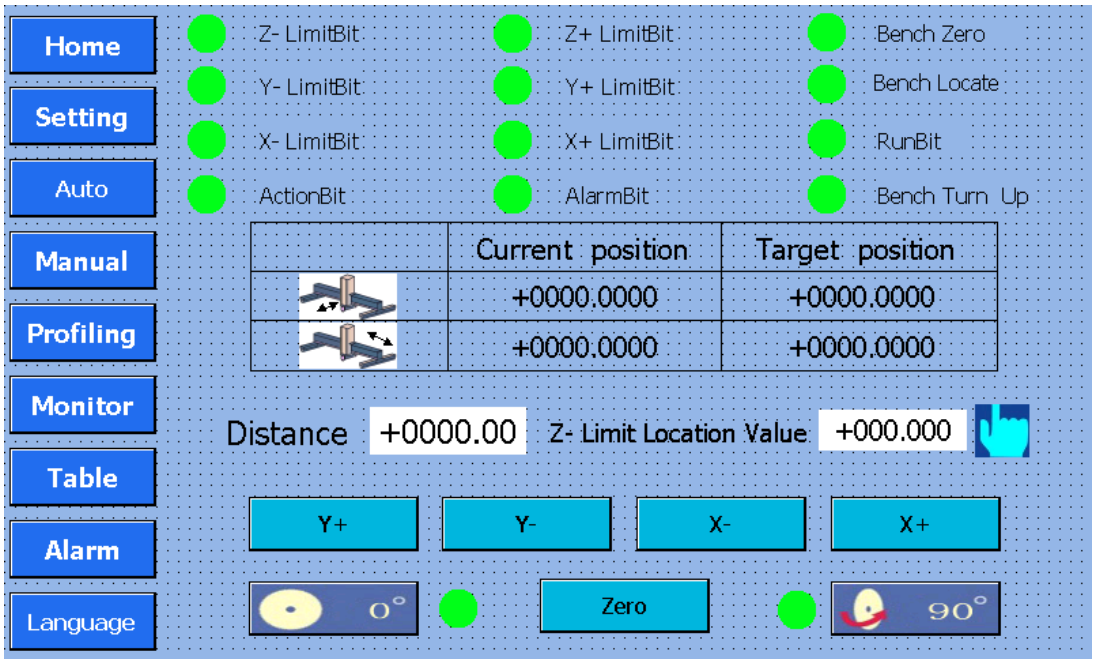


Indicate lamp of spindle speed. The red lamp will turn to green when

speed reaches a normal value. Auto mode can't be triggered until this lamp turns to green.

Machine will back to zero (initial) position when this command is triggered.

3.4.3 Manual



Function of manual mode is to cut single line.

Press X+(X-), machine executes X direction single cut when head at 0 degree. Press Y+(Y-), machine executes Y direction single cut when head at 90 degree. The value which "Distance" specifies is cutting length.

Press Y+(Y-) when head at 0 degree, machine move along Y axis without Z feed. Press X+(X-) when head at 90 degree, machine move along X axis without Z feed.

Distance: Specify single cutting length.

Z- Limit Location Value: Set Z value of wood top surface. Press  to auto measure.

- **This parameter is the virtual of Z- limit switch. Set the data to a large negative value before moving blade to top of wood.**
- This parameter is saved on the system, please set it when you use the machine first time. Adjust this value when diameter of blade changes.

: Specify move direction.

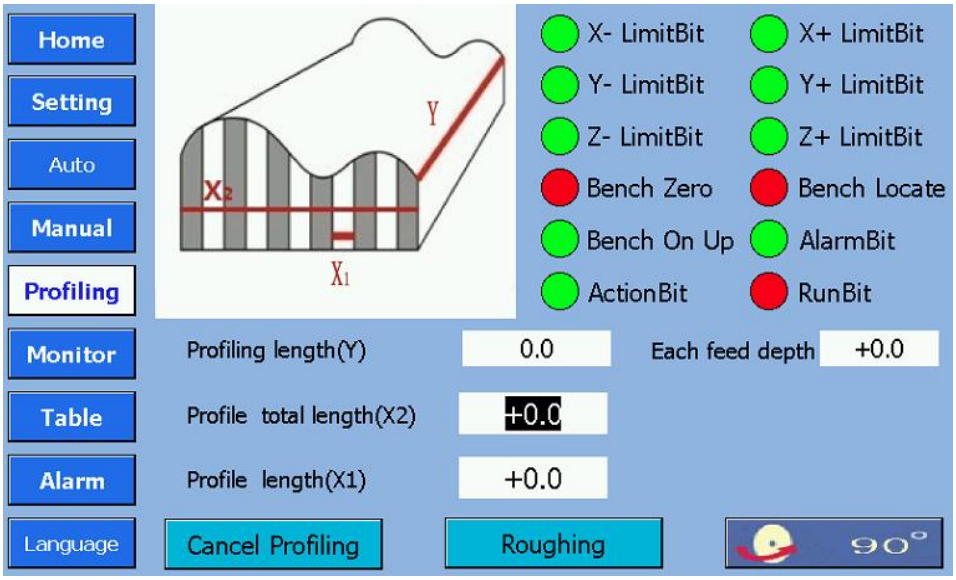
: Machine return to zero position.

