CNC Six-Side Boring Machine User Manual

Contents

Section I - Six-Side Boring Machine Installation, Commissioning and Training Procedures

1.1 Installation and adjustment steps

1. Overall level adjustment, is to adjust four feet of the machine to height of the same horizontal plane via level bar, firstly install six foundation bolts for main machine body, once the entire machine is leveled, then install foundation bolts on both sides of gripper horizontal beam, exert force slightly, for horizontal beam's foundation bolts to bear weight is not appropriate.
2. Connect electricity and gas (ensure electrical voltage reaches 380V, air pressure reaches 6mpa and above, air hose is Ø12, and electrical cable uses 3 phases x6mm^2)
3. Install feed air floatation table and discharge conveyor table. (Adjust feed air floatation table to be lower than gripper approximately 0.3mm. Adjust lifting brush of discharge conveyor table higher than gripper approximately 3mm-5mm.)
4. Turn on machine power switch, ensure the operation preparation light can be lit normally, and there is no vibration abnormal after it is lit.
5. Processing system, enters manual interface, first to confirm manual operation is normal, and sensor works normally, and no reverse rotation in main axle and drilling package.
6. Reset, return to zero, return to origin, and calibrate origin displacement parameter of each axle.
7. Insert customer USB flash drive, copy the processing file from USB flash drive to machine's computer disc C.
8. Modify processing system's processing file format (XML, MPR, BAN) to be consistent with customer processing file format.
9. Export customer processing file from machine's computer, scan bar code, and process.

1.2 Equipment repair and maintenance

1. Transmission component:

（2） Maintain guideway clean and tidy, to be wiped with cloth after usage every day, to be blown clean with an air gun, keep it smooth, no debris nor dust obstruct operation, and ensure processing precision.

（3） Automatic lubricate oil pump is filled with appropriate amount of lubricate oil each week, to prolong machine usage lifespan.

2. Machine case:

（1） Electrical components are cleaned with air gun each week to ensure that electrical components are not interfered by dust.

（2） Cooling fan filter net inside machine case is inspected once per month, to be kept clean, to prevent dust from entering machine case and interfering electrical components' performance and stability.

（3） Regularly check whether the emergency stop button is normal.

3. Cylinder:

（1） Regularly check whether there is water drained by the air filter inside the machine device gas triplet, and whether there is still oil inside the atomized lubricator.

4. Drill package:

(1) It is recommended to clean it after start of work and before end of work every day.

(2) Designated grease specification (KLUBE ISOFLEX TOPAS L 32 N): It is prohibited to use any grease of any other brand or specification or any fake KLUBE grease.

(3) Dosing of grease: 0.2~0.3g of grease shall be used for each spindle (do not over-inject grease, since over-injection will cause overheating).

(4) It is recommended to lubricate horizontal drill with 2g grease on a semi-annual basis.

(5) First remove any dust on spindle and dust cap with air sprayer pistol.

(6) Stretch out all vertical drill spindles and horizontal drills, and spray integrated rust-proof/rust-removing agent (in small quantity) to drill rod, and then clean it with cloth. Do not over-spray the agent, since over-spraying may cause entry of the agent into bearing and thereby damage to bearing grease which may result in overheating and locking. (Be sure to remember to wipe the part where the integrated rust-proof/rust-removing agent is attached)

(7) Start the equipment and run the built-in heating program at least once every day (for 3~5 minutes).

1.3 Frequently asked questions and treatment method

1. Cannot return to origin: (resolve in one day)

(1) There is problem with the limit switch, exchange limit switch;

（2） Electrical cable of the limit switch is broken, exchange electrical cable connecting between the limit switch and the power source cable of control module 24V switch;

（3） Check whether stop block, and limit switch distance is normal;

（4） Whether limit switch works normally, toggle the limit switch, check if output light is on, exchange limit switch if it is not on, inspect whether the system can receive signal if it is on.

2. System installation program cannot find USB flash drive:

（1） Plug USB flash drive directly into the system, if program cannot be read, it means data cable has problem, exchange data cable;

（2） Format the USB flash drive;

（3） Exchange system.

3. Driver abnormal alarm: inspect each axle parameter and whether each axle has collision or stuck.

4. Axle limit alarm: readjust each axle's limit parameter, increase to 2mm-5mm.

Section II - Overview of Six-Side Boring Machine Software

Hold® Six-Side Boring Machine software is provided for use in conjunction with Six-Side Boring Machine machine, and shall be installed at machine side. When processing plate with CNC drill, workers will operate the machining directly by running this software to perform processing. By using this software, you will view machine status and any alarm message on a real-time basis; fulfill some common manual actions, such as control on motion of a single spindle, or on start or closure of paw; import plate data and fulfill processing operations; perform simulating processing of plate; edit information on hole and slot positions of plate.

Section III -Software Function Description

2.1 Real-time display of machine status information

Figure 1

2.1.1 Display of machine and processing statuses

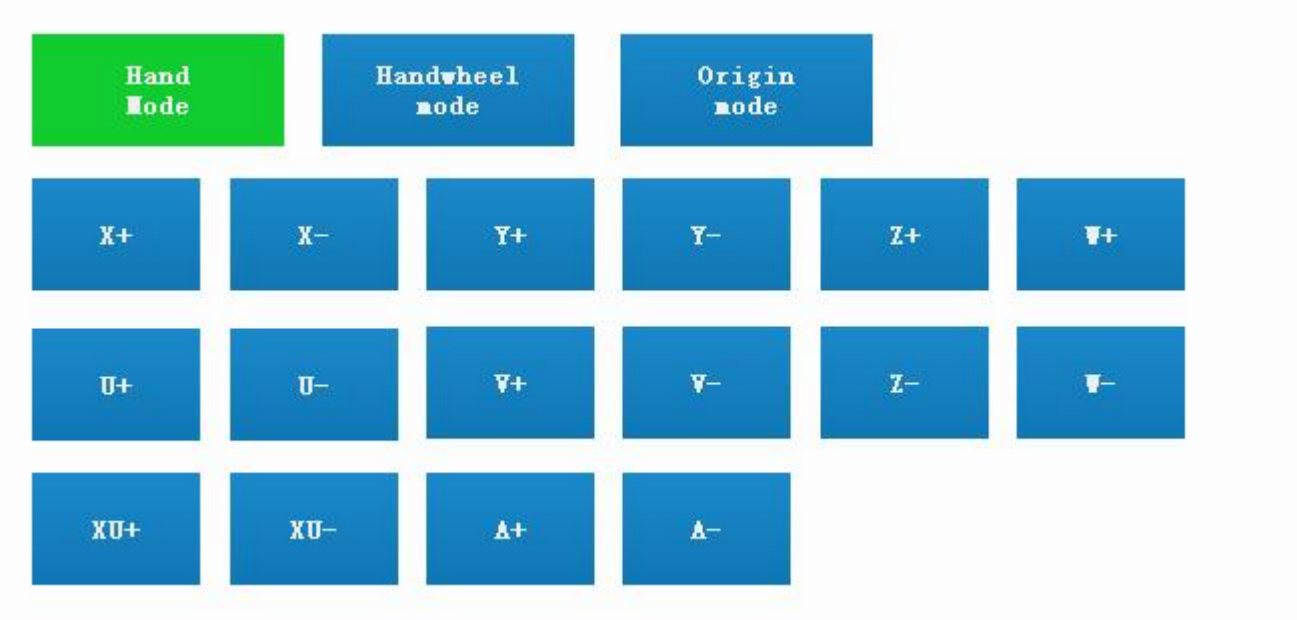
Machine and processing statuses will be displayed in the first place at the left side in Figure 1. Machine status information includes: disconnected from controller; normal status; alarm activated and etc. Processing status information includes: processing ongoing, processing suspended (idle).

2.1.2 Display of alarm message

In case of alarm activated in the equipment, details on the alarm will be displayed at column "alarm message" in Figure 1, and the background of the column will become red.

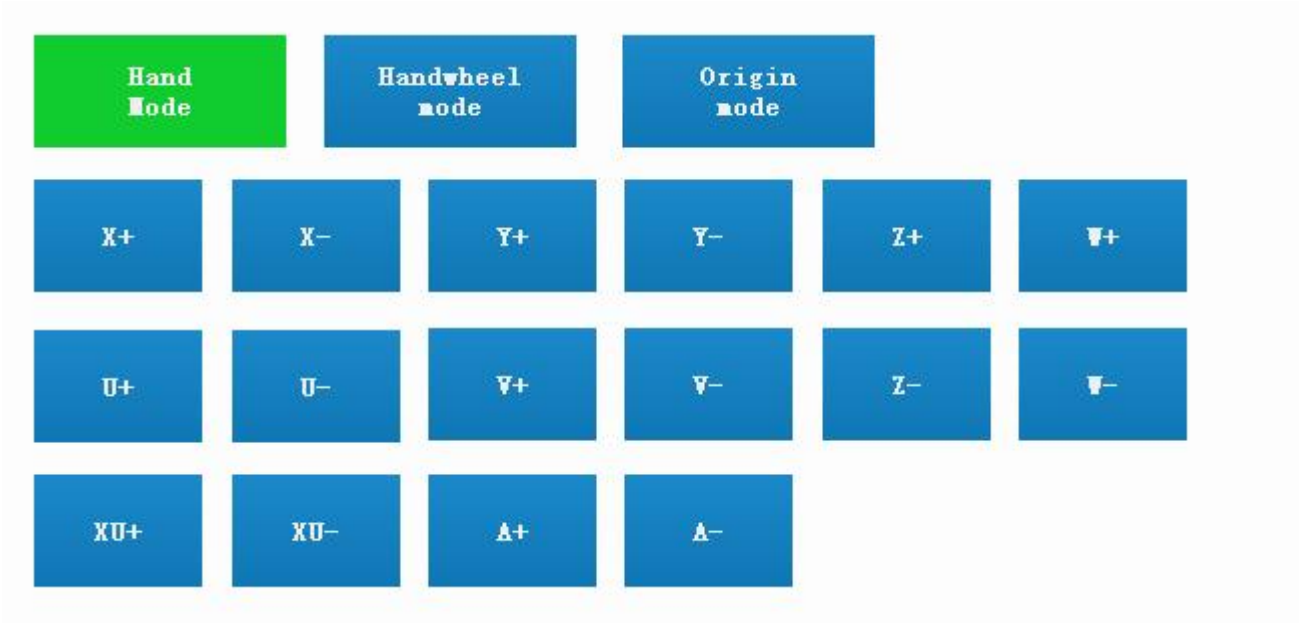
2.2 Manual mode function

2.2.1 Control on return-to-origin of spindles



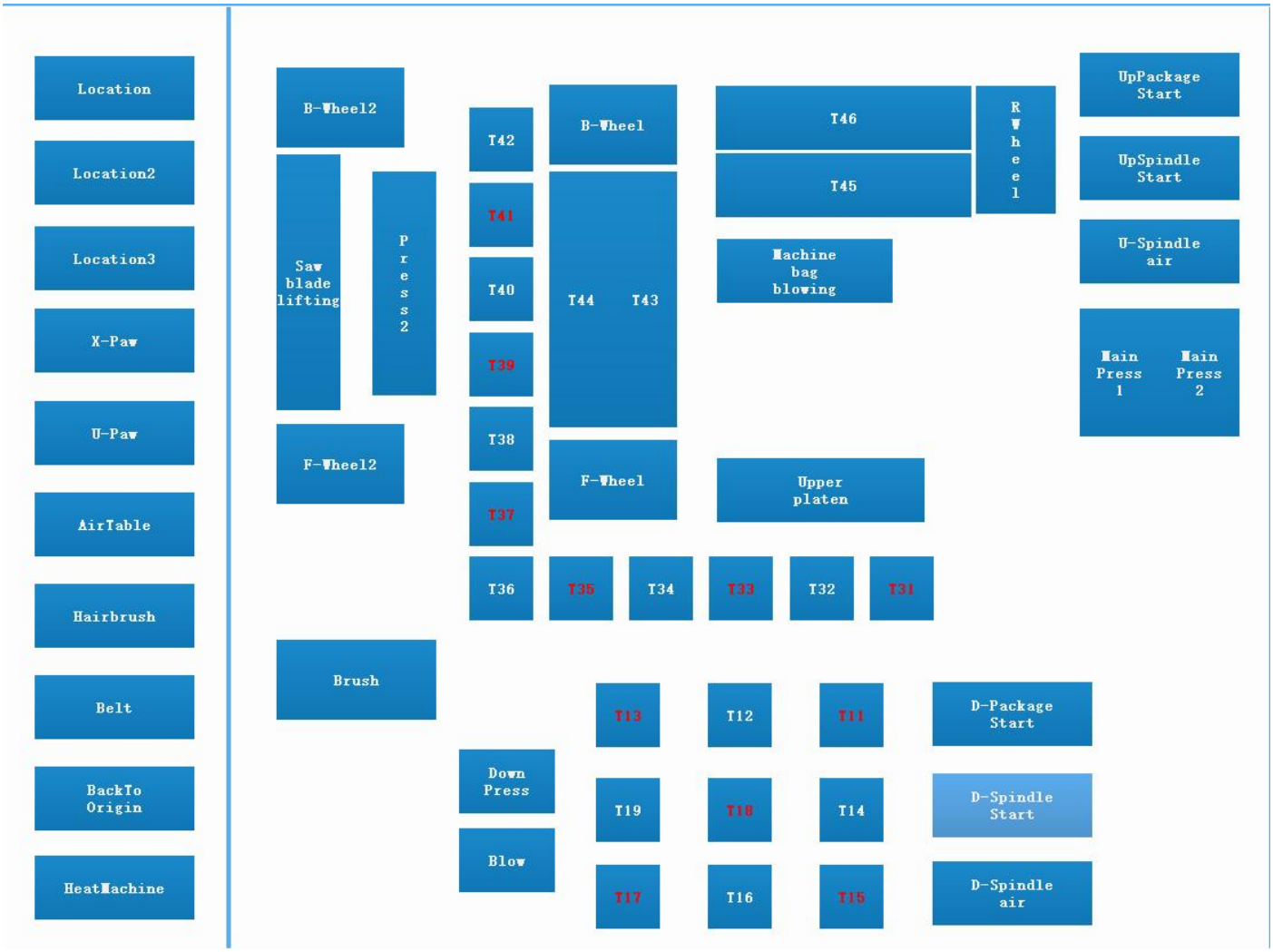
On the operation interface as shown below, click on "Origin Mode" and then click on "Return to Origin" button at the left side of Manual Interface to perform return of all spindles to origin.

2.2.2 Control on motion of spindles



On the interface above, click on "Manual Mode", and then click on the button related to a certain spindle to control motion of the spindle.

2.2.3 Control on clamp and drill cylinders



In manual mode, you can control drill, clamp and locating rod in the interface above.

2.2.4 Layout of drill package (including primary and secondary packages)

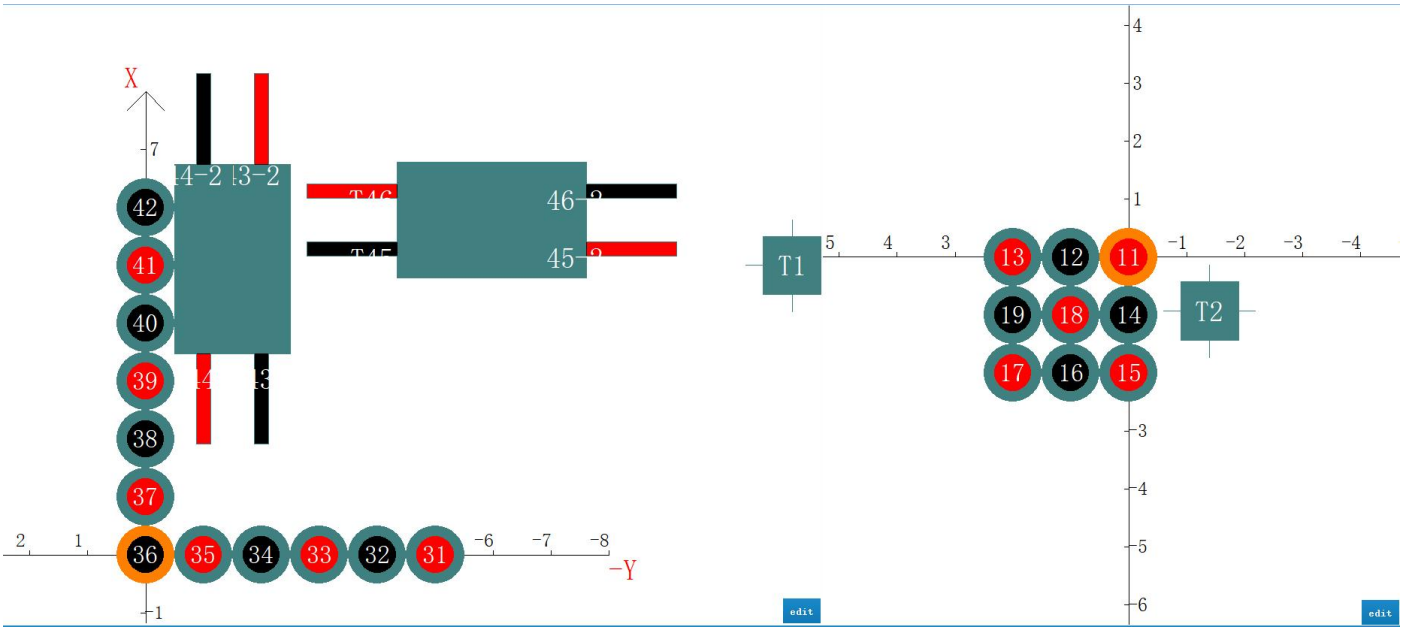


Figure 2

Click on "Edit Drill Package" in main interface to access package edition page, where you can add drill, re-arrange drill package, and set properties of each drill and tools on main spindle. A layout of upper drill package is given at the left side. A layout of lower drill package is shown at the right side. Click on "Edit" button at the lower right corner to set properties of drill and tools on main spindle.