: Rotate head to 0 degree.

: Rotate head to 90 degrees.

3.4.4 Profiling

Profiling function is use to process all kinds of line or abnormal stone. Please make the profiling model before processing. Blade cuts along the model when blade is at 90 degrees.



Parameters:

Profiling Length(Y): Specify the profiling length at Y axis;

Profile total length(X2): Specify profiling width at X axis.

Profile Length(X1): Specify each feed distance at X axis.

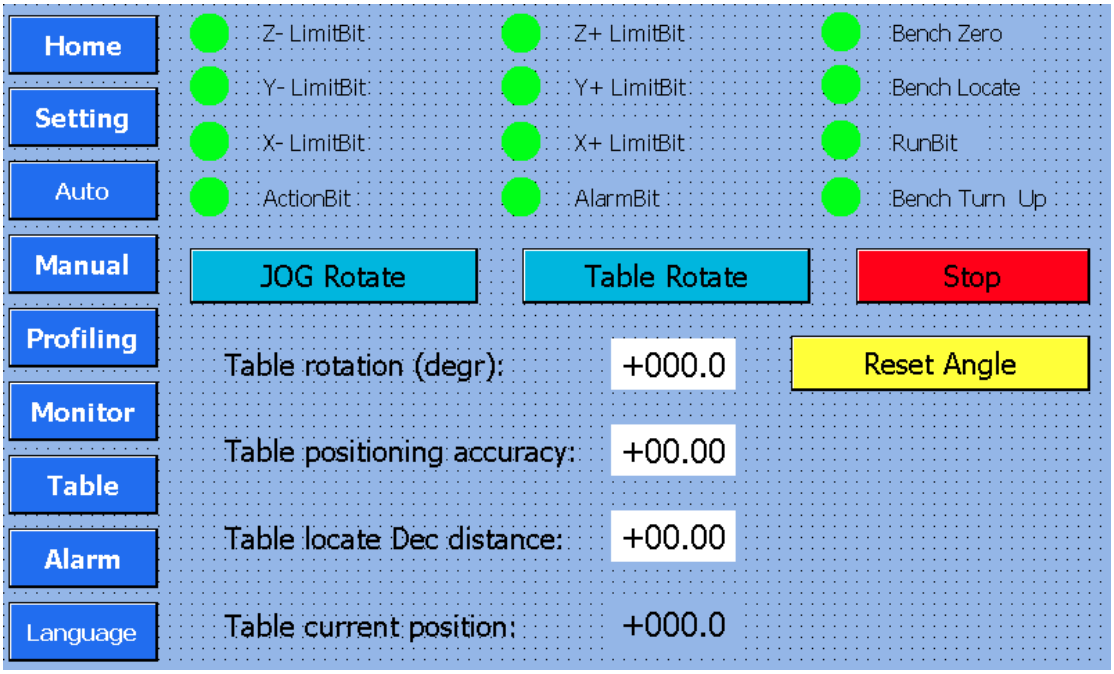
Each Feed Depth: Specify each feed depth at Z axis.

Commands:

Cancel Profiling / Profiling :This command is use to ***Open*** or ***Cancel*** profiling function.

Roughing / Finishing :This command is use to select ***Roughing*** or ***Finishing*** profiling.

3.4.5 Table



Reset Angle Clear “Table current position” to 0 when table at 0 position.

Table Rotate Start to rotate the table to direction which “Table rotation (deg)” specified. This function is enable in JOG Rotate mode.

JOG Rotate Auto Rotate Specify table rotate mode, JOG or Auto.

Jog mode: Table would rotate to the specify direction.

Auto mode: Table would stop each 45 degree.

Stop Stop table rotate.

Table rotation (Degree): Specify the destination direction of table.

Table positioning accuracy: Setting positioning accuracy of table.

Table locate Dec distance: Setting decelerate distance when table rotate.

Table current position: Display current position of table.

3.4.6 Joystick

Joystick axis motion XZ.

Joystick axis motion Y.

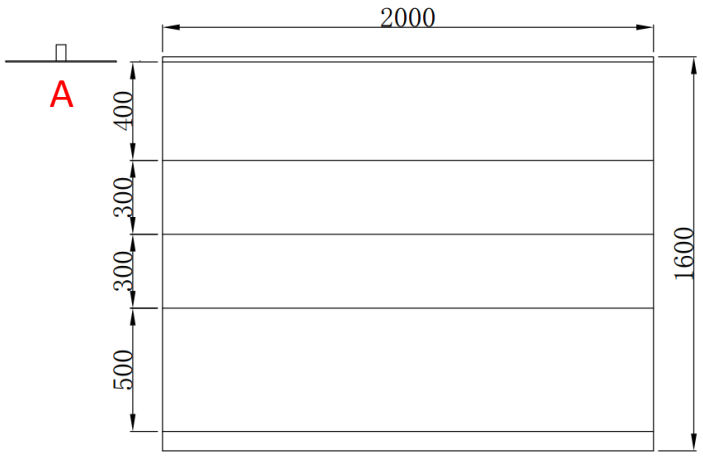
We design special function of joystick axis motion when **automatic cycle is running**.

- System finish current cutting when you press **Z+ direction**, then machine moves to next step to continue auto cycle.
  This is useful if you set cutting length larger than product size.

- **Cut of X axis**: System finish current cutting when you press **X- direction**, then machine returns to origin point.
  Cut of Y axis: System finish current cutting when you press **Y+ direction,** then machine returns to origin point.
  This function is useful if stone broken when cutting.

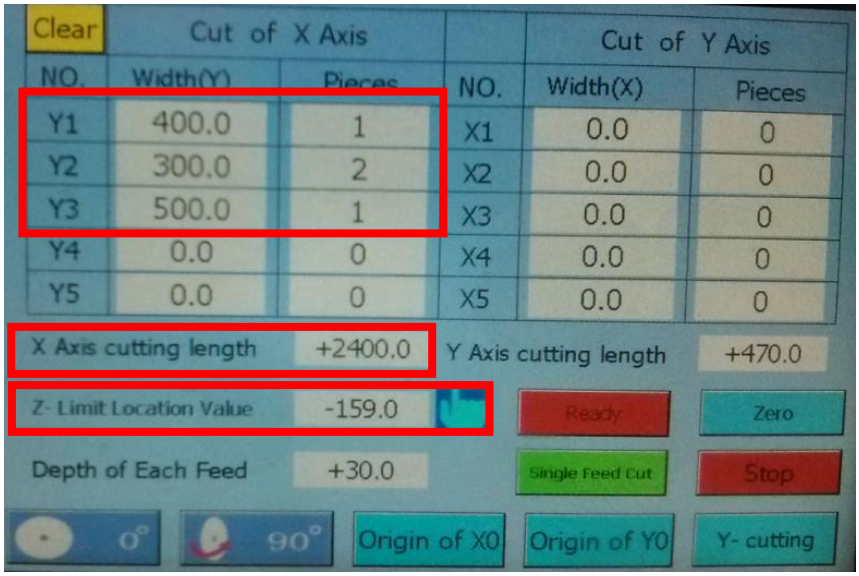
3.5 Example

3.5.1 Cut of X axis



- Material size: 2000*1600
- Product size: 2000*400, 2000*300 (2pieces), 2000*500.

Parameter setting:



1) Set the size ("**width**" and "**pieces**") (**1**) of product. 400mm-1psc, 300mm-2psc, 500mm-1psc.

2) As the diameter of blade is 470mm. Set "**X axis cutting length**" (**2**) 250-400mm larger than length of product. We can adjust cutting length when auto cycle run, system reads this parameter real time. Here we set cutting length **2400**mm.

3) Move blade to the top of wood table. Press  to auto measure the value of Z axis," **Z-limit location value**" (**3**).
   - Set the data to a large negative value before moving blade to top of wood.

- This parameter is saved on the system, please set it when you use the machine first time.

4) Rotate head to 0 degree  . Move blade to left corner of material (**A**). Start position is default "**origin of X0**".

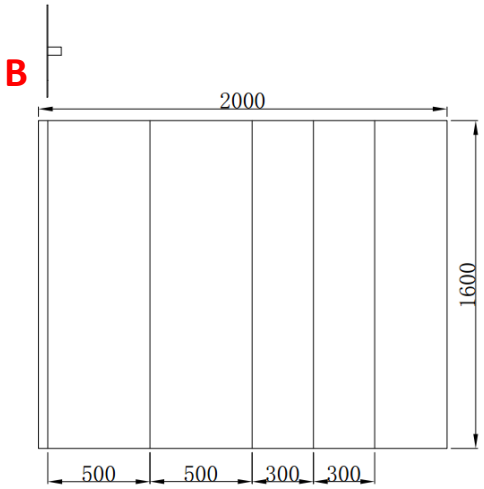
Warning: Origin of blade must higher than top of stone. Otherwise blade will feed under stone at width direction, the blade maybe damaged.