Figure 3

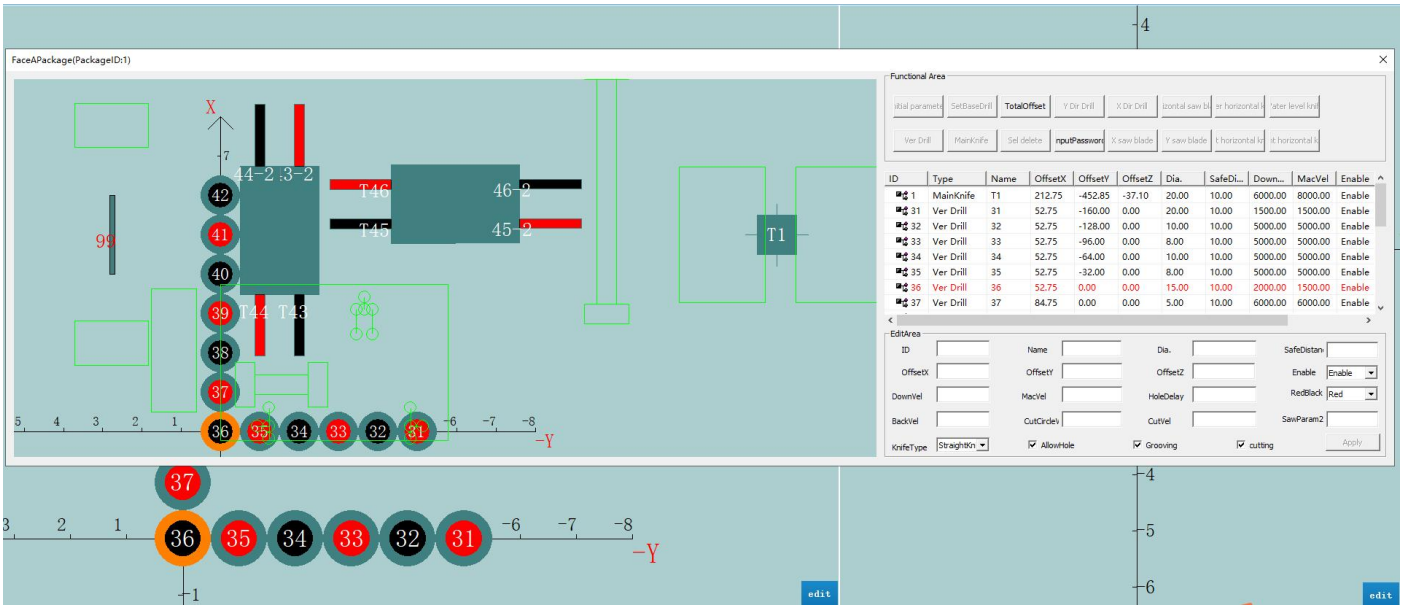
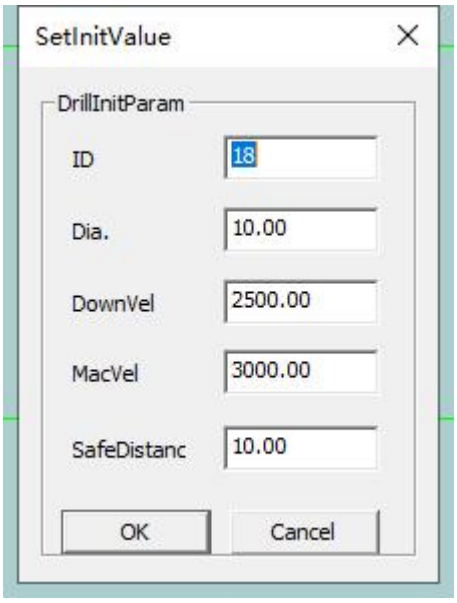


Figure 4

In Figure 3, you can adjust information on drill and main spindle of primary drill package (the one at the upper part of Six-Side Boring Machine). In Figure 4, you can adjust information on drill and main spindle of secondary drill package (the one at the lower part of Six-Side Boring Machine).

1. Set initial parameters



The initial values set will be used as default parameters of drill when drill or main spindle tools are added, and search for number of unused drill will begin with the initial value.

2. Add vertical drill

   Click on "Vertical Drill" button and then left click on a proper position in the layout view at the left side to add a new vertical drill at current position.

3. Add Y-direction horizontal drill

   Click on "Longitudinal Drill" button and then left click on a proper position in the layout view at the left side to add a pair of Y-direction drills at current position.

4. Add X-direction horizontal drill

   Click on "Transverse Drill" button and then left click on a proper position in the layout view at the left side to add a pair of X-direction drills at current position.

5. Add main spindle tools

   Click on "Main Spindle" button and then left click on a proper position in the layout view at the left side to add a main spindle tool at current position.

6. Bracketing deletion

   Bracketing deletion is used to delete improper or unnecessary drill. Click on "Bracketing Delete" and then click on any two points in the left layout view to choose all drills between the points (in the rectangle limited by the points), which are displayed in green color, and then press "Delete" to delete any drill and tool chosen.

7. Discard Tool

   Right click on the left layout view to discard the aforesaid tools, including vertical drill or X-direction horizontal drill

as added above.

8. Set primary drill

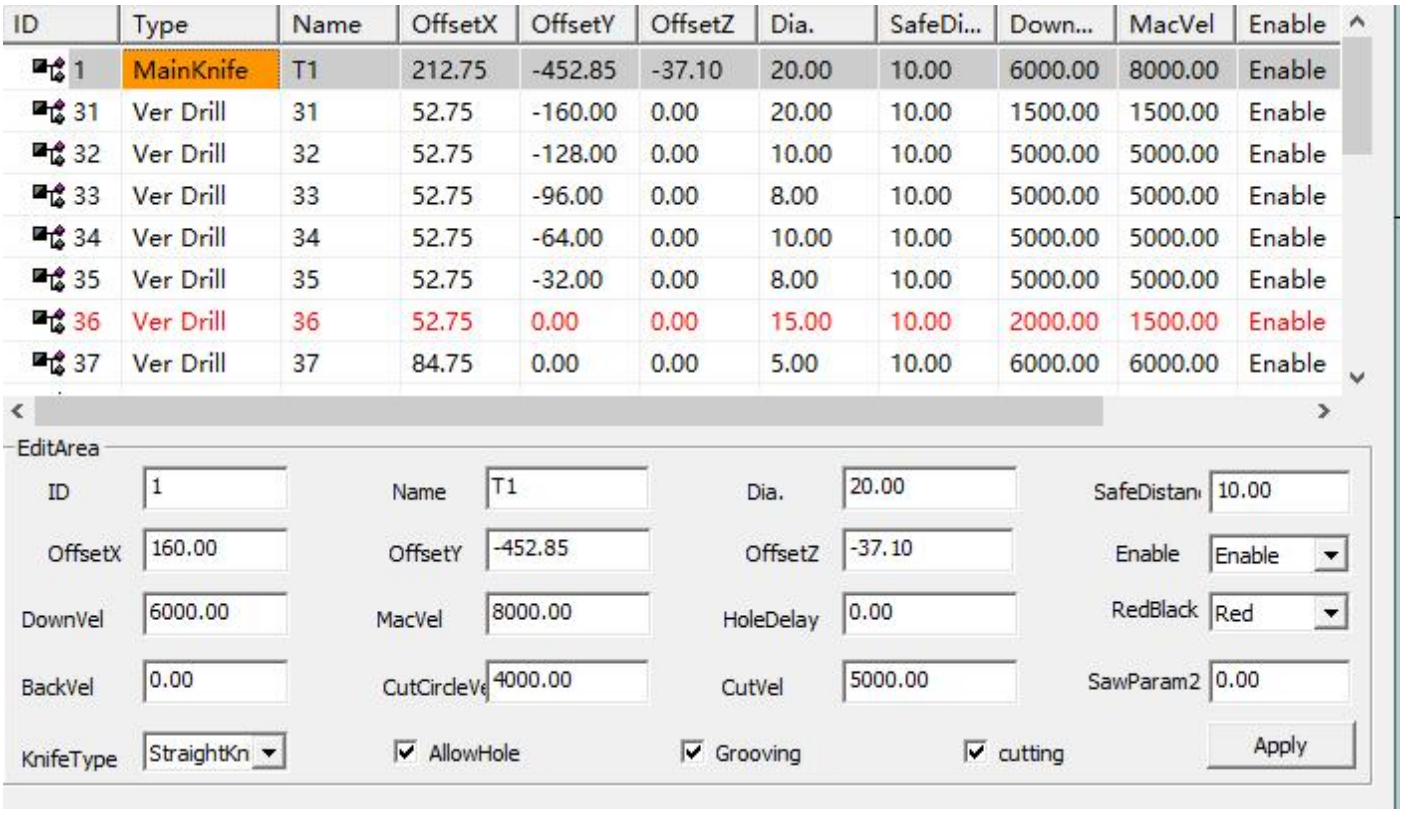
Each drill package includes a base drill (primary drill), which must be a vertical drill. First click on a vertical drill in the left layout view, and then click on "Set as Primary Drill" button to set the drill as a base drill.

9. Collective displacement

Collective displacement is used to displace all drills and tools in a drill package collectively. The drill set as base drill is displayed in orange color in the left layout view.

10. Change properties of drill/tool

Click on a button to choose a certain drill in the left layout view, and then change its properties in the edit box at the right side;



or choose a drill from the list of drills at the top, and then change its properties in the edit box at the lower side.

(1) Number - each drill is assigned with a unique number.

(2) Name - each drill is identified with a name for convenience of identification.

(3) Diameter - the diameter of drill or tool.

(4) Safe distance - the distance between drill and plate surface at which a drill is first set before drilling a hole, and to which the drill is returned after completion of drilling.

(5) X-offset - the offset of drill along X-axle in G54 coordinate system.

(6) Y-offset - the offset of drill along Y-axle in G54 coordinate system.

(7) Z-offset - the offset of drill along Z-axle in G54 coordinate system.

(8) Enabled - any drill is usable only after being "enabled", or otherwise it will be unusable as if it has not been installed on drill rod.

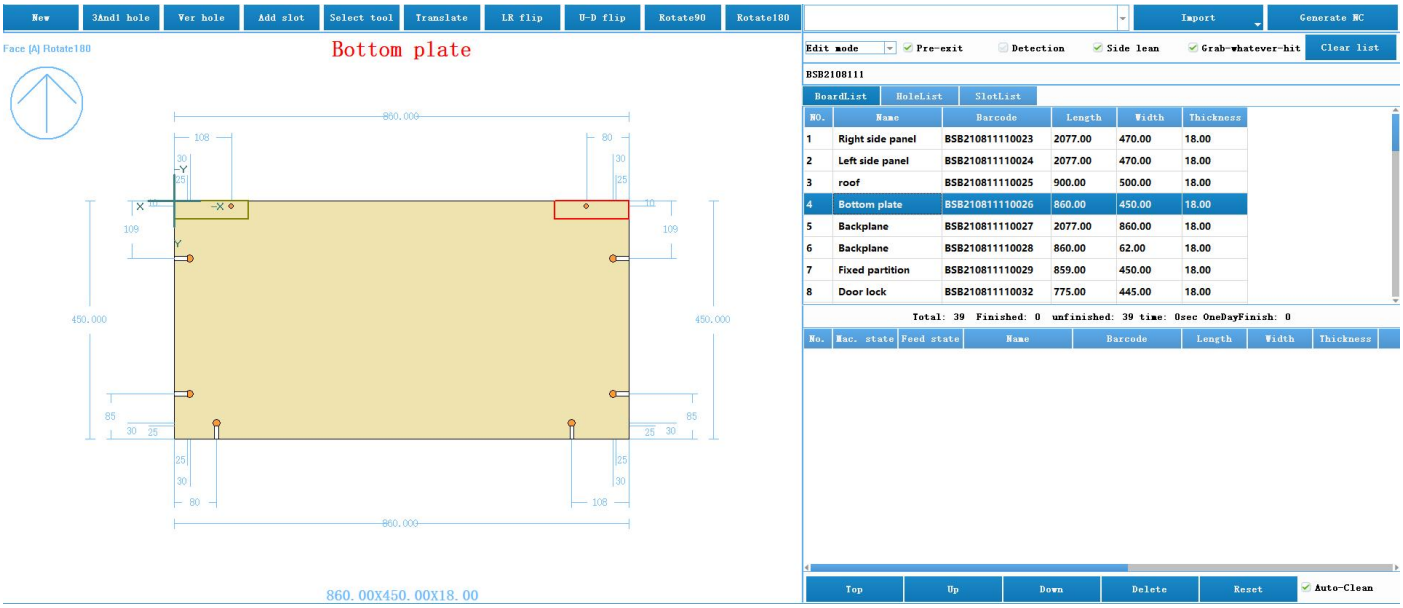
(9) Cutting velocity - means the velocity of drill cutting into the surface of a plate, in mm/minute.

(10) Drilling velocity - means the velocity of drilling from the surface to the hole depth, in mm/minute.

(11) Hole bottom delay - the time delay after drilling to the hole depth, to ensure the depth is consistent with the actual data, in ms.

(12) Red or black - with respect to a drill, Red and Black respectively mean forward rotation and reverse rotation, which is used for visual identification of a drill, and meaningless in actual processing.

3.1 Automatic mode function



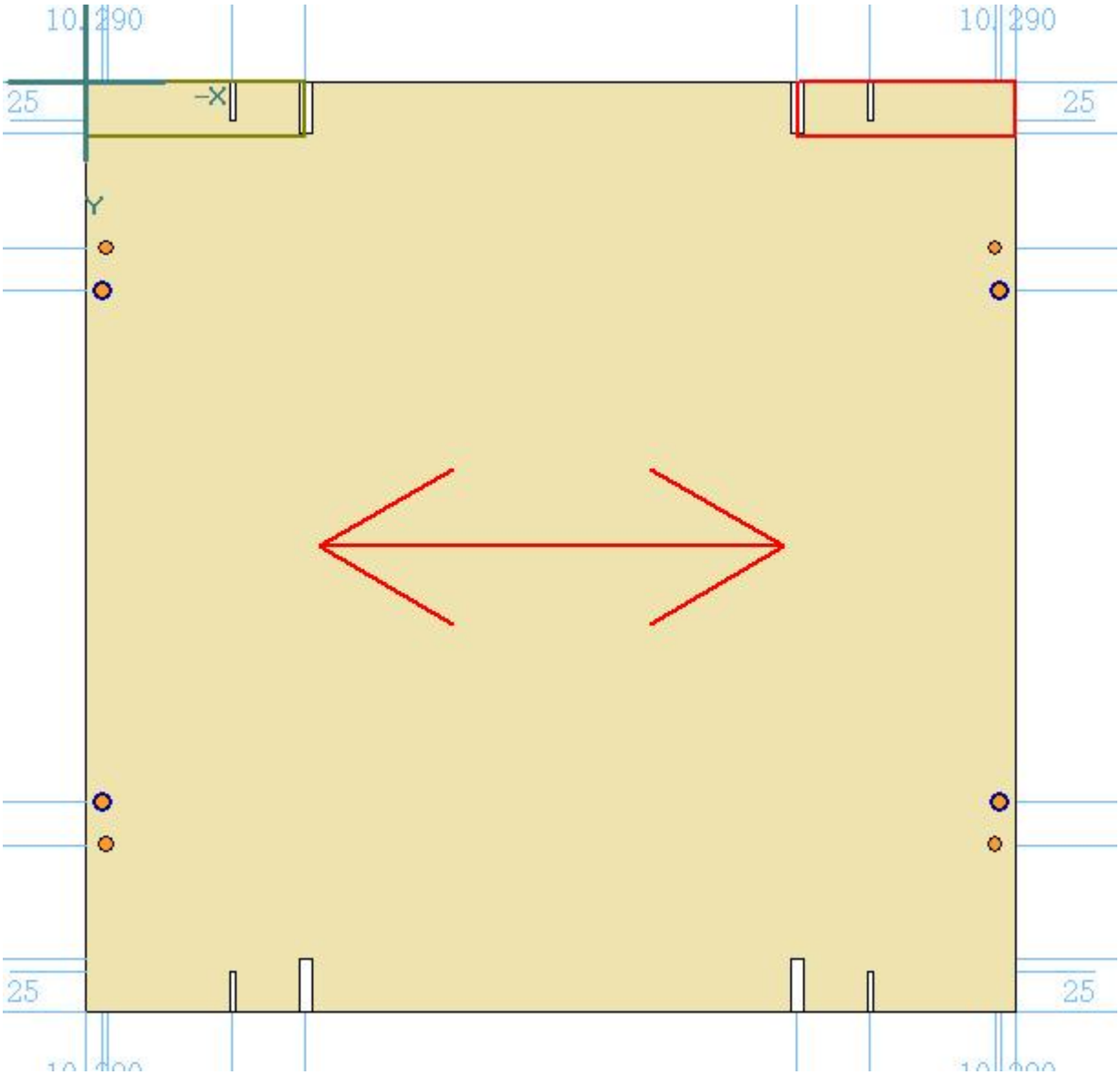
3.1.1 Import plate data

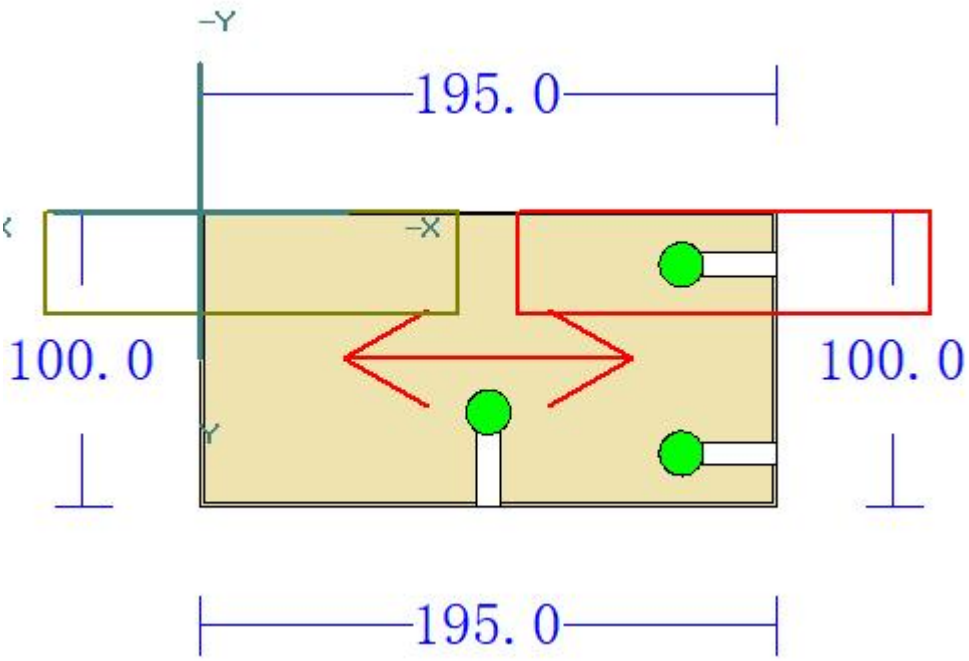
In Automatic Mode interface, click on "Import Data" button and then choose "3-D XML folder", "general MPR folder" or "general BAN folder" to import related separate data, and information on all plates will be displayed in the list after imported successfully.

3.1.2 Scan plate bar-code

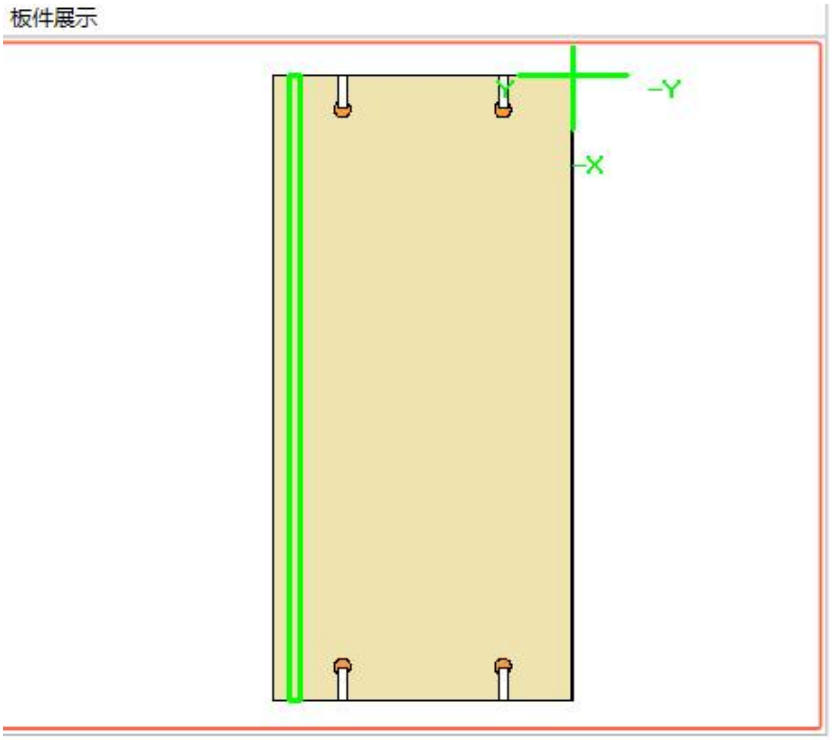
Scanner in USB or serial port is available. In processing mode, when bar-code of a plate is scanned successfully, the plate will be added to "List of Processing".

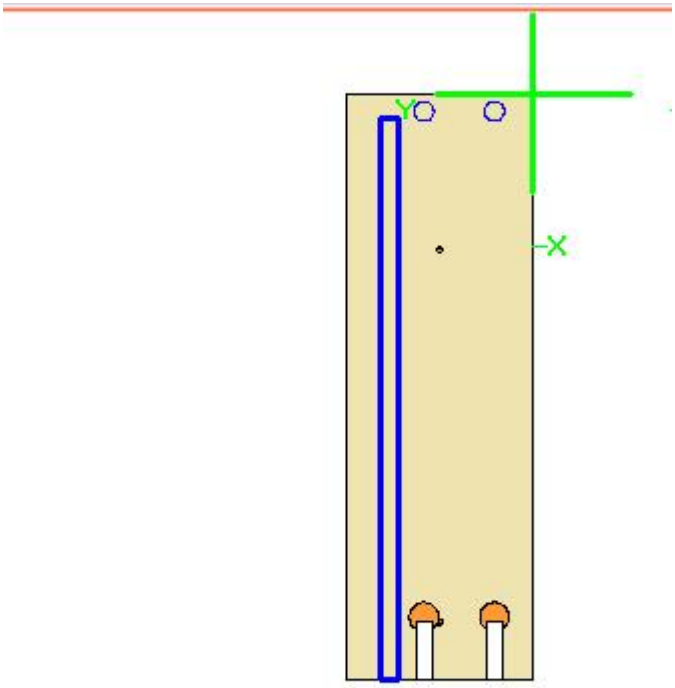
3.1.3 Graphical display of plate





Details on plate currently processed will be displayed, including hole/slot, profile and edge banding of the plate. Hole/slot in plate will be displayed in different color to indicate different status. Green means that the hole/slot has been made in cutting machine, and does not need to be processed further in CNC drilling machine. Solid green icon means hole/slot in front side, while hollow green icon means hole/slot in back side.





Blue means hole/slot in back side, while orange means hole/slot in front side.

3.1.4 Rotation and flipping of plate

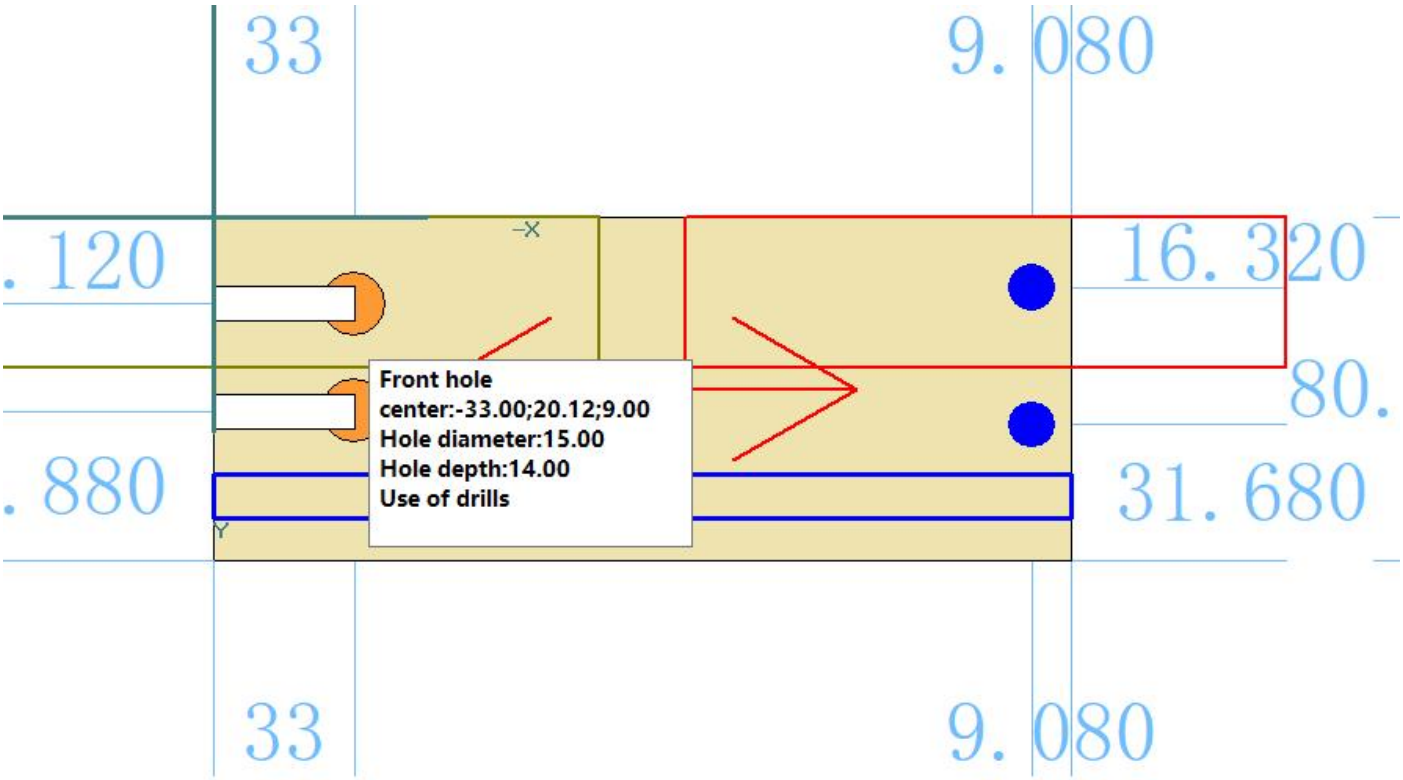
Plate Rotation is used to rotate plate in clockwise direction by 90 degree, one click for a single rotation, two clicks for rotation by 180 degree.

Plate flipping includes transverse flipping and longitudinal flipping. After flipping, hole/slot on the front side will be on the back side, vice versa.

3.1.5 Available processing list

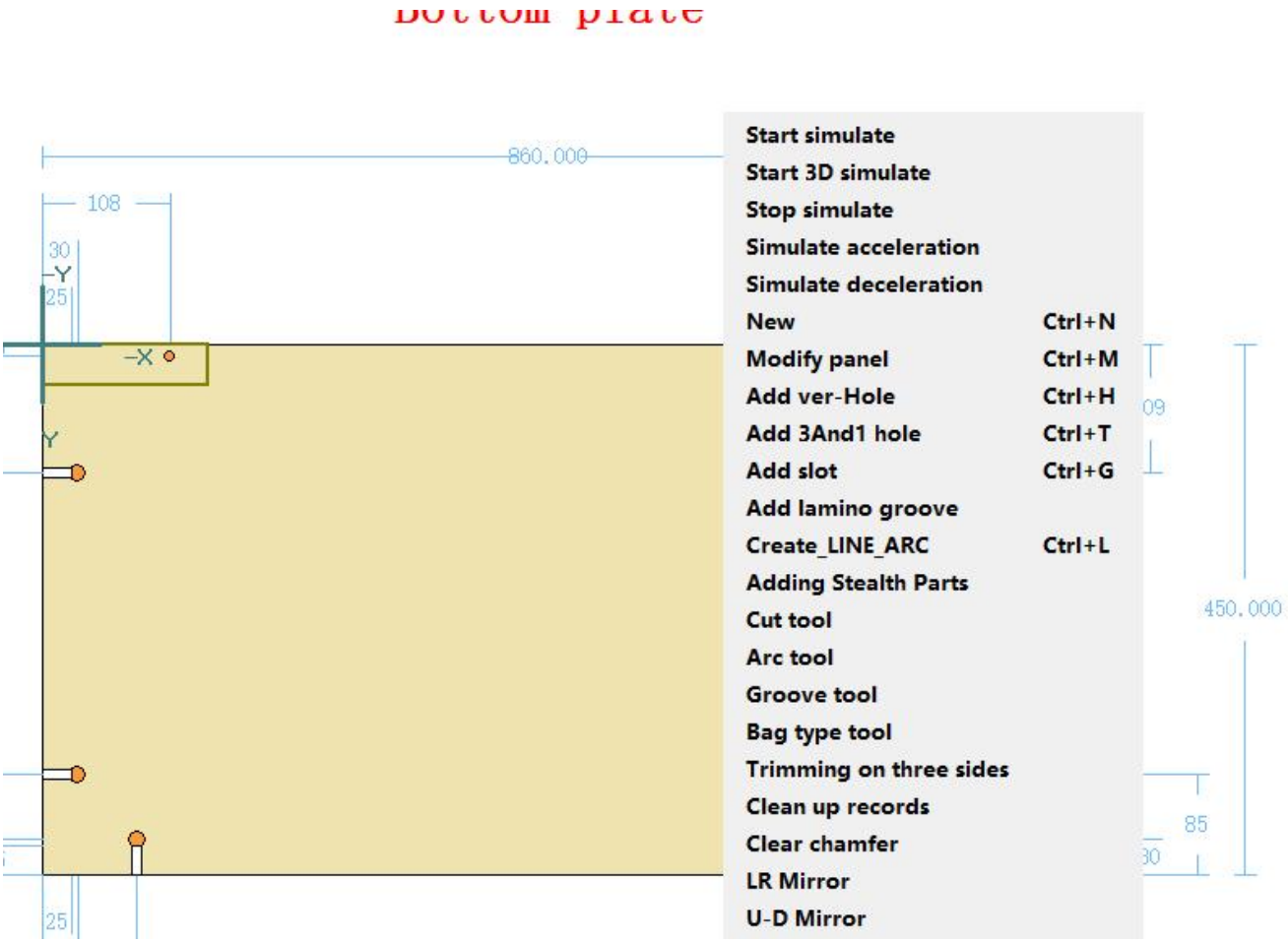
In "Processing Mode", any plate(s) scanned will be added to processing list. When a plate has been processed, the next one to be processed will be loaded automatically, and the processing data on it will be sent to controller in the form of NC file. Sequence of plates contained in processing list can be adjusted, including "move up", "move down", "set to top", and "delete".

3.1.6 View information on hole/slot

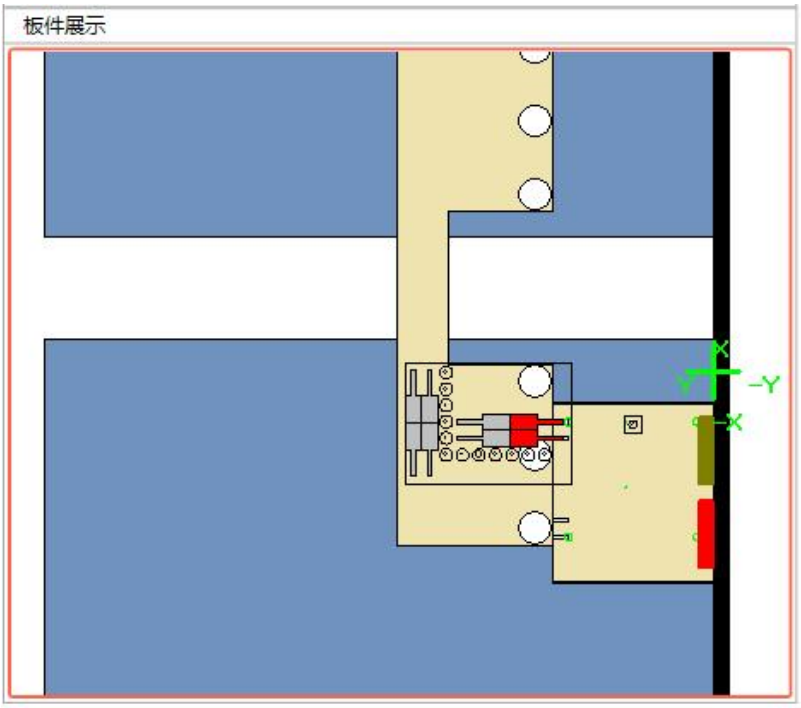


As shown above, in plate display area, move cursor to related hole or slot, a message box will pop up, displaying details on the hole/slot.

3.1.7 Simulating processing



In plate display area, right click and choose "Start simulation" from the right-click menu to enter simulation processing page, and click on "Stop simulation" to exit from it. You can use "simulation acceleration" or "simulation deceleration" to adjust simulation processing speed. A simulation processing page is shown below.

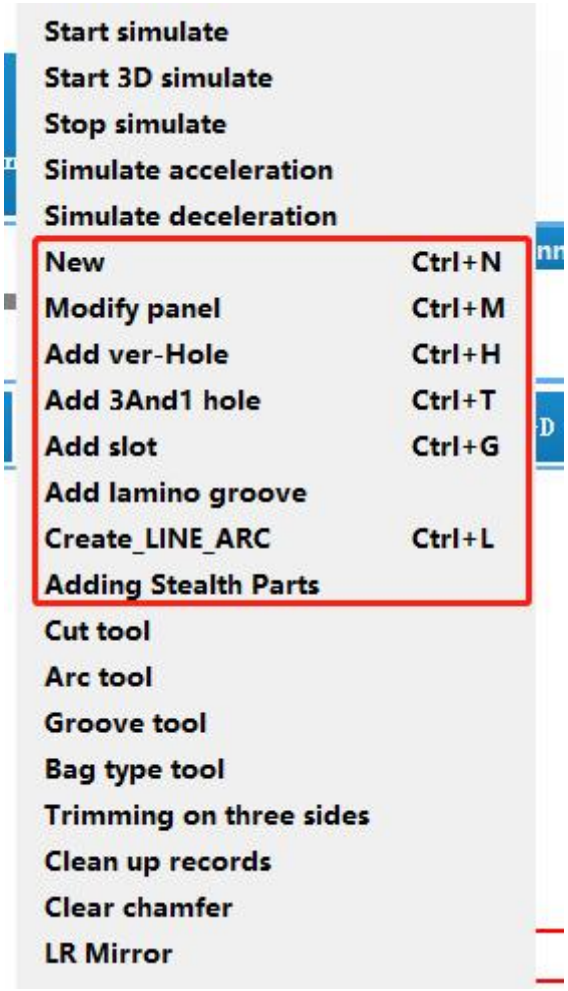


3.1.8 Dual-plate processing

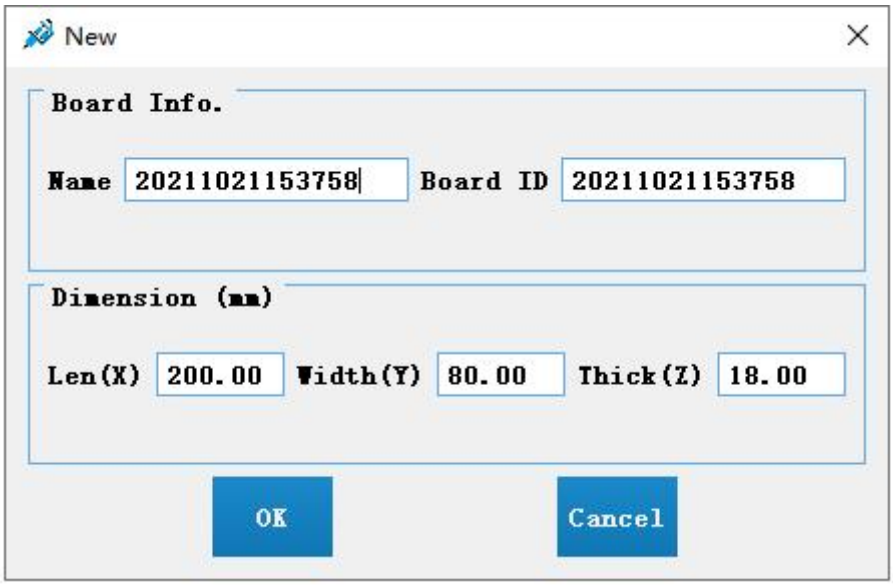
Dual-plate processing is for batching processing of plates in same sizes and with processing data available only on one side, where two plates of same sizes will be overlapped for processing at the same time, so as to improve processing efficiency.

3.1.9 Plate edition

In plate display area, use right-click menu and the buttons as shown above to access plate edition functions.