5) Press command  to start Spindle on the operation panel, spindle indicate lamb  turns to green  after spindle reach normal speed.

6) Turn on 'Auto switch'  to start automatic cutting on the operation panel

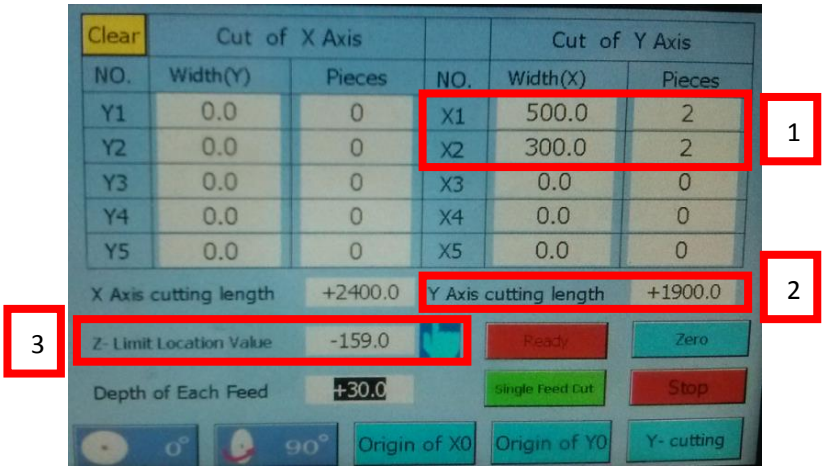
- Please set the thickness of blade correctly before cutting.
- If you want to stop auto cycle, please use the switch  on the operation panel. Or turn 'Auto switch'  to 'Manual mode'
- Machine back to zero when cycle finish.

3.5.2 Cut of Y axis



- Material size: 2000*1600
- Product size: 500*1600(2pieces), 300*1600(2pieces).

Parameter setting:



1) Set the size ("**width**" and "**pieces**") (**1**) of product. 500mm-2pcs, 300mm-2pcs.

2) As the diameter of blade is 470mm. Set "**Y axis cutting length**" (**2**) 250-400mm larger than length of product. We can adjust cutting length when auto cycle run, system reads this parameter real time. Here we set cutting length **1900**mm.

3) Move blade to the top of wood table. Press  to auto measure the value of Z axis," **Z-limit location value**" (**3**).
   - Set the data to a large negative value before moving blade to top of wood.
   - This parameter is saved on the system, please set it when you use the machine first time.

4) Rotate head to 90 degrees 

. Move blade to left corner of material (**B**). Start position is default "**origin of Y0**".

Warning: Origin of blade must higher than top of stone. Otherwise blade will feed under stone at width direction, the blade maybe damaged.

5) Press command  to start Spindle on the operation panel, spindle indicate lamb 

turns to green 

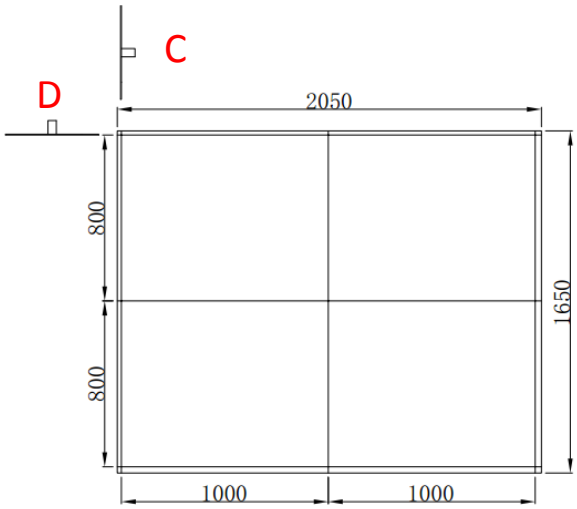
after spindle reach normal speed.