1. New plate

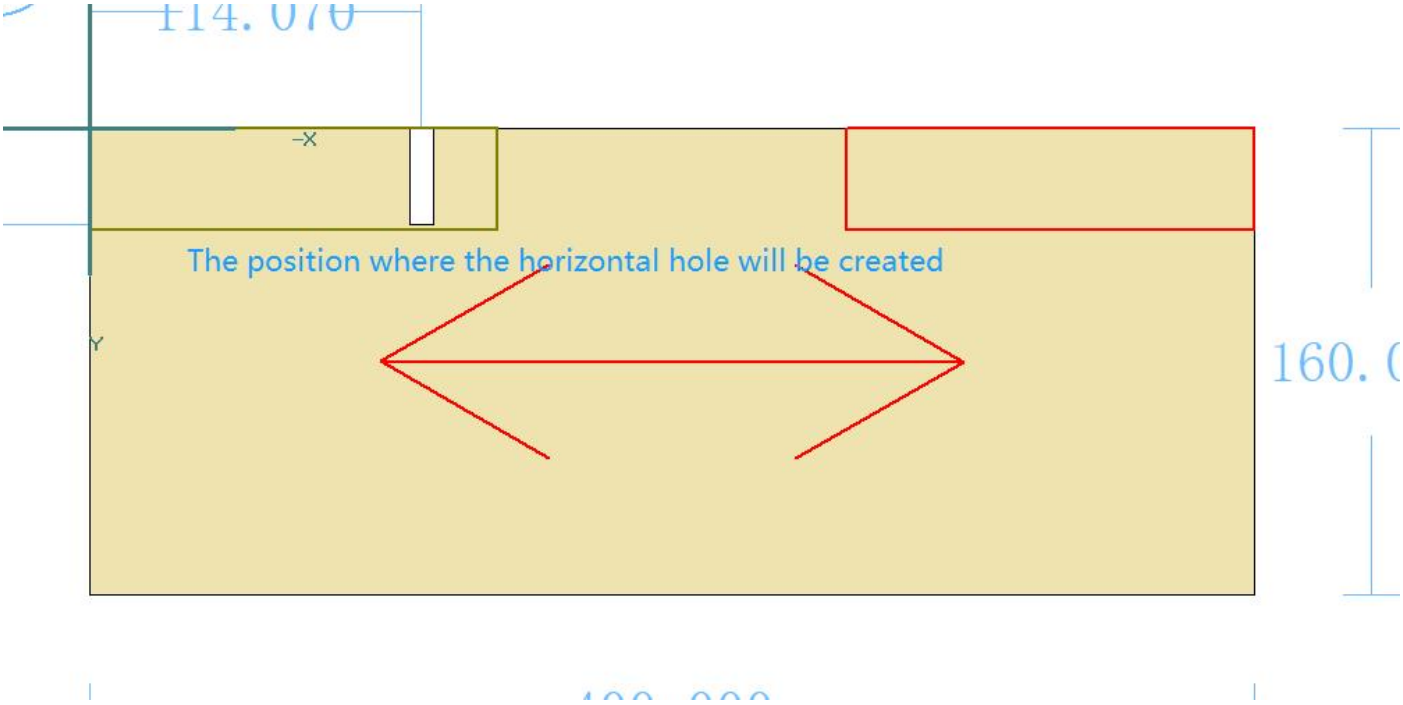


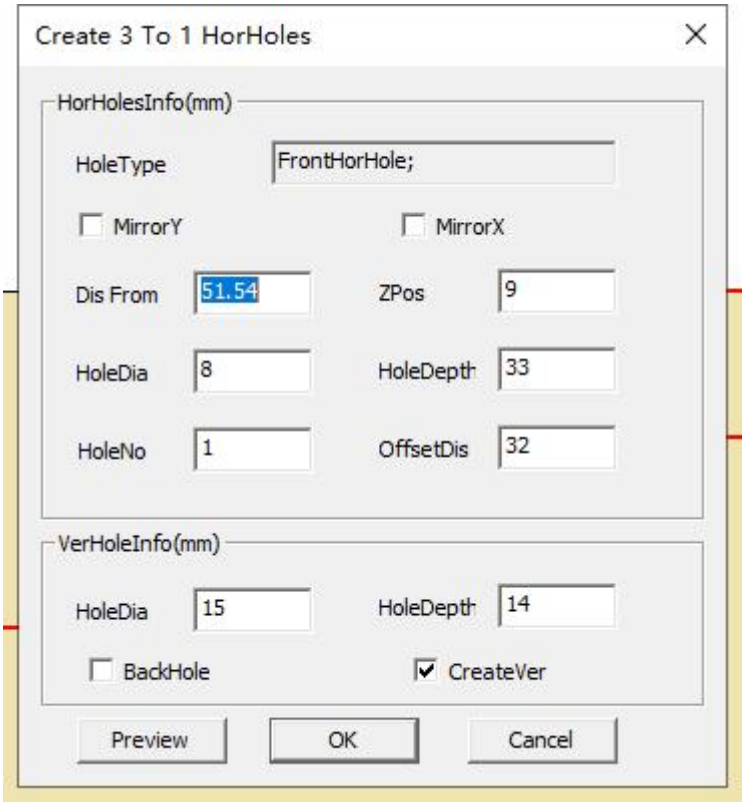
Enter plate information to the dialog box and click on OK to create a new plate.

2. Add three-in-one hole

Choose "Add three-in-one hole" from right-click menu, and then click on a certain corner of a plate, and move cursor

to the target position and left click on it to pop up a dialog box as shown below, and enter details on three-in-one hole in it.





Notes:

Distance to origin: in case of horizontal hole at the left or right side, it means the distance between center of the hole and the origin in Y direction; In case of horizontal hole at the upper or lower side, it means the distance between center of the hole and the origin in X direction, and this value should be larger than 0.

Z-coordinate: means the distance between center of side hole and the lower plane of plate, this value should be larger

than 0.

Side hole diameter: the diameter is generally 8.

Side hole depth: generally, it is around 30mm.

Number of side holes: in case of more than 1 hole, a number of side holes will be created based on offset.

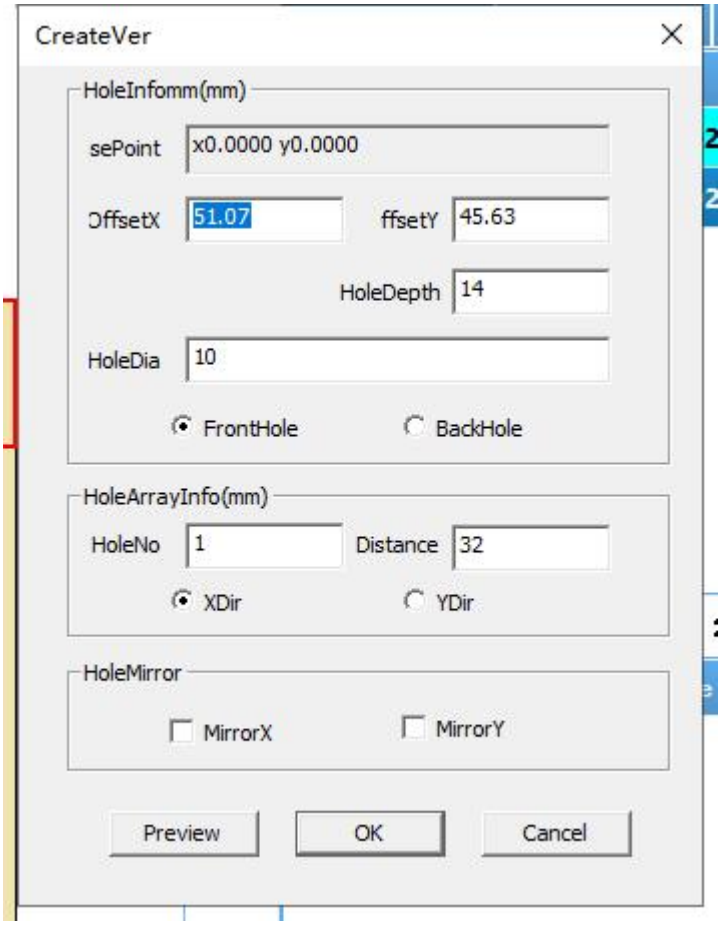
Side hole offset: in case of more than 1 hole, offset means the relative position of two adjacent holes, which may be larger or less than 0.

Vertical hole diameter: diameter of large hole, and generally 15mm.

Vertical hole depth: depth of large hole, and generally 14mm.

3. Add vertical hole

Vertical hole can be created based on the four corner points of plate, or any other vertical hole created already. Choose "Add vertical hole" from right-click menu, and click the four corner points or a certain vertical hole in the plate to pop up a dialog box as shown below, and then enter details on the hole in it.



Notes:

X-offset/ Y-offset: the position of hole relative to the base point, which may be positive or negative value.

Hole diameter: diameter of hole, which should be larger than 0.

Hole depth: larger than 0 and less than or equal to thickness of the plate; when the depth is equal to plate thickness, it means that the hole is a through-hole.

Front-face/back-face hole: means whether the hole is in the front side or back side.

Number of arrays: can be equal to or larger than 1.

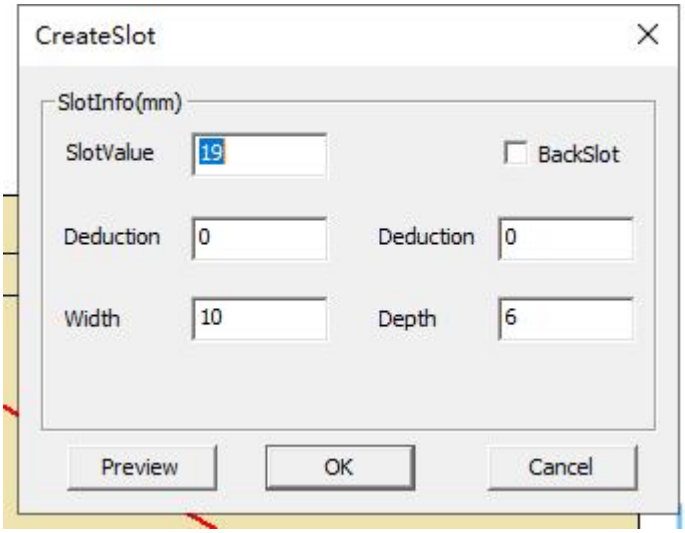
Spacing of arrays: this value is valid when there are more than 1 array, and may be larger or less than 0.

Array direction: it may be in X or Y direction.

Hole mirror: to create a symmetrical hole.

4. Add slot

Choose "Add slot" from right-click menu, and click on a certain side line of the plate to pop up a dialog box as shown below. A new slot will be created based on the line which is clicked on.



Notes:

Slot banding value: means the value of distance from the center of slot to edge of the plate.

Back-face slot: means whether the slot is on the front or back side.

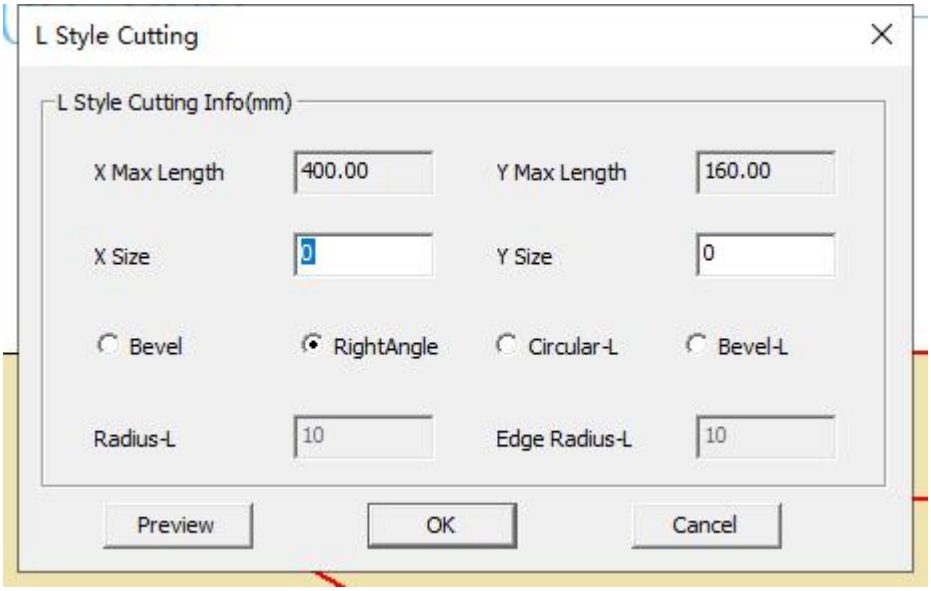
Deduction: means the distance from the both ends of the slot to edge of the plate. The first deduction is the one in positive direction, while the second deduction is the one in negative direction.

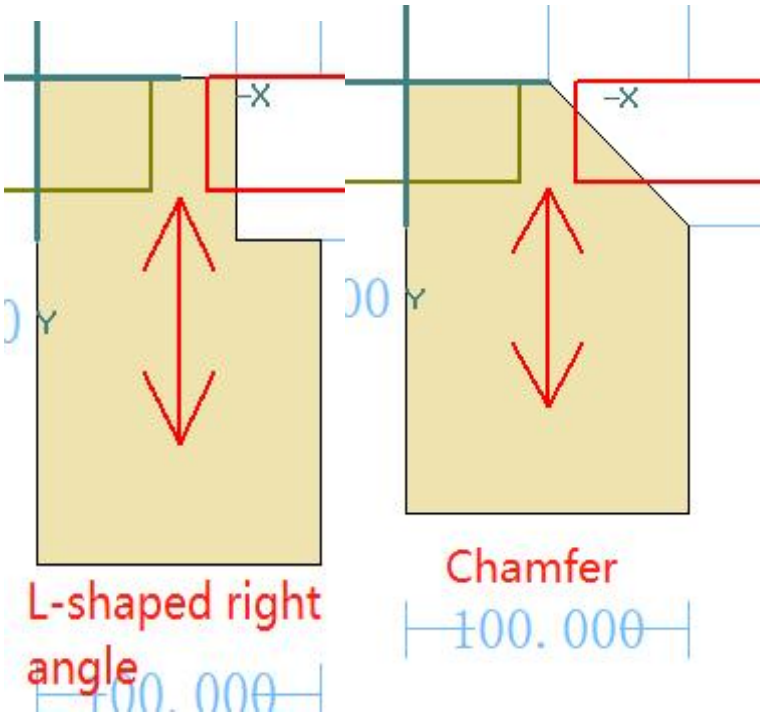
Slot width: width of the slot, generally 6 or 10.

Slot depth: depth of the slot.

5. Corner cutter (L-shape plate)

Choose "Corner cutter" from right-click menu, and then click on a certain corner point of the plate to pop up a dialog box as shown below.


L Style Cutting
L Style Cutting Info(mm)
X Max Length
400.00
Y Max Length
160.00
X Size
0
Y Size
0
Bevel
RightAngle
Circular-L
Bevel-L
Radius-L
10
Edge Radius-L
10
Preview
OK
Cancel


X
X
Y
Y
L-shaped right angle
Chamfer
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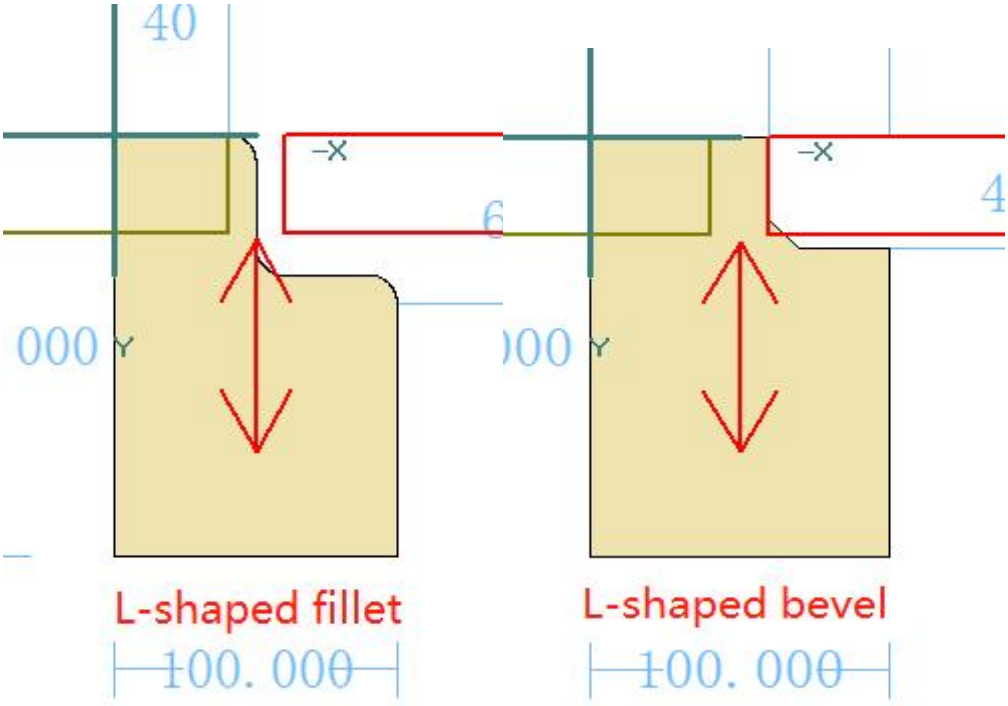
100.000



Notes:

X-direction corner size: not larger than the maximum length in X direction.

Y-direction corner size: not larger than the maximum length in Y direction.

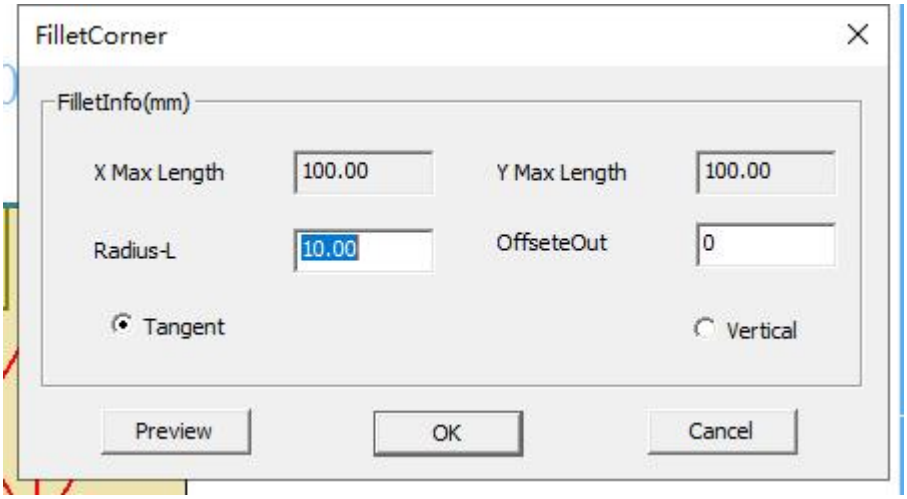
Corner type: includes diagonal, L-shape straight, L-shape circular and L-shape diagonal corners.

L-shape circular corner radius: radius of the middle arc in L-shape circular corner.

L-shape edge radius:radius of the small arcs at both ends of L-shape circular corner, which can be 0.

6. Circle cutter (arc-shape plate)

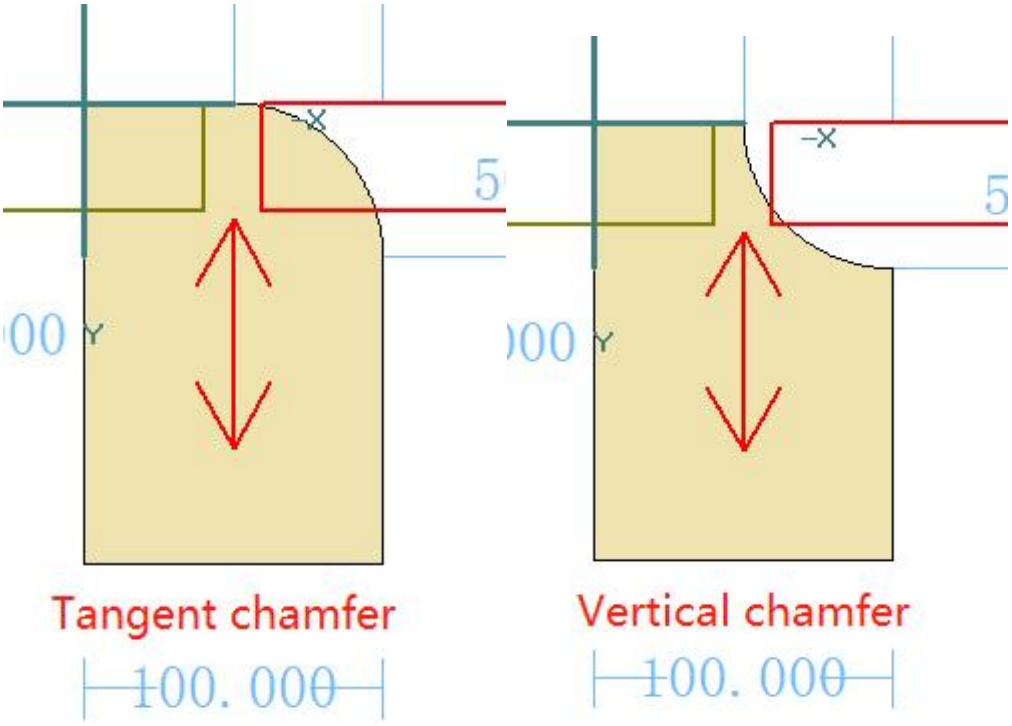
Choose "Circle cutter" from right-click menu, and then click on a certain corner point of the plate to pop up a dialog box as shown below. The corner which is clicked on will be cut in circle.