7) Turn on 'Auto switch'  to start automatic cutting on the operation panel

- Please set the thickness of blade correctly before cutting.
- If you want to stop auto cycle, please use the switch 

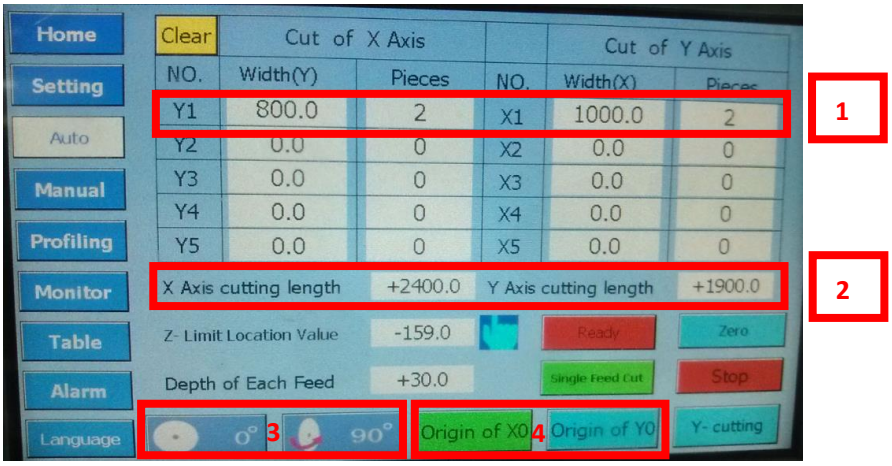
on the operation panel. Or turn 'Auto switch'  to 'Manual mode'
- Machine back to zero when cycle finish.
-

3.5.3 Auto rotate



- Material size: 2000*1600
- Product size: 1000*800(4 pieces).

Parameter setting:



1) Set the size (“**width**” and “**pieces**”) (**1**) of product.
“**Cut of X axis**” 800mm-2pcs. “**Cut of Y axis**” 1000mm-2pcs.

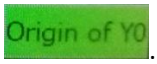
2) As the diameter of blade is 470mm. Set “**X axis cutting length**” and “**Y axis cutting length**” (**2**) 250-400mm larger than length of product.
Here we set “**X axis cutting length**” =**2400**mm, “**Y axis cutting length**” =**1900**mm.

3) Move blade to the top of wood table. Press  to auto measure the value of Z axis,” **Z-limit location value**” (**3**).
   - Set the data to a large negative value before moving blade to top of wood.
   - This parameter is saved on the system, please set it when you use the machine first time.

4) Press 

(**3**) to rotate head to 90 degrees. Move blade to left corner of material (**C**).

Press 

(**4**) to set the "**origin of Y0**". Background of command changes to green 

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Press 

(**3**) to rotate head to 0 degree. Move blade to left corner of material (**D**).

Press 

(**4**) to set the "**origin of X0**". Background of command changes to green 

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Warning: Origin of blade must higher than top of stone. Otherwise blade will feed under stone at width direction, the blade maybe damaged.

6) Press command  to start Spindle on the operation panel, spindle indicate lamb 

turns to green 

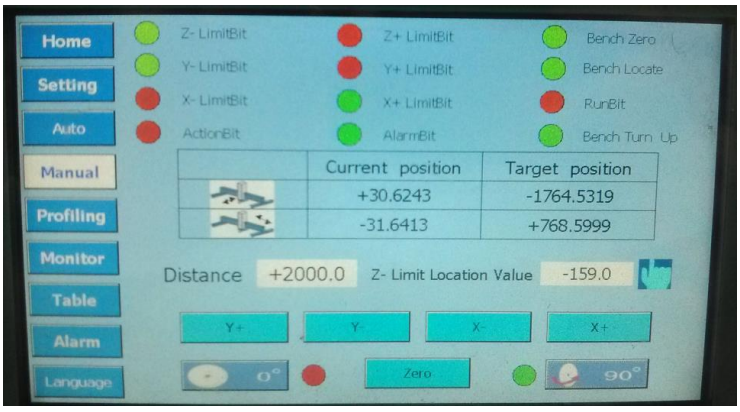
after spindle reach normal speed.

8) Turn on 'Auto switch'  to start automatic cutting on the operation panel

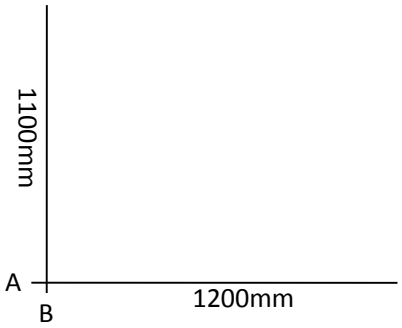
- Please set the thickness of blade correctly before cutting.
- If you want to stop auto cycle, please use the switch 

on the operation panel. Or turn 'Auto switch'  to 'Manual mode'
- Machine back to zero when cycle finish.

3.5.4 Manual cut



- Warming: **Please remember to start spindle when execute manual cutting.**



Cutting process:

1. cut one single line along X axis 1200mm
    1) Rotate blade to 0 degree, move it to position **A**;
    2) Set cutting "**Distance**" 1200
    3) Start spindle
    4) Press X+.