Notes:

Circle radius: not larger than the maximum length in X and Y directions.

Circle type: includes tangential and perpendicular circles.



7. Clear corner

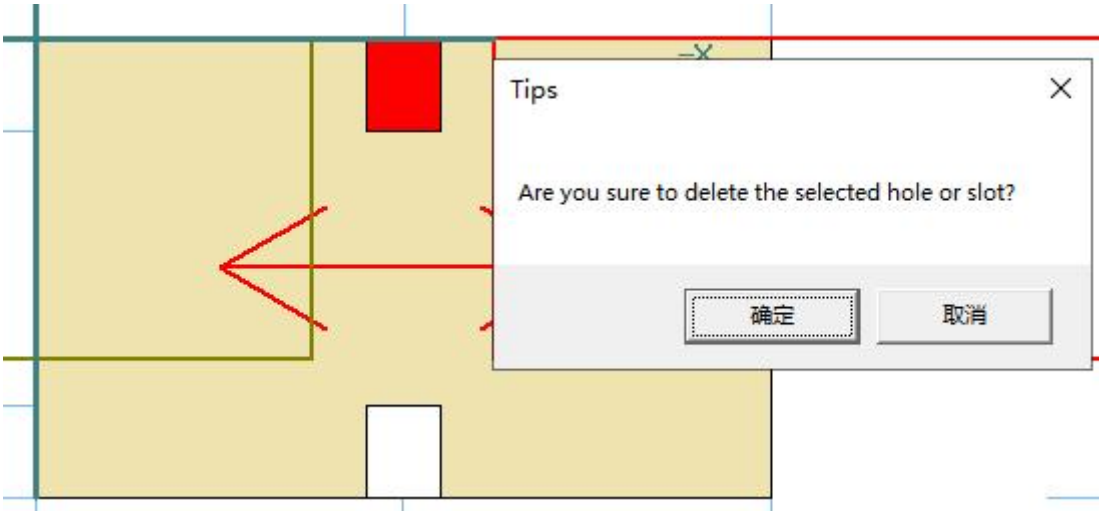
"Clear corner" is used to restore the external profile of plate to the original rectangle.

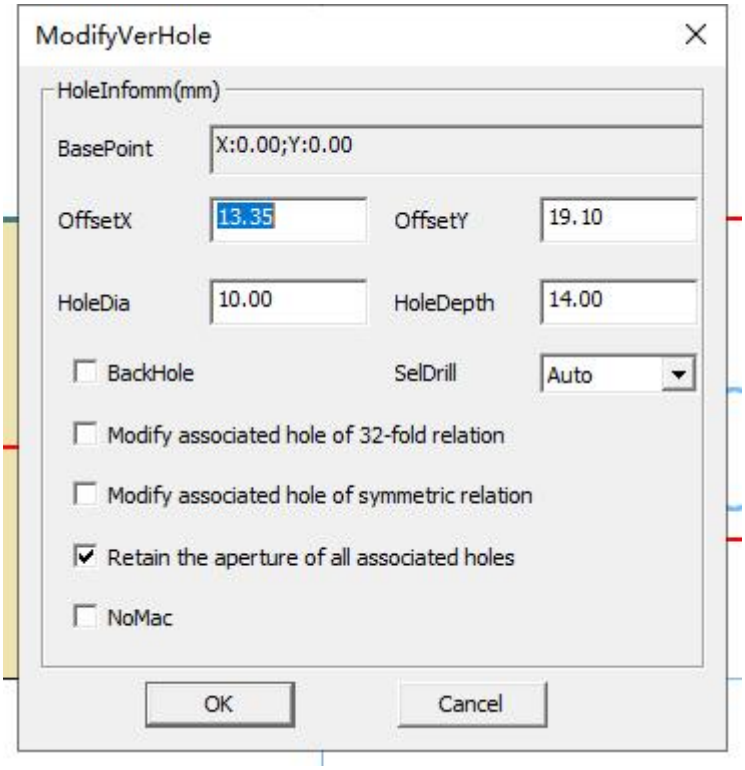
8. Selection tool

Selection tool means to discard all plate editing tools. After discarding all plate editing tools, choose by clicking the hole or slot. The chosen hole or slot will be displayed in red color. You can choose more than one hole/slot by pressing CTRL key. After choosing hole/slot, press "Delete" to delete it.

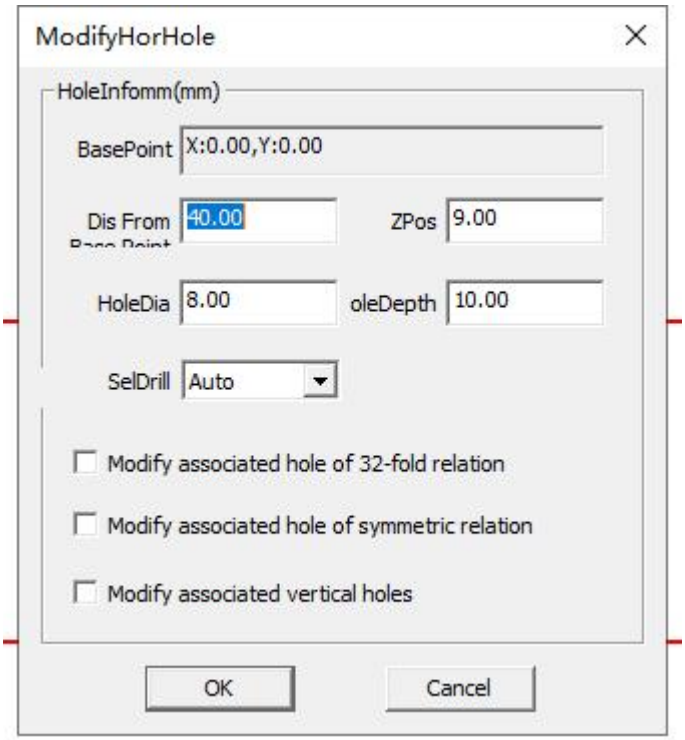
Modify vertical hole information

First access "Selection tool", and then move cursor to a certain hole and double click on it to pop up a edition dialog box as shown below.

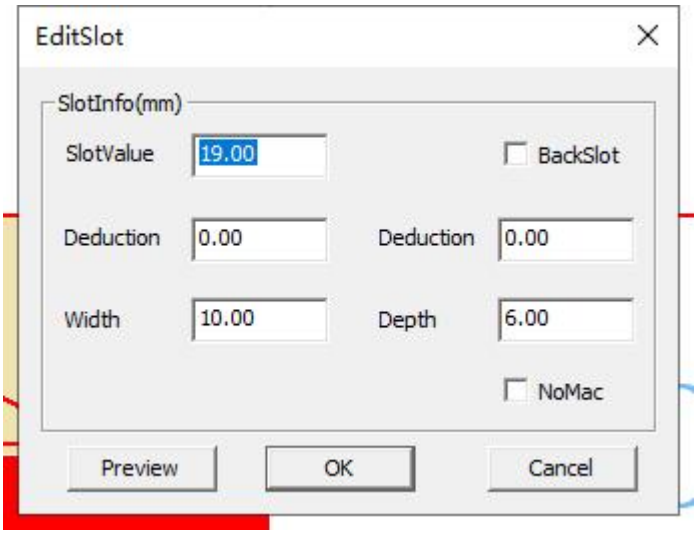




9. Modify horizontal hole information



10. Modify slot information



4.1 Parameter setting

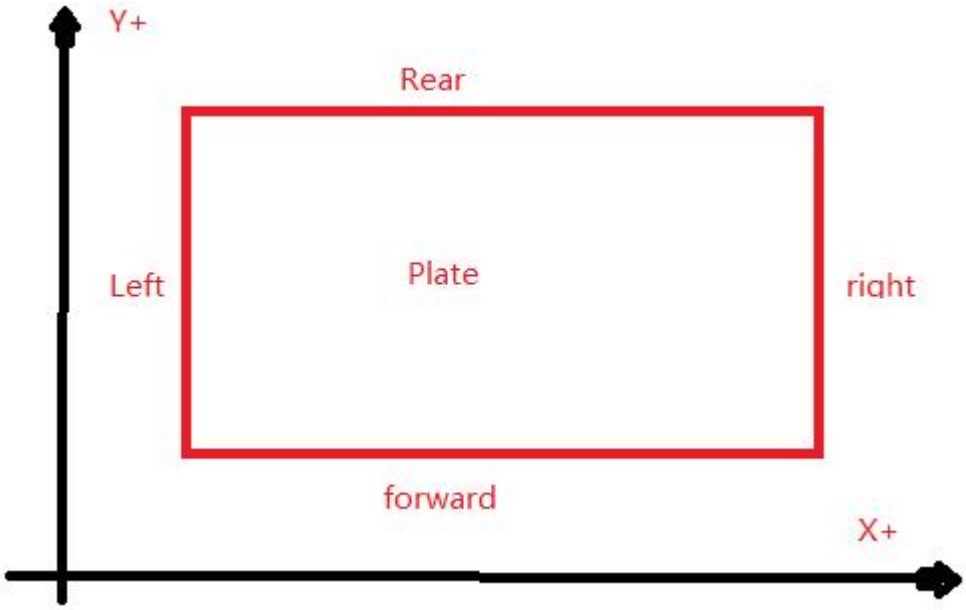
4.1.1 User parameters

In user parameters, those in blue font are read-only and non-modifiable. Upon finishing modification, click on "Save" button at the lower right corner to apply the modification. All parameters are described in details below.

1	DeviceFactory	Device Factory Information	8:HD6
2	PawPosType	Paw Position Type: 0-left, 1-front, 2-right,3-back	1
3	DeviceType	Device Type: 1- five sided drilling machine, 2-six sided drilling machine, 3-high speed throughing drilling machine	2
4	CoorAngle	Coordinate Angle	180.00
5	CoorQuadrant	Coordinate Quadrant 0, 1, 2, 3	1
6	IsFlipY	Valid for five sided drilling machine, flip along with X axis	0
7	OutputVerHoles	Make vertical holes in face A-YES OR NOT	1
8	OutputHorHoles	Make horizontal holes-YES OR NOT	1
9	OutputSlots	Make slots in face A-YES OR NOT	1
10	OutputVerHolesBack	Make vertical holes in face B-YES OR NOT	1

Parameter description:

1. DeviceFactory - information on manufacturer of any device compatible with this software, which is read-only and non-modifiable.
2. PawPosType - paw position: 0 - left side; 1 - front side; 2 - right side; 3 - back side. These positions are defined based on X-Y coordinate system, as shown below.



The common models on the market include left-type model and right-type model. The value is 3 for left-type model, or 1 for right-type model.

3. DeviceType - device type: 0 - pentahedral drill, bottom-mounted drill package, and single paw; 1 - pentahedral drill, top-mounted drill package, and double paws; 2 - Six-Side Boring Machine, double paws; 3 - through-type multi-drill.
4. CoorAngle - rotation angle of coordinate system, which can be 0, 90, 180 or 270, meaning rotation of coordinate system in counterclockwise direction.
5. CoorQuadrant - the quadrant where the plate is located: 0, 1, 2 and 3 means respectively the 1st, 2nd, 3rd and 4th quadrant.
6. IsFlipY - direction of flipping back-face plate: 1 - vertical flipping along Y axle; 0 - horizontal flipping along X axle. This parameter is valid only for pentahedral drill, and for flipping in processing on reserve side data.
7. OutputVerHoles - whether front-face hole is processed: 0 - no; 1 - yes.
8. OutputHorHoles - whether horizontal-side hole is processed: 0 - no; 1 - yes.
9. OutputSlots - whether front-face slot is processed: 0 - no; 1 - yes.
10. OutputVerHolesBack - whether back-face hole is processed: 0 - no; 1 - yes.

11	OutputSlotsBack	Make slots in face B-YES OR NOT	1
12	OutputShape	Make contour of irregular shape-YES OR NOT	1
13	OutputShapeHor	Whether or not the horizontal hole at the profile is machined, this parameter takes effect when the	1
14	IsMultiCut	Multi Cut-YES OR NOT	1
15	PerCutDepth	every Cut Depth	25.00
16	SingleFaceFlipStyle	0-No flip;1-Filp only with face B data" ;2-Slot first-Valid for six sided drilling machine only	0
17	ForceHorSlot	Force the board with vertical slots to rotate 90	0
18	BigHoleAtFaceA	15mm hole Force flip to face processing	0.00
19	RotateBoardStyle	Plate rotation mode: 0Avoid the clamp hand; 1Not Rotate; 2Turn 180 or 90.	1
20	DoubleBoardMac	0-No double boards processing;1-Mirroring processing;2-right and right flip;3-up and down flip	0

11. OutputSlotsBack - whether back-face slot is processing: 0 - no; 1 - yes.
12. OutputShape - whether allotypic profile is processed: 0 - no; 1 - yes.
13. OutputShapeHor - whether horizontal hole in allotypic profile is processed, which is valid other than in processing of external profile: 0 - no; 1 - yes.
14. IsMultiCut - whether multi-cutting is applied, taking into consideration that, in thickness processing, full-thick cutting is too demanding to tools.
15. PerCutDepth - depth of cutting, which is in pair with the aforesaid parameter, meaning the maximum cutting depth in multi-cutting.
16. SingleFaceFlipStyle - rule of flipping: 0: no flipping; 1: flipping only when back-face data is available; 2: priority to slot; It is valid only for Six-Side Boring Machine! Flipping rule is intended to improve processing efficiency. After flipping, the hole/slot originally on back side will be processed on front side, by using upper drill package.
17. ForceHorSlot - forcible rotation of plate with vertical slot by 90degree: 0 - no; 1 - yes.
18. BigHoleAtFaceA -forcible rotation of large hole (equal to or larger than 15) to front side for processing: 0 - no; 1 - yes. After flipping, large hole will be processed with upper drill package.
19. RotateBoardStyle - plate rotation means: 0 - try to avoid paw; 1 - no rotation; 2 - rotation by 180 or 90 degree. It is recommended to set it to 0 so as to improve processing efficiency.
20. DoubleBoardMac - 0: no dual-plate processing; 1: dual-plate mirror processing; 2: horizontal flipping; 3: vertical flipping. This is an option for dual-plate processing. When 1 is chosen, the two plates processed are mirrored and symmetrical to each other. When 2 or 3 is chosen, the two plates processed are the in same profile.

21	BoardExitPos2	Board rear exit position	1100.00
22	BoardExitPos	Board front exit position	150.00
23	EnableShatter	Enable Shatter:0-NO, 1-YES	0
24	HolesSortingStyle	Sorting optimization for process holes: 0-only in; 1- Shortest path	1
25	PerLenForSorting	Shortest path for partition optimization, PerLenth	600.00
26	EnableThroughSixFaces	Enable through-type hexahedral drilling characteristics: no rotation of the original plate; light plate conveying, etc.	0
27	LanguageIni	INI Multilingual setting file INT	XhEnglish.XML
28	DrawPreview	Whether to display thumbnails	0
29	BoardInitAngle	Initial rotation Angle of board data--anticlockwise, to keep pace with board data and labelling position	180

21. BoardExitPos2 - rear output position, which means the target position of plate tail (G54 coordinates).

22. BoardExitPos - front output position, which means the target position of plate head (G54 coordinates).
23. EnableShatter - 0: disable shattering processing; 1: enable shattering processing, meaning whether the whole of scrap will be shattered in processing internal milling data.
24. HolesSortingStyle - hole processing sequence optimization rule: 0 - only input; 1 - the shortest path. It is recommended to set it to "1" so as to optimize hole processing path and minimize idle running distance, and thus improve processing efficiency.
25. erLenForSorting - length of each segment in segmented shortest path optimization. This parameter will be used when HolesSortingStyle above is set to "1", meaning segmented optimization of hole processing sequence.
26. EnableThroughSixFaces - enable through-type Six-Side Boring Machine properties: transfer of empty plate. This option is used in automated equipment, where a plate without hole/slot waiting for processing data will be transferred to rear output position.
27. LanguageIni - multi-language configuration file (INI), used for setting of internal multi-language package, and associated to a XML file, from which related language information will be read by this software.
28. DrawPreview - whether preview of a secondary plate is displayed. When it is set to 1, two plates will be displayed in display area, and the one which is being processed or about to be processed will be displayed at the left side, while the next plate displayed at the right side.
29. BoardInitAngle - Initial counterclockwise rotation angle of plate, so as to ensure plate data is consistent with the orientation as labeled. It should be set to 180 degree for right-type model, since operator faces toward X-direction. This parameter is closely related to the reminder of plate location at the upper left corner of this software.

30	MprMergeType	Mpr Merge Type:0-No, 1-right and left flip merge,2-Up and down flip merge	0
31	MprBackwardsNumber	Use reciprocal letter of file name to differentiate face A and B of MPR	0
32	MprBackCharacter	Character in MPR file name to identify data of face B	
33	MprFrontCharacter	Characters used to identify positive data in MPR file names	
34	MprToolNOAllowed	Whether spindle is used for processing and cutting data: 0 no processing, 1 processing.	
35	IgnoreBackwordNumber	After scan bar-code, ignore reciprocal figures of bar-code, when the value is bigger than 0, this setting work	0
36	IgnoreFrontBits	Scanning the bar code, ignore several bits in front of the bar code. If the value is greater than 0, this setting will work	0
37	IgnoreBackBits	Scanning the bar code, ignore several bits after the bar code, the value is greater than 0, will work	0
38	MprLoadingPath	MPR monitored directory	D:\MPR\
39	DelayPawOpen	DelayPawOpen	500.00

30. MprMergeType - consolidation of MPR front and back data: 0 - no consolidation; 1 - consolidation of horizontal flipping data; 2 - consolidation of vertical flipping data. When outputting MPR, some certain software would output two separate MPR files respectively for front-face and back-face data. In such case we need to consolidate data on two sides into one.
31. MprBackwardsNumber - which backward digit of file name is used to identify front and back sides for MPR.
32. MprBackCharacter - the character in MPR file name used to identify back-face data.

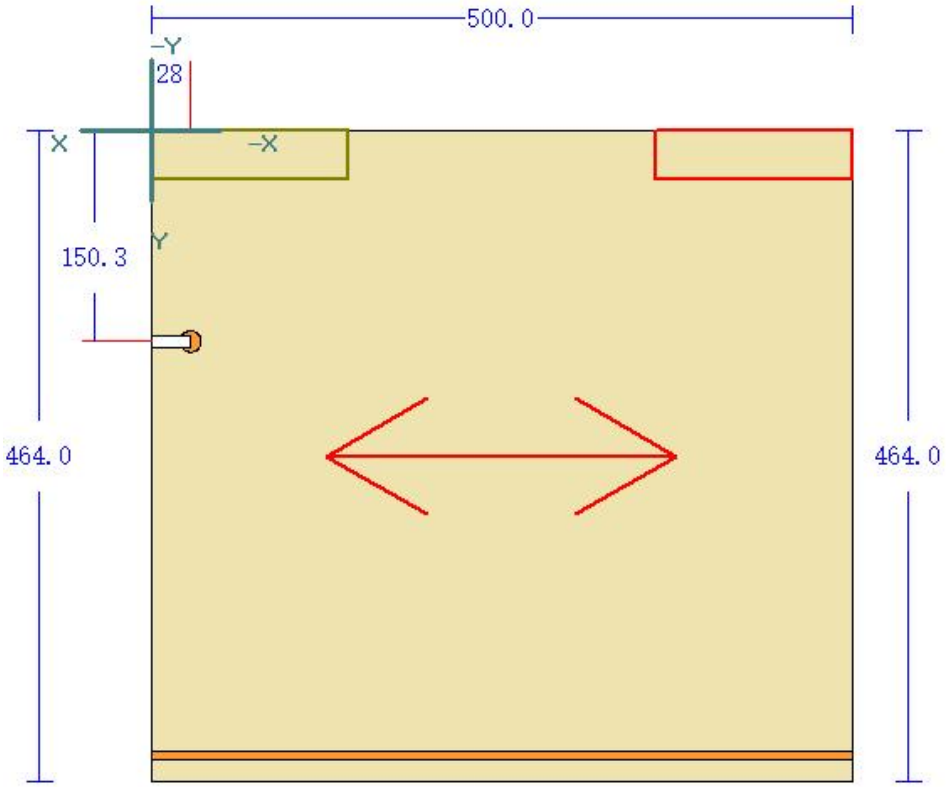
33. MprFrontCharacter- the character in MPR file name used to identify front-face data.
34. IgnoreBackwordNumber - which backward digit of the bar-code will be ignored after scanning. This parameter is valid when the value is larger than 0.
35. MprLoadingPath - MPR monitoring directory from which plate data will be loaded after bar-code is scanned. The parameter is an absolute path, so that data don't have to be imported each time. After scanning, plate data will be found directly in the MPR monitoring directory.
36. DelayPawOpen - paw opening delay, in ms.
37. DelayPawClose - paw closing delay, in ms.
38. SideInDelay - side-push stretching delay, in ms. This parameter is valid only for model complete with cylinder.
39. SideOutDelay - side-push withdrawal delay in ms. This parameter is valid only for model complete with cylinder.

40	DelayPawClose	DelayPawClose	500.00
41	SideInDelay	Push the cylinder out delay time	0.00
42	SideOutDelay	Push the cylinder to recover the delay	0.00
43	DelayMainStart	Start-up delay of spindle (including vice-spindle)	0.00
44	DelayDrillStart	Start-up delay of drill pack (including auxiliary drill pack)	0.00
45	DelayMainSel	Delay for spindle in	1000.00
46	DelayMainBack	Delay for spindle out	500.00
47	DelayDrillSel	Drill Delay	0.00
48	DelayDrillBack	Bit recovery delay	0.00
49	BigHoleDiameter	BigHoleDiameter	15.00
50	HoleDelayCode	HoleDelayCode	

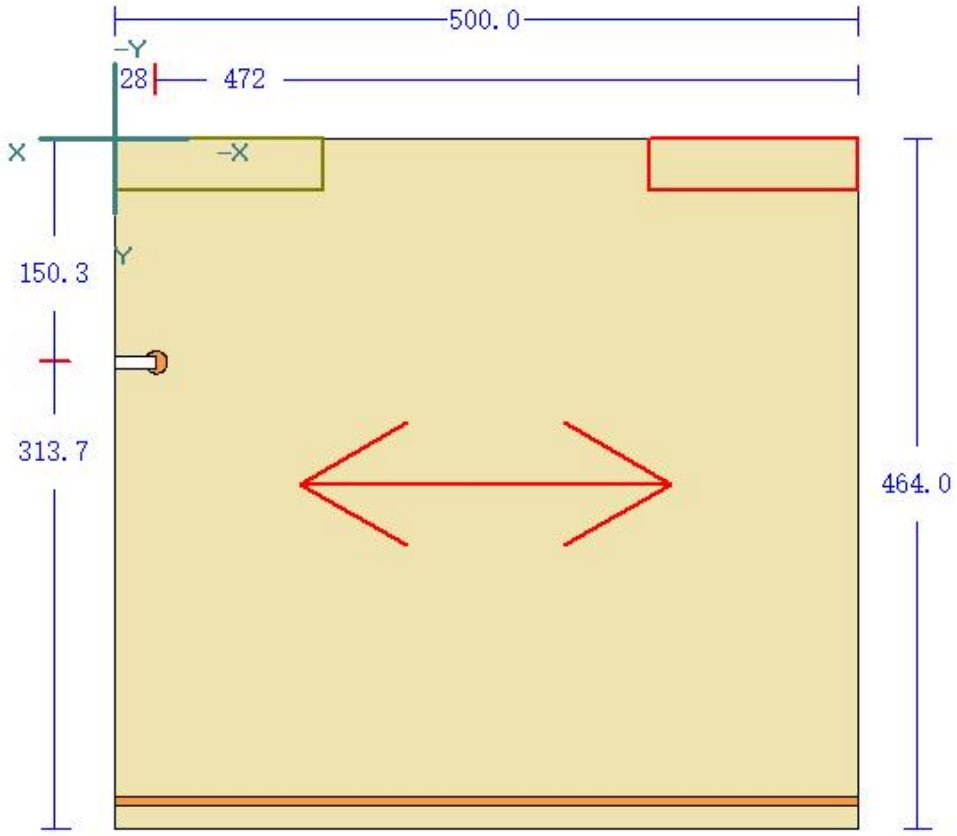
40. DelayMainStart - primary spindle (including sub-primary spindle) start-up delay in ms. This delay is used to ensure rotation speed of primary spindle reaches set value.
41. DelayDrillStart - drill package (including sub-drill package) start-up delay, in ms.
42. DelayMainSel - primary spindle stretching delay, in ms.
43. DelayMainBack - primary spindle withdrawal delay, in ms.
44. DelayDrillSel - drill stretching delay, in ms.
45. DelayDrillBack -drill withdrawal delay, in ms.
46. BigHoleDiameter - drilling diameter, discarded already, substituted by hole bottom delay set for each drill.
47. HoleDelayCode - hole bottom delay code, discarded already, substituted by hole bottom delay set for each drill.
48. ArcPrecision - arc sequence precision, that is, the distance between two points. Here the precision means distance between adjacent two points in point chain converted in processing of circle.
49. AdditionalDepth - an additional depth in depth processing.
50. ThroughHoleAddDepth - the depth in addition to half of the plate thickness to hole when a through hole is divided into two. The recommended value is 2mm to ensure both sides of the hole is bored.

51	ArcPrecision	The accuracy of arc serialization, i.e. the distance between two points	1.00
52	AdditionalDepth	Adding a depth to the spindle during cutting through	1.00
53	ThroughHoleAddDepth	ThroughHoleAddDepth, recommended 2 mm	2.00
54	DrawDimension	Whether to display hole position labeling information	1
55	EnableSimMac	Whether simulated processing is enabled or not, i.e. no hole depth; 0 is not enabled, 1 is enabled	0
56	XMLFileType	XML File Type:0SYNTEC;1YM;2YC	0
57	UseFileNameAsBarcode	BAN File Using FileName as Barcode	1

51. DrawDimension - whether hole position information is displayed: 0 - no; 1/2 - yes.



The above is the display when the option is set to 1, and is close-end display mode.



The above is the display when the option is set to 2, and is both-end display mode.

52. EnableSimMac - whether simulation processing is enabled, that is, not processing of hole depth: 0 - no; 1 - yes. After it is enabled, in NC generated, drill will not penetrate into plate for boring.
53. XMLFileType _- specific software format for standard XML file.
54. UseFileNameAsBarcode - BAN data using file name as bar-code (YF should be set to 1).
55. MaxSlotWidthForExpand - expansion for one cut diameter when slot width is less than or equal to the value to ensure back plate will be inserted into the slot.
56. StartSegVel - velocity (in mm/min.) of processing initial end when processing with primary spindle.
57. EndSegVel- velocity (in mm/min.) of processing tail end when processing with primary spindle.

Two read-only special parameters:

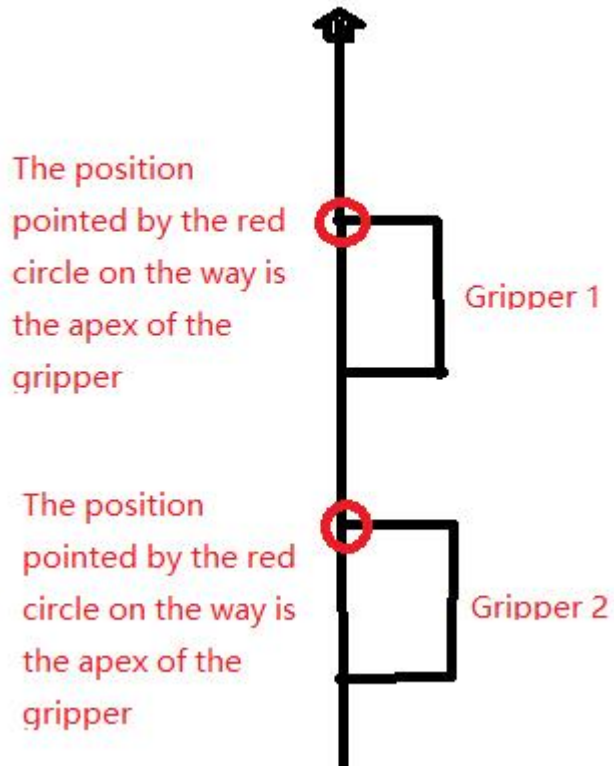
1. UsingFixLocation - 1: use fixed locating cylinder; 0: use movable locating cylinder.
2. MainPressUsing - 0: not use primary spindle pressing; 1: use primary spindle pressing on both front and back sides; 2: use primary spindle pressing only on front side.

4.1.2 Safety parameters

1	PawLength	PawLength	140.00
2	PawWidth	PawWidth	35.00
3	PAW1OFFSET	PAW1OFFSET	0.00
4	PAW2OFFSET	PAW2OFFSET	0.00
5	PAWSSYNVEL	PAW synchrospeed(suitable for double paws)	85000
6	SideBackerInit	SideBackerInit	10.00
7	BoardHeadOffset	BoardHeadOffset	0.00
8	SDrillOffsetX	X OffsetX of subsidiary drill relative to G54 ZERO	0.00
9	SDrillOffsetY	Y OffsetY of subsidiary drill relative to G54 ZERO	0.00
10	EyeOffset	EyeOffset	-70.50

1. PawLength - length of paw, means size of paw in X direction.
2. PawWidth - paw depth, means size of the part holding plate in Y direction.
3. PAW1OFFSET - offset of rear clamping paw to origin.
4. PAW2OFFSET - offset of front clamping paw to origin.It is generally required that peak point of paw should be set as the origin. In such case these two parameters will be set to 0.

   The peak point of paw in positive direction is illustrated below:



5. PAWSSYNVEL - paw sync speed (available for dual-paw), which should be set to 85000 to be compatible with earlier version, and the actual operation speed shall be G00 speed in the control system.
6. SideBackerInit - Initial speed distance of side-backer. That is, initial distance of side-backer should be plate width plus an initial distance.
7. BoardHeadOffset - position of plate head (position of locating rod), which is generally 0.

8. SDrillOffsetX - position "X" of base drill of lower drill package in G54 coordinate system.
9. SDrillOffsetY - position "Y" of base drill of lower drill package in G54 coordinate system, which is generally 0, and fine-adjustable.
10. EyeOffset - position of eye in G54 coordinate system, used for measurement of plate width.

11	TrenchMin	TrenchMin	150.00
12	TrenchMax	TrenchMax	280.00
13	ToPawMinValue	when the distance between hole and paw axis is smaller than this value, use bit near paw	800.00
14	ToPawMaxValue	when the distance between hole and paw axis is smaller than this value, use bit near side	800.00
15	PawSafeDistance	Safe distance between paws	20.00
16	PawVerSafeDistance	Safe distance between vertical drill and paw	10.00
17	PawHorSafeDistance	Safe distance between horizontal drill and paw	30.00
18	MainSafeDistance	Safe distance between spindle and paw	32.00
19	PawSDrillSafeDistance	Safe distance between reverse drill and paw	10.00
20	PawSDrillVerSafeDis	Safe distance between reverse drill in vertical direction and paw, min is 5	10.00

11. TrenchMin - minimum of drilling trench position, in G54 coordinates.
12. TrenchMax - maximum of drilling trench position, in G54 coordinates. These parameters are used to determine whether drill is located in trench, since lower tray will be enabled only for drill located in pit.
13. ToPawMinValue - when distance between hole and paw is less than the value, a drill closest to the paw will be used as possible.
14. ToPawMaxValue - when distance between hole and paw is larger than the value, a drill closest to the side-backer will be used as possible.
15. PawSafeDistance - the minimum distance between paws.
16. PawVerSafeDistance - safe distance between vertical drill and paw, means the safe distance from edge (not center) of drill to paw.
17. PawHorSafeDistance - safe distance from horizontal drill to paw, means the distance from edge (not center) of drill to paw.
18. MainSafeDistance - safe distance from primary spindle to paw, means the distance from center of primary spindle to paw, here the spindle is the one on top side.
19. PawSDrillSafeDistance - safe distance from back-face drill to paw, means the distance from drill of lower drill package to paw in X direction.
20. PawSDrillVerSafeDis - safe distance from back-face drill to paw in vertical direction, and the minimum value is 5, that is, the safe distance to paw in Y direction.

21	SMainSafeDistance	Safe distance between subsidiary spindle and paw	100.00
22	SMain2SafeDistance	The lower spindle 2 is the safe distance from the clamp in the X direction	100.00
23	MaxBoardLength	MaxBoardLength	2500.00
24	MinBoardLength	MinBoardLength	120.00
25	MaxBoardWidth	MaxBoardWidth	1220.00
26	MinBoardWidth	MinBoardWidth	30.00
27	HorSafeDepth	Safe height of horizontal drill, which should be higher than paw	30.00
28	VerDrillSafeHeight	Safe height of vertical drill, which should be bigger than thickness of paw	30.00
29	FaceBPressHeight	Height of pressing plate when drill face B	15.00
30	AbsSafeHeight	Absolute safe height of spindle	70.00

21. SMainSafeDistance - safe distance from sub-primary spindle to paw, that is, the distance from primary spindle on lower side to paw, meaning the distance from center of tool to paw.
22. MaxBoardLength - the maximum length of plate which can be processed.
23. MinBoardLength - the minimum length of plate which can be processed.
24. MaxBoardWidth- maximum width of plate which can be processed.
25. MinBoardWidth- minimum width of plate which can be processed.
26. HorSafeDepth - safe height of horizontal drill at least higher than paw, which is determined by: distance from center of horizontal drill to drill bottom + paw thickness + reserved quantity, the reserved quantity is generally 10mm.
27. VerDrillSafeHeight - safe height of vertical drill on front and back sides, at least higher than paw sheet thickness.
28. FaceBPressHeight - height of lifting pressing plate up when processing back-face hole, which is generally 10mm.
29. AbsSafeHeight - absolute safe height of primary drill package.
30. AbsSDrillHeight- absolute safe height of secondary drill package. These parameters means the G54 coordinates of upper and lower drill packages along Z axle; when changing paw position, first move the packages to the two positions to ensure paw will not run into drill package.

31	AbsSDrillHeight	Absolute safe height of subsidiary spindle	-30.00
32	SlotMinDisToPaw	Min distance between slot and paw when slot face B	0.00
33	PressSafeDistance1	Safe distance between pressing plate and paw	15.00
34	PressSafeDistance2	Safe distance between side and paw	15.00
35	HorDrillPressZ	Z coordinate when using horizontal drill as pressing plate	4.00
36	SDrillToEdgeOffset	Offset of subsidary Drill to aviod scraps	200.00
37	FaceBMinValue	When the distance between drills in Face B and paw is smaller then this value, No continuous drilling	75.00
38	PressMinLength	Min length for pressing plate to press board	20.00
39	PawMinLengthAtBoard	Min length of double paws to clamp	40.00
40	MinSinglePawLength	Min length of one paw to clamp	100.00

31. SlotMinDisToPaw - restriction on processing of back-face slot, the minimum distance from slot to paw, which is related to the equipment itself.
32. PressSafeDistance1 - safe distance from pressing wheel/pressing plate to one side of paw.
33. PressSafeDistance2 - safe distance from pressing wheel /pressing plate to one side of side-backer.
34. HorDrillPressZ - Z-coordinate of horizontal drill pressing the platform (discarded already).

35. SDrillToEdgeOffset - offset of secondary drill package to avoid scrap.
36. FaceBMinValue - when distance from back-face hole to paw is less than the value, continuous drilling is not enabled (discarded already).
37. PressMinLength - the minimum permitted length of pressing plate pressing plate piece when processing front-face hole.
38. PawMinLengthAtBoard - the minimum length of dual-paw clamping.
39. PawMinLengthAtBoard - the minimum length of single-paw clamping.
40. HorMaxDistanceFromPaw - the maximum permitted distance from horizontal hole to paw.