    Machine start, Z axis feeds to top of table, then cuts along X axis. Cutting length is 1200. X axis and Z axis back to position A after cycle finishing.

2. Cut one single line along Y axis 1100mm.
    1) Rotate blade to 90 degree, move it to position **B**;
    2) Set cutting "**Distance**" 1100
    3) Start spindle
    4) Press Y+.

    Machine start, Z axis feeds to top of table, then cuts along Y axis. Cutting length is 1100. Y axis and Z axis back to position B after cycle finishing.

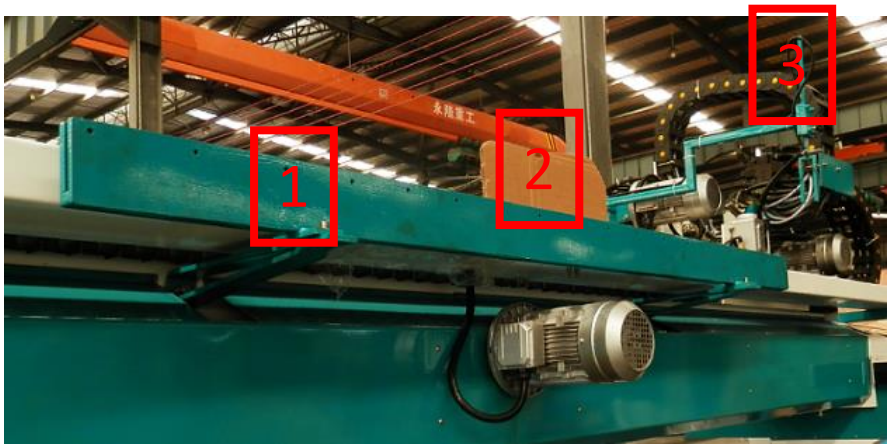
3. Feed directly.
    - Press X+ or X- when head at 90 degree, machine feed along x axis directly without

executing Z feed.

- Press Y+ or Y- when head at 0 degree, machine feed along Y axis directly without executing Z feed.

3.5.5 Profiling

1) Install the profiling mode **(2)** on the rack**(1)**.



2) Rotate blade to 90 degrees.

3) **Activate profiling mode:** Click command 

on profiling screen, It changes to 

.

4) **Choose profiling type:** Roughing 

or finishing 

.

5) **Set the value of 'Z- limit'**: This process should protect the cover of blade when profiling process outside the range of profiling model.

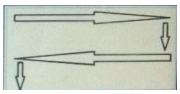
6) **Set processing parameter:**

7) Start spindle: Press command  to start Spindle on the operation panel.

8) Turn on ‘Auto switch’  to start automatic cutting on the operation panel.

Warming:

1) 2 cutting modes are changed when profiling, please adjust before ***Auto*** cutting:

   Setting screen: Double direction mode  would be active.

   Auto screen: “Multi Feed Cut” 

would active.

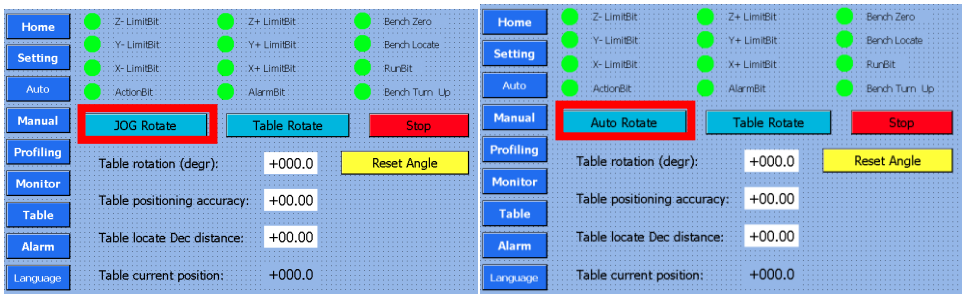
2) Suspend profiling process: Turn ‘Auto switch’  to manual mode. Profiling process can be continued if you turn it to auto mode.

3) Stop profiling**:** Click command 

, the status changes to 

.

3.5.6 Table rotation



- Make sure Z axis is at up limit (Z+ limit) before rotate table.
- We can rotate table in two types. JOG Rotate Auto Rotate

  Jog mode: Table would rotate to the specify direction.

  Auto mode: Table would stop each 45 degree.

1) Jog rotate.(2 types)

Choose JOG Rotate mode at HMI.

- Turn the switch  or handle  "**C+**""**C-**" manually. Table rotates at fast speed when switch is on.
- Set the destination angle at "**Table rotation (deg)**", then press Table Rotate.