41	HorMaxDistanceFromPaw	Max distance between paw and horizontal hole	200.00
42	EyeCheckRanger	Accuracy range of eye detecting	1
43	MaxHorHoleDepth	MaxHorHoleDepth	40.00
44	HorHoleUnderPaws	Allowing horizontal holes under paw-0-NO, 1-YES	0
45	MinWidthUsingSide	MinWidthUsingSide	85.00
46	MaxWidthUsingSide	The maximum width of the side is used	1200.00
47	MinLengthUsingSide	When the length of board is smaller than this value, no side	200.00
48	MinSizeSwitchPress	When width of processing data is bigger than this value, switch avoiding spindle pressing fall	30.00
49	MainPressStyle	Avoiding spindle pressing fall type: 0-No spindle pressing;1-alternate loading and unlaoding	0
50	MainPressWidthInBoard	Min width of spindle pressing the board, when it is 0, pressing is no beyond by side	40.00

41. EyeCheckRanger - optical eye testing precision range.
42. MaxHorHoleDepth - the maximum permitted depth of horizontal hole to be processed, which will mainly take into consideration length of drill.
43. HorHoleUnderPaws - whether horizontal hole is permitted to be just below paw (0 - no; 1 - yes). It is recommended to set it to 0.
44. MinWidthUsingSide - the minimum plate width for which side-backer is used.
45. MaxWidthUsingSide - than maximum plate width for which side-backer is used.
46. MinLengthUsingSide- the minimum plate length for which side-backer is used.
47. MinSizeSwitchPress - when width in processing data is larger than the value, primary spindle pressing is enabled to prevent it from falling to trench.
48. MainPressStyle - means of prevent primary spindle from falling to trench: 0 - not enable primary spindle pressing; 1 - use upper and lower pressing alternatively.
49. MainPressWidthInBoard - the minimum width for primary spindle pressing on plate: 0 - not permit pressing beyond the side of side-backer.
50. EnableFaceAPress - whether pressing plate is enabled when processing front-face hole.

51	EnableFaceAPress	Whether to Enable Press Plate for Machining Front Hole	1
52	EnableWheelOutSide	Whether the press wheel is allowed to exceed the side by side	1
53	EnableFaceBAvoid1	Whether to Enable Backward Avoidance Parameter Group 1	1
54	FaceBAvoidY1	When G54Y2 coordinates reach this value, reverse face slot avoidance is enabled.	40.00
55	FaceBLeftX1	Avoidance Position (Small Value) (G54 coordinates) of Claw with Reverse Face Groove	150.00
56	FaceBRightX1	Collision avoidance position (large value) (G54 coordinates)	280.00
57	EnableFaceBAvoid2	Whether to Enable Backward Avoidance Parameter Group 2	1
58	FaceBAvoidY2	When G54Y2 coordinates reach this value, reverse face slot avoidance (priority avoidance) is enabled.	5.00
59	FaceBLeftX2	Small value of collision avoidance position (G54 coordinates) of jaw with reverse orifice groove (p	55.00
60	FaceBRightX2	Large Avoidance Position (G54 coordinates) of Reverse Face Slot Claw (Priority Avoidance)	295.00

51. EnableWheelOutSide - whether pressing wheel is permitted to go beyond the side of side-backer.
52. EnableFaceBAvoid1 - whether back-face avoidance array #1 is enabled.
53. FaceBAvoidY1 - when G54Y2 coordinate reaches the value, back-face hole/slot avoidance will be enabled.
54. FaceBLeftX1 - position of paw avoiding back-face hole/slot (minimum value) (in G54 coordinates).
55. FaceBRightX1- position of paw avoiding back-face hole/slot (maximum value) (in G54 coordinates).
56. EnableFaceBAvoid2 - whether back-face avoidance array #2 is enabled.
57. FaceBAvoidY2 - when G54Y2 coordinate reaches the value, back-face hole/slot avoidance will be enabled (on-priority avoidance).
58. FaceBLeftX2 - the minimum value of position of paw avoiding back-face hole/slot (in G54 coordinates) (on-priority avoidance).
59. FaceBRightX2 - the maximum value of position of paw avoiding back-face hole/slot (in G54 coordinates) (on-priority avoidance).

60	FaceBRightX2	Large Avoidance Position (G54 coordinates) of Reverse Face Slot Claw (Priority Avoidance)	295.00
61	MinClampsHor	Minimum clamping capacity of clamp when processing horizontal holes on the side of clamp	10.00
62	HorUsingDoublePaws	Horizontal holes should be machined with double clamps as far as possible	0
63	HorVelSinglePaw	Machining Speed of Single Claw Machining Horizontal Hole	800.00
64	TableWidth	Table width	540.00
65	BoardOutVel	Front discharging speed of wide plate	80000

60. MinClampsHor - the minimum clamping quantity of paw when processing horizontal hole at paw side.
61. HorUsingDoublePaws - use dual-paw for processing of horizontal hole in X direction as possible. It is not recommended to enable it, unless the paw has insufficient clamping force.
62. HorVelSinglePaw - processing speed of single paw processing horizontal hole.
63. TableWidth - width of platform, used to control front output velocity.
64. BoardOutVel - front output velocity.
65. MinWidthFroFront - when plate width is less than the value, front output is forcibly enabled.

4.1.3 Equipment parameters

1	PawMinRange	Min travelling size of paw	-1970.00
2	PawMaxRange	Max travelling size of paw	3100.00
3	DownSupportingMin	DownSupportingMin(G54)	40.00
4	DownSupportingMax	DownSupportingMax(G54)	1000.00
5	UpDrillMilusLimit	Cathode value of upper drill	-570.00
6	UpDrillPlusLimit	Anode value of upper drill	1165.00
7	DownDrillMilusLimit	Cathode value of lowe drill	-40.00
8	DownDrillPlusLimit	Anode value of lower drill	1350.00
9	UseOnlyG5000	UseOnlyG5000" "Loading type, after modify it, software needs to be restarted: 0-Manual, 1-Automatic	0

1. PawMinRange - the minimum range of paw, meaning the negative soft limit position of front paw.
2. PawMaxRange - the maximum range of paw, meaning the positive soft limit position of rear paw.
3. DownSupportingMin - the minimum range position of lower support (G54), with edge of lower tray not going beyond the platform.
4. DownSupportingMax - the maximum range position of lower support, with edge of lower tray not going beyond the platform.
5. UpDrillMilusLimit - negative limit value digit Y for upper drill package.
6. UpDrillPlusLimit - positive limit value digit Y for upper drill package.
7. DownDrillMilusLimit - negative limit value digit Y for lower drill package.
8. DownDrillPlusLimit - positive limit value digit Y for lower drill package.
9. UseOnlyG5000 - loading mode; when this value is modified, the software has to be restarted. 0: manual loading G303: 1: single-channel automatic loading G5000; 2: dual-channel automatic loading G500. Option #1 has been discarded already.

10	DrillStart	DrillStart	M102
11	DrillEnd	DrillEnd	M103
12	MainKnifeStart	MainKnifeStart	M03 S21000
13	MainKnifeEnd	MainKnifeEnd	M05
14	SDrillStart	Subsidiary drill start	M104
15	SDrillEnd	Subsidiary drill end	M105
16	SMainStart	Subsidiary spindle start	M254 S21000
17	SMainEnd	Subsidiary spindle end	M255
18	EyeHasBoard	M code for eye to detecting board in position-YES	G04P1000\nM271
19	EyeHasNoBoard	M code for eye to detecting board in position-NO	G04P1000\nM272
20	EyeBlowOn	M code for eye to detecting air blowing on	M273
21	EyeBlowOff	M code for eye to detecting air blowing off	M274

10. DrillStart - M code for starting multi-drill group, here meaning upper drill package.
11. DrillEnd - M code for ending multi-drill group, here meaning upper drill package.
12. MainKnifeStart - M code for starting primary spindle, here meaning upper primary spindle.
13. MainKnifeEnd - M code for ending primary spindle, here meaning upper primary spindle.

14. SDrillStart - M code for starting secondary drill package, here meaning lower drill package.
15. SDrillStSDrillEnd - M code for ending secondary drill package, here meaning lower drill package.
16. SMainStart - M code for starting secondary spindle, here meaning lower primary spindle.
17. SMainEnd - M code for ending secondary spindle, here meaning lower primary spindle.
18. EyeHasBoard - M code for optical eye detecting plate.
19. EyeHasNoBoard - M code for optical eye not detecting plate.
20. EyeBlowOn - M code for optical eye detecting air blow turning on.
21. EyeBlowOff - M code for optical eye detecting air blow turning off.

22	Paw2Loosen	Paw2 Loosen	M161\nM211
23	Paw2Close	Paw2 Close	M182\nM212
24	PawLoosen	Paw Loosen	M215\nM213
25	PawClose	Paw Close	M163\nM214
26	PawsBinding	Paws Binding	
27	PawsUnbunding	Paws Unbunding	
28	HorAxisID	ID of horizontal drill axis	
29	XAxisID	ID of X axis	U
30	YAxisID	ID of Y axis	Y
31	ZAxisID	ID of Z axis	Z
32	X2AxisID	ID of X2 axis for six sided drilling machine	X
33	Y2AxisID	ID of Y2 axis for six sided drilling machine	V
34	Z2AxisID	ID of Z2 axis for six sided drilling machine	W
35	VAxisID	ID of side axis	A

22. Paw2Loosen - M code for paw #2 loosening (front paw).
23. Paw2Close - M code for paw #2 closing (front paw).
24. PawLoosen - M code for paw loosening (rear paw).
25. PawClose - M code for paw closing (rear paw).
26. PawsBinding - M code for sync motion of paws.
27. PawsUnbunding - M code for canceling sync motion of paws.
28. HorAxisID - identifier of horizontal hole axle, discarded already.
29. XAxisID - identifier of X-axle, here meaning the motion axle of rear paw.
30. YAxisID - identifier of Y-axle, here meaning Y axle of upper drill package.
31. ZAxisID - identifier of Z-axle, here meaning Z axle of upper drill package.
32. X2AxisID - identifier of X2-axle, used for Six-Side Boring Machine, meaning motion axle of front paw.
33. Y2AxisID - identifier of Y2-axle, used for Six-Side Boring Machine, meaning Y-axle of lower drill package.
34. Z2AxisID - identifier of Z2-axle, used for Six-Side Boring Machine, meaning Z-axle of lower drill package.
35. VAxisID - identifier of side-backer axle.

36	NCPathDir	Save path of NC file	D:\NcFiles\
37	NCFileName	NCFileName	o0000
38	NCExt	Suffix of NC file	
39	NCUseBarcodeAsFileName	Use barcode as FileName	0
40	DownBlowOn	Air blowing of subsidiary drill-on	
41	DownBlowOff	Air blowing of subsidiary drill-off	
42	UpBlowOn	Air blowing of drill drill-on	M192
43	UpBlowOff	Air blowing of drill drill-off	M193
44	TableUpCode	Table up	
45	TableDownCode	Table down	
46	SideInCode	Side in	
47	SideOutCode	SideOut	
48	AllPawsOpen	AllPawsOpen	
49	BackExitCode0	Code of discharge before and after feeding	G00 U%I X%U
50	BackExitCode	BackExitCode	M267 M259

36. NCPathDir - path where NC file is saved.
37. NCFileName - name of NC file.
38. NCExt - suffix of NC file.
39. NCUseBarcodeAsFileName - whether a bar-code is used as NC file name.
40. DownBlowOn - M code for turning on air blow of secondary drill package, here meaning lower drill package.
41. DownBlowOff - M code for turning off air blow of secondary drill package, here meaning lower drill package.
42. UpBlowOn - M code for turning on air blow of primary drill package, here meaning upper drill package.
43. UpBlowOff - M code for turning off air blow of primary drill package, here meaning upper drill package.
44. TableUpCode - M code for lifting platform up.
45. TableDownCode - M code for lowering platform down.
46. SideInCode = M code for pushing side-backer in, which shall be configured only for side-backer with cylinder.
47. SideOutCode - M code for withdrawing side-backer, which shall be configured only for side-backer with cylinder.
48. AllPawsOpen - M code for all paws opening.
49. BackExitCode0 - code for front loading and rear unloading.
50. BackExitCode - code for rear unloading.

51	PREMAINSTART	Spindle pre-start	M261
52	PRESMAINSTART	Subsidary spindle pre-start	M263
53	PreDrillStart	Drill bank pre-start	
54	PreSDrillStart	Subsidary drill bank pre-start	
55	SupportingBlow	M code for undercarriage blowing	M265
56	SupportingBlowClose	M Code for Blow-off of Lower Stock	M266
57	StartFeeding	Start Next Feeding	
58	DrillExt	The suffix of the calling knife	
59	SideOrigin	Side back to the origin of the code	G00 A-1240.00

51. PREMAINSTART - code for pre-starting primary spindle, here meaning upper primary spindle.
52. PREMAINSTART - code for pre-starting sub-primary spindle, here meaning lower primary spindle.

53. PreDrillStart - M code for pre-starting primary drill package, here meaning upper drill package.
54. PreDrillStart - code for pre-starting secondary drill package, here meaning lower drill package.
55. SupportingBlow - M code for air blowing for lower support.
56. StartFeeding - start loading of next plate, which is available for models with automatic loading.
57. DrillExt - suffix of cutter adjustment, which is generally 00 or no surfix is required.
58. SideOrigin - code of returning side-backer to origin, which will be used when side-backer is not enabled.
59. NCRule - 0: rule for Baoyuan new generation; 1: rule for Ousai.

60	NCRule	NCRule,0:Syntec 1:OSai	0
61	Location1Out	Fixed positioning cylinder protrusion code	M109
62	Location1Back	Fixed positioning cylinder recovery code	M110
63	Location2Out	Fixed positioning cylinder 2 protruding code	M111
64	Location2Back	Fixed positioning cylinder 2 recovery code	M112
65	Location2UsingWidth	Minimum Plate Width Corresponding to Activation of Positioning Cylinder 2	250.00
66	AirCheckMCode	Cylinder in place detection code	
67	LocationOut	Output code of movable positioning cylinder	M234
68	LocationBack	Movable positioning cylinder recovery code	M235
69	LocationPos	G54 coordinates of movable positioning cylinder	-217.00
70	LocationY	Positioning cylinder position Y	0.00
71	LocationZ	Positioning cylinder position Z	0.00
72	LocationDiameter	LocationDiameter	20.00
73	FixSupporting	Is it a fixed tray, not moving with Z axis?	1
74	SideFarwardDir	Whether the lateral motion direction is positive or not	0

60. Location1Out - code for stretching fixed locating cylinder out.
61. Location1Back - code for withdrawing fixed locating cylinder.
62. Location2Out - code for stretching fixed locating cylinder #2 out.
63. Location2Back - code for withdrawing fixed locating cylinder #2.
64. Location2UsingWidth - the minimum plate width for enabling locating cylinder #2.
65. AirCheckMCode - M code for cylinder detected.
66. LocationOut - code for stretching movable locating cylinder, which is mounted along with upper drill package, and moves along with upper drill package.
67. LocationBack - code for withdrawing movable locating cylinder.
68. LocationPos - position X of movable locating cylinder, which is generally 0, that is, position of the origin of G54.
69. LocationY - position Y of movable locating cylinder, which is the position relative to base drill of upper drill package.
70. LocationZ - position Z of movable locating cylinder, to which upper drill package Z should be moved when locating cylinder is used. This position should ensure the locating cylinder is slightly higher than platform surface when it is stretched out.

71. LocationDiameter - diameter of movable locating cylinder.
72. FixSupporting - whether the tray is fixed and does not move with Z axle.
73. SideFarwardDir - whether side-backer moves in positive direction.
74. BackHasBoard - M code for check whether there is a plate on unloading platform.

4.1.4 Setting of M code for drill

UserParam | SafeParam | DeviceParam | AxisParam | Tool M code | Press param. | utton Param | utton param

Drill No.	Drill Name	Select Code	ack back cod
2	T2	T2	T0
4	T4	T4	T0
31	T31	T31	T101
32	T32	T32	T101
33	T33	T33	T101
34	T34	T34	T101
35	T35	T35	T101
36	T36	T36	T101
37	T37	T37	T101
38	T38	T38	T101
39	T39	T39	T101
40	T40	T40	T101

M or T code used in selection (stretch-out) and withdrawal of each drill will be set. In this interface, drill name and M code is non-modifiable.

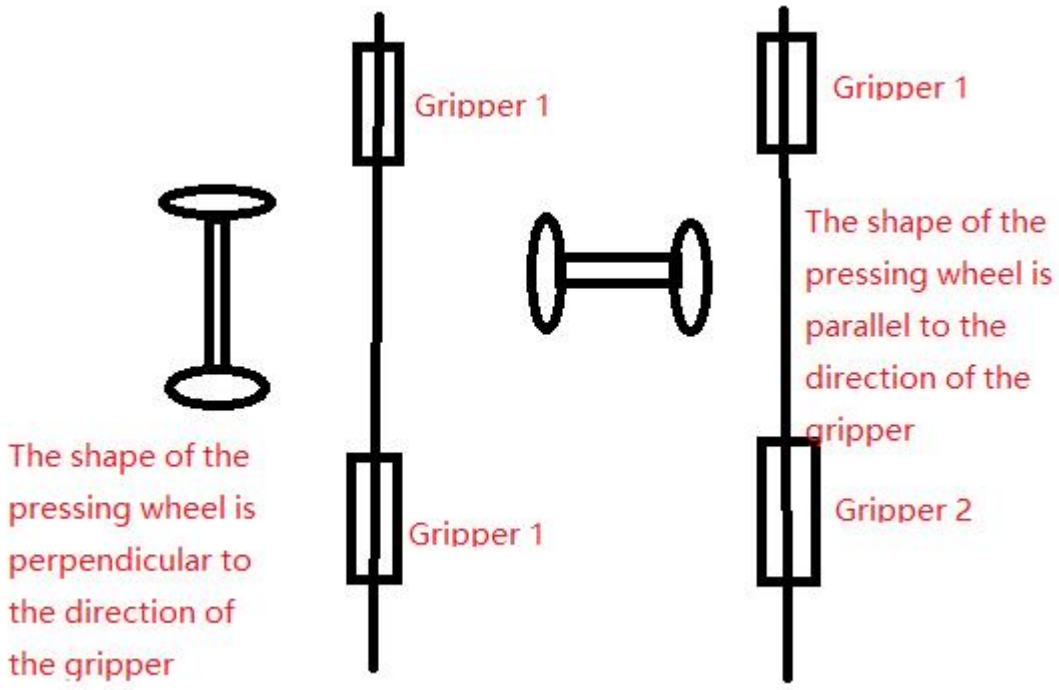
4.1.5 Parameters of pressing wheel/pressing plate

UserParam | SafeParam | DeviceParam | AxisParam | Tool M code | Press param. | utton Param | utton para

Press Type	Describe	h(X direc	ı(Y direct	enter Point	enter Point	hen the mesa is
Pressboard	x-PressBoard	260.00	45.00	114.00	-24.50	-1.00
Pressboard	Y-PressBoard	45.00	180.00	263.50	-122.00	-1.00
Press wheel (the wheel move	F-Wheel	36.00	75.00	-27.00	-85.00	5.00
Press wheel (the wheel move	B-Wheel	36.00	75.00	223.00	-85.00	5.00
Press wheels (wheels moving	The left wheel	100.00	36.00	353.00	0.00	3.38
Press wheels (wheels moving	Right roller	100.00	36.00	335.00	-260.00	-9.00
Underfeed	Underfeed	110.00	215.00	256.00	100.00	-10.00

hen the mesa is	KeyPoints	elect cod	k back c	elect delay(ms	k back delay(s	belong to
-1.00		M173	M174	0	0	0
-1.00		M175	M176	0	0	0
5.00		M165	M166	200	0	0
5.00		M145	M146	200	0	0
3.38		M167	M168	200	0	0
-9.00		M169	M170	200	0	0
-10.00		M155	M156	200	0	0

Pressing wheel and pressing plate include three types: pressing plate, pressing wheel traveling in parallel to paw shaft, and pressing wheel traveling perpendicularly to paw shaft. When processing front-face hole, pressure plate will be used, but not necessarily, since some certain Six-Side Boring Machines do not contain pressure plate. When processing back-face slot in parallel to paw, pressing wheel traveling in parallel to paw will be used. When processing back-face slot perpendicular to paw, pressing wheel traveling perpendicularly to paw will be used.