  Table rotates fast in the beginning. It rotates at low speed when approaches to range of decelerate distance near destination position.

2) Auto rotate.

Choose Auto Rotate mode at HMI.

1. Turn the switch  or handle  "**C+**""**C-**" manually. Table rotates 45° each time.

3.5.7 Table lift up

<u>Please "Zero" machine before lift up table.</u> Table lift up is often used when we put the slate on table.

Press "table lift up switch"  on the operation panel to turn up or turn down.

4.Adjust and Maintenance

4.1 Hydraulic Adjust.

4.1.1 Table Rotating speed.

(Table rotating speed has been setting normally before deliver.)

Adjust speed of table when table is rotating. Manual rotate table use handle in table rotate mode. Press C+ to rotate table clockwise, press C- to rotate table anticlockwise.

Table rotation speed adjust：

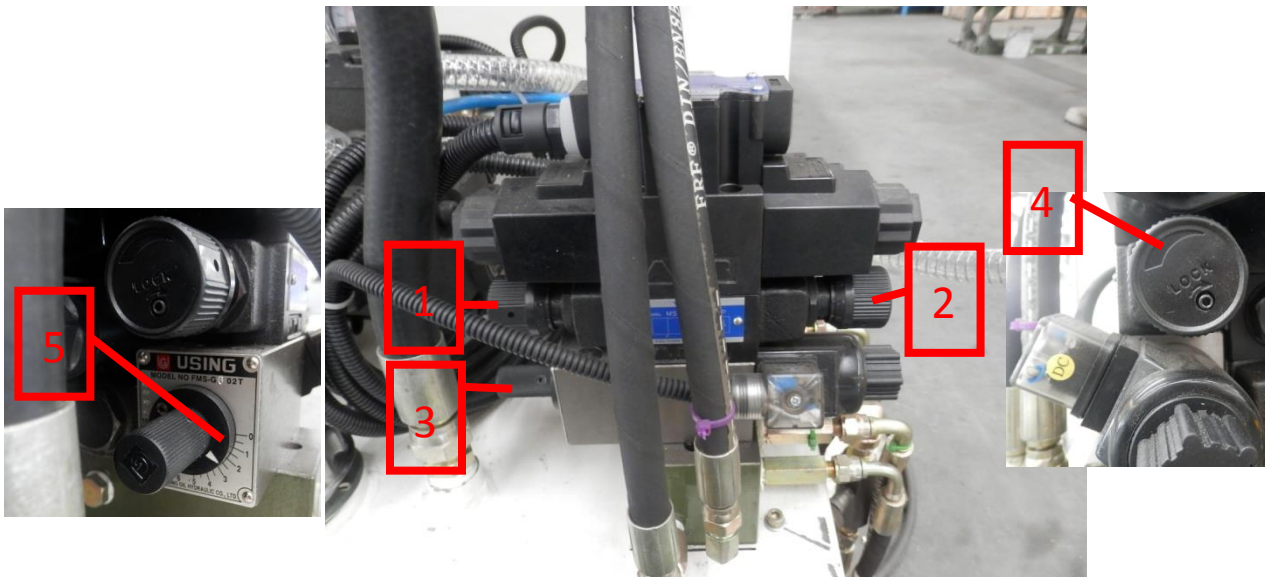
One-way throttle valve **(1) (2),** these both knobs use to control the speed of table.

Adjust Knob **(1)** to control table clockwise rotate speed. Transfer clockwise to small, transfer anticlockwise to large. **(4)**

Adjust Knob **(2)** to control table anticlockwise rotate speed. Transfer clockwise to small, transfer anticlockwise to large. **(4)**

Table location speed (low speed)：

Solenoid control valve（**3**)， this element use to control the location speed of table (low speed). The factory setting of scale **(5)** is 2-3.



4.2 Maintenance

Before starting any maintenance operations disconnect the electrical power supply by setting the main switch to position OFF.

Never use petrol, solvents or other inflammable liquids to clean the machine.

EVERY DAY

Clean away dust from the machine, particularly in the areas: floor around machine, worktable, mobile carriage.

EVERY Month

Check the level of oil bath.

Lubricate the gear of table.

EVERY YEAR

Exchange the engine oil bath of beam and both sides of bridge.

5. Attachment

5.1 Parameter

1) **Y axis positioning accuracy**: Maximum permissible error of Y axis.
2) **X axis positioning accuracy**: Maximum permissible error of X axis
3) **Z axis positioning accuracy**: Maximum permissible error of Z axis
4) **Y axis decelerate distance**: Decelerating distance at **width** direction when "**cut of X axis**".
5) **X axis decelerate distance**: Decelerating distance at **width** direction when "**cut of Y axis**".
6) **Z axis decelerate distance**: Z axis decelerating distance when automatic cutting.
7) **Start interval of lubrication pump** (min): Indicate how long does lubrication pump work once.
8) **Runtime of lubrication pump** (0.1 sec): Indicate runtime of lubrication each time.
9) **Y axis pulse equivalent**: Y axis moving distance per pulse.
10) **X axis pulse equivalent**: X axis moving distance per pulse.
11) **Z axis pulse equivalent**: Z axis moving distance per pulse.
12) **Pulse equivalent of table**: Table rotation distance per pulse
13) **Y axis encoder resolution**: Setting Y axis encoder pulses per revolution.
14) **X axis encoder resolution**: Setting X axis encoder pulses per revolution.
15) **Z axis encoder resolution**: Setting Z axis encoder pulses per revolution.
16) 

Recover the parameter to default value.
17) 

Setting the unit of system. (Metric/inch system)

5.2 Input/Output

I0.0	A phase of Y axis encoder	Q0.0	Forward
I0.1	B phase of Y axis encoder	Q0.1	Backward
I0.2	#1 inverter alarm	Q0.2	Invert #1 fast speed(Y axis)
I0.3	A phase of X axis encoder	Q0.3	Invert #1 low speed(Y axis)
I0.4	B phase of X axis encoder	Q0.4	Invert #2 clockwise(XZ axis)
I0.5	#2 inverter alarm	Q0.5	Invert #2 anticlockwise(XZ axis)
I0.6	A phase of Z axis encoder	Q0.6	Invert #2 fast speed
I0.7	B phase of Z axis encoder	Q0.7	Invert #2 low speed
I1.0	Y+ limit	Q1.0	disable
I1.1	Y- limit	Q1.1	Spindle start
I1.2	A phase of table encoder	Q1.2	Spindle Delta
I1.3	B phase of table encoder	Q1.3	Spindle Star
I1.4	X- limit	Q1.4	X axis motor
I1.5	X+ limit	Q1.5	Z axis motor
I1.6	Z+ limit	Q1.6	Hydraulic pump
I1.7	Z- limit	Q1.7	disable
I2.0	Y+ move	Q2.0	Table clockwise
I2.1	Y- move	Q2.1	Table anticlockwise
I2.2	X+ move	Q2.2	Table cylinder brake off
I2.3	X- move	Q2.3	Table cylinder brake on
I2.4	Z+ move	Q2.4	Table up
I2.5	Z- move	Q2.5	Table down
I2.6	Spindle alarm	Q2.6	Table disc brake off

I2.7	Hydraulic overload	Q2.7	Table disc brake off
I3.0	Table clockwise	Q3.0	Head clockwise
I3.1	Table anticlockwise	Q3.1	Head anticlockwise
I3.2	Table up	Q3.2	Head cylinder brake off
I3.3	Table down	Q3.3	Head cylinder brake on
I3.4	stop	Q3.4	Table rotate low speed
I3.5	Table at zero position	Q3.5	Grease pump
I3.6	Table position	Q3.6	disable
I3.7	disable	Q3.7	disable
I4.0	Head at 0 degree	Q4.0	disable
I4.1	Head at 90 degree	Q4.1	disable
I4.2	Head at 180 degree	Q4.2	disable
I4.3	Head at 270 degree	Q4.3	disable
I4.4	Auto	Q4.4	disable
I4.5	Spindle start	Q4.5	disable
I4.6	Spindle stop	Q4.6	disable
I4.7	disable	Q4.7	disable

5.3 Servo parameter

NO.	value	Function
1-00	60	Maximum Output Frequency
1-04	36	Mid-Point Voltage
1-06	36	Minimum Output Voltage
1-08	4	Minimum Output Frequency
1-09	1	Accelerate Time
1-10	0.3	Decelerate Time
2-00	1	Source of Frequency
2-03	1	Source of Operation Command
5-00	60.00	1st Step Speed Frequency
5-01	2.500	2nd Step Speed Frequency
5-02	10.0	3rd Step Speed Frequency

Machine has 4 step speeds:

1. 1-00 Maximum output frequency. It's the cutting speed which can be control by potentiometer install on panel.
2. 5-00 1st step speed frequency. It's the fast moving speed.
3. 5-01 2nd step speed frequency. It's the decelerate speed when cutting.
4. 5-02 3rd step speed frequency. It's the decelerate speed when feed.

FPGM/DATA**(1)** is use to select and save the parameter.

Up and Down is to adjust the parameter.

5.4 Hydraulic system