Specific parameters are described below:

Length and width: these parameters mean sizes of the bounding rectangle for pressing wheel or plate, and the length means the size in X direction while width is the size in Y direction.

Coordinates X and Y of central point: mean the coordinates of central point of the bounding rectangle for pressure wheel/plate.

Z-coordinate of pressing platform: means the Z-coordinate of pressing wheel which pops up to just press the platform.

Fall code: M code of controlling fall (pop-up) of pressing wheel/plate.

Withdrawal code: M code of controlling withdrawal of pressing wheel/plate.

Fall delay: fall time delay in ms.

Lift delay: lift-up time delay in ms.

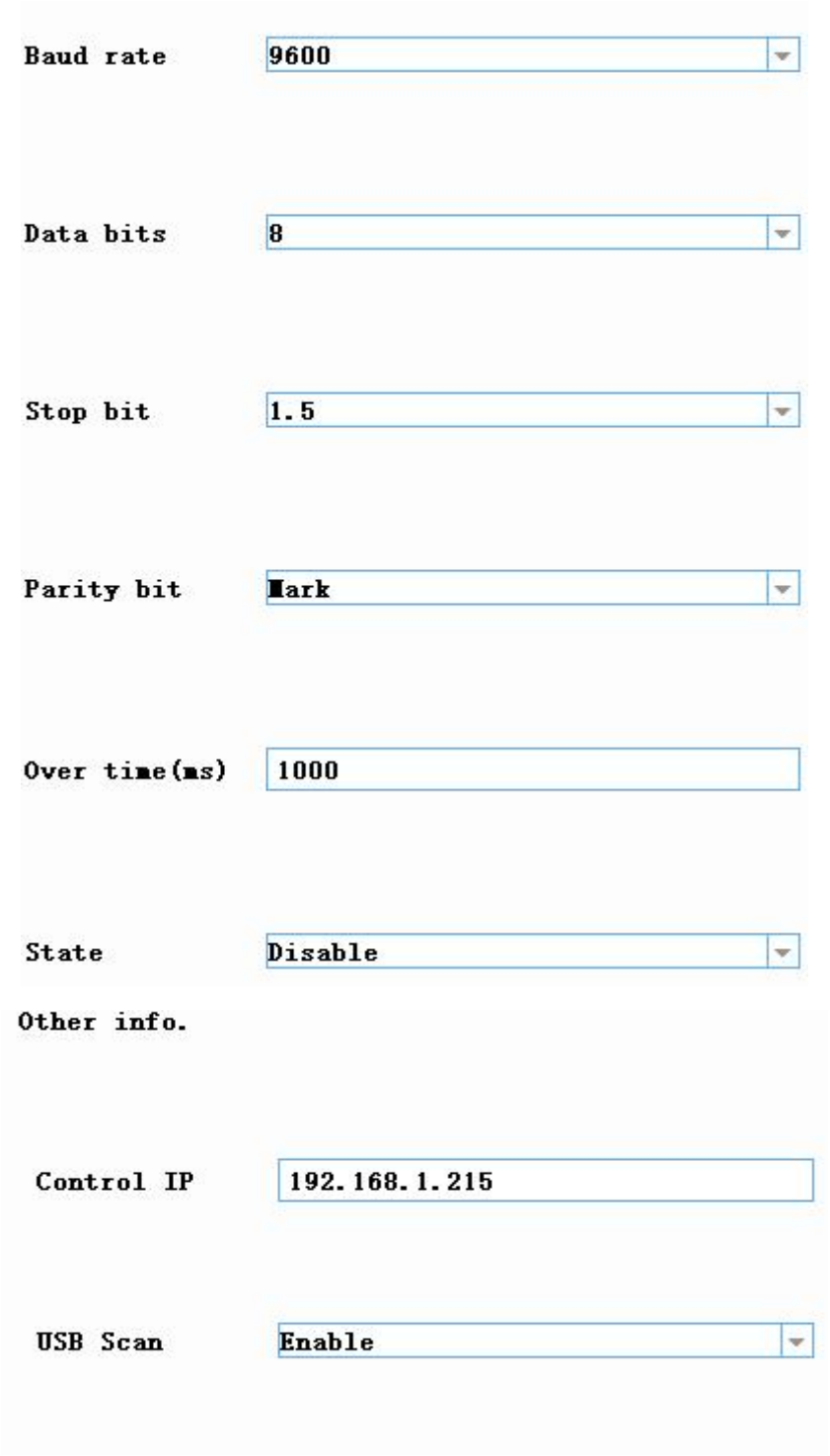
4.1.6 CN start and end codes

Set start and end parts of NC codes. Start and end parts can be line wrapped, that is, both start part (start codes) and end parts (end codes) of NC codes can be in multiple lines.

To configure start and end codes flexibly, the following surrogates are defined.

%X	plate length (in X direction)
%Y	plate width (in Y direction)
%T	plate thickness
%S	plate name
%I	initial position of rear paw
%U	initial position of front paw
%V	position of left side-backer (including reserved position)
%P	multi-drill pre-start code
%LY	position Y of locating rod
%LZ	position Z of locating rod
%LU	stretch-out of locating cylinder
%LD	withdrawal of locating cylinder

4.1.7 Setting of other parameters



In setting of other parameters, you can set information on serial port and type of scanner: USB or serial port, or set IP address of controller.

5.1 Detailed description of key parameters

Equipment parameters:

PawMinRange	The minimum range of paw

PawMaxRange	The maximum range of paw
DownSupportingMin	The minimum range position of lower support
DownSupportingMax	The maximum range position of lower support
UpDrillMilusLimit	Y-axle negative limit position of upper drill package
UpDrillPlusLimit	Y-axle positive limit position of upper drill package
DownDrillMilusLimit	Y-axle negative limit position of lower drill package
DownDrillPlusLimit	Y-axle positive limit position of lower drill package

Safety parameters:

TrenchMin	The minimum value of machine drilling trench position
TrenchMax	The maximum value of machine drilling trench position
HorSafeDepth	Safe height of horizontal drill
VerDrillSafeHeight	Safe height of vertical drill at front and back faces
AbsSafeHeight	Absolute safe height of primary drill package
AbsSDrillHeight	Safe height of secondary drill package
FaceBAvoidY1	Y value of avoidance of lower drill package
FaceBLeftX1	Position of paw avoiding back-face hole/slot (minimum value) (in G54 coordinates)
FaceBRightX1	Position of paw avoiding back-face hole/slot (maximum value) (in G54 coordinates)
FaceBAvoidY2	Y value of avoidance of lower drill package (on-priority avoidance)
FaceBLeftX2	The minimum value of position of paw avoiding back-face hole/slot (in G54 coordinates) (on-priority avoidance)
FaceBRightX2	The maximum value of position of paw avoiding back-face hole/slot (in G54 coordinates) (on-priority avoidance)

User parameters:

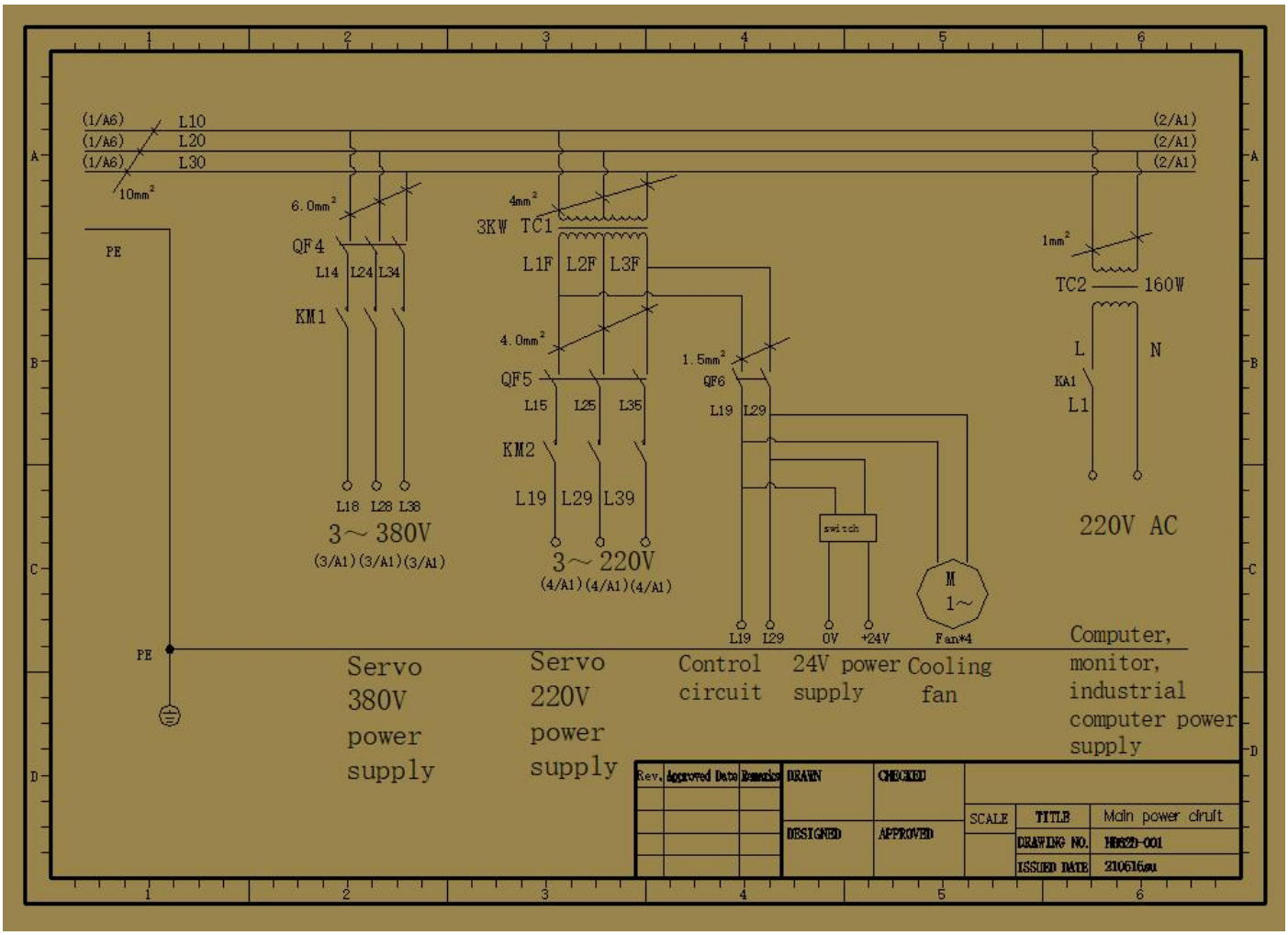
SingleFaceFlipStyle	Flipping style
ForceHorSlot	Forcibly rotate plate of vertical slot by 90 degree

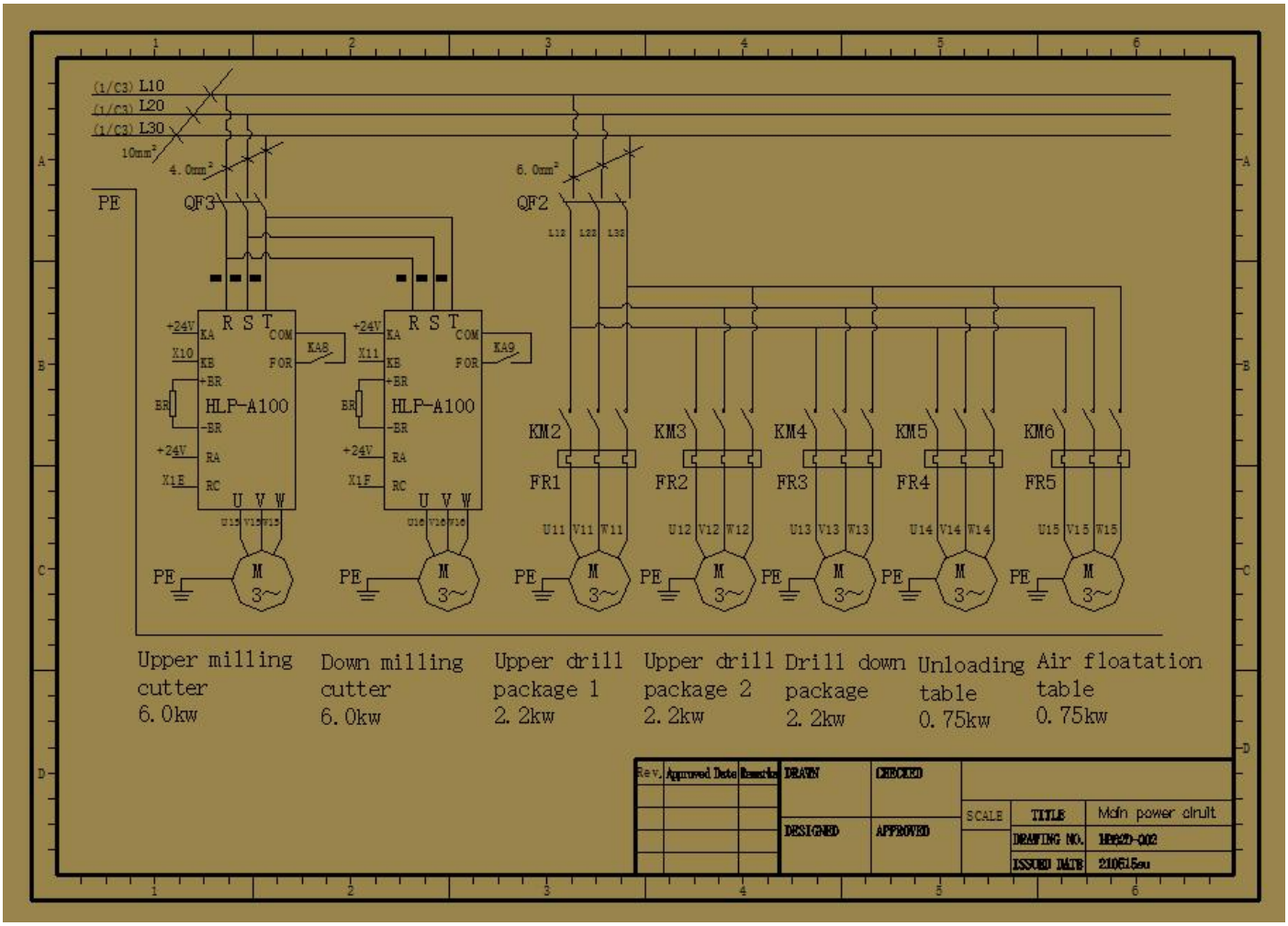
BigHoleAtFaceA	Forcibly flip large hole (including holes larger than 15) to front face for processing.
RotateBoardStyle	Plate rotation style

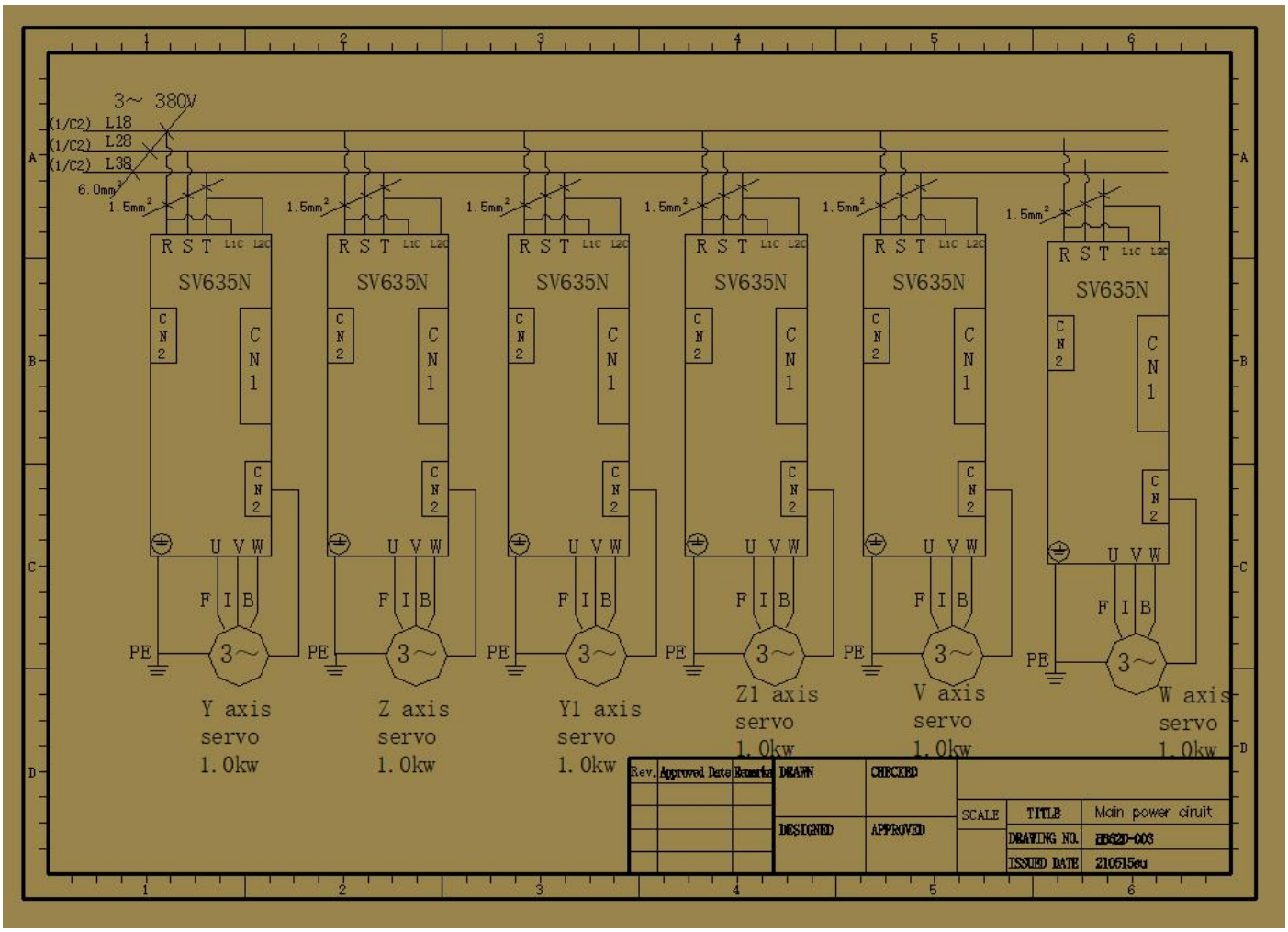
Safety parameters related to pressing wheel/pressure plate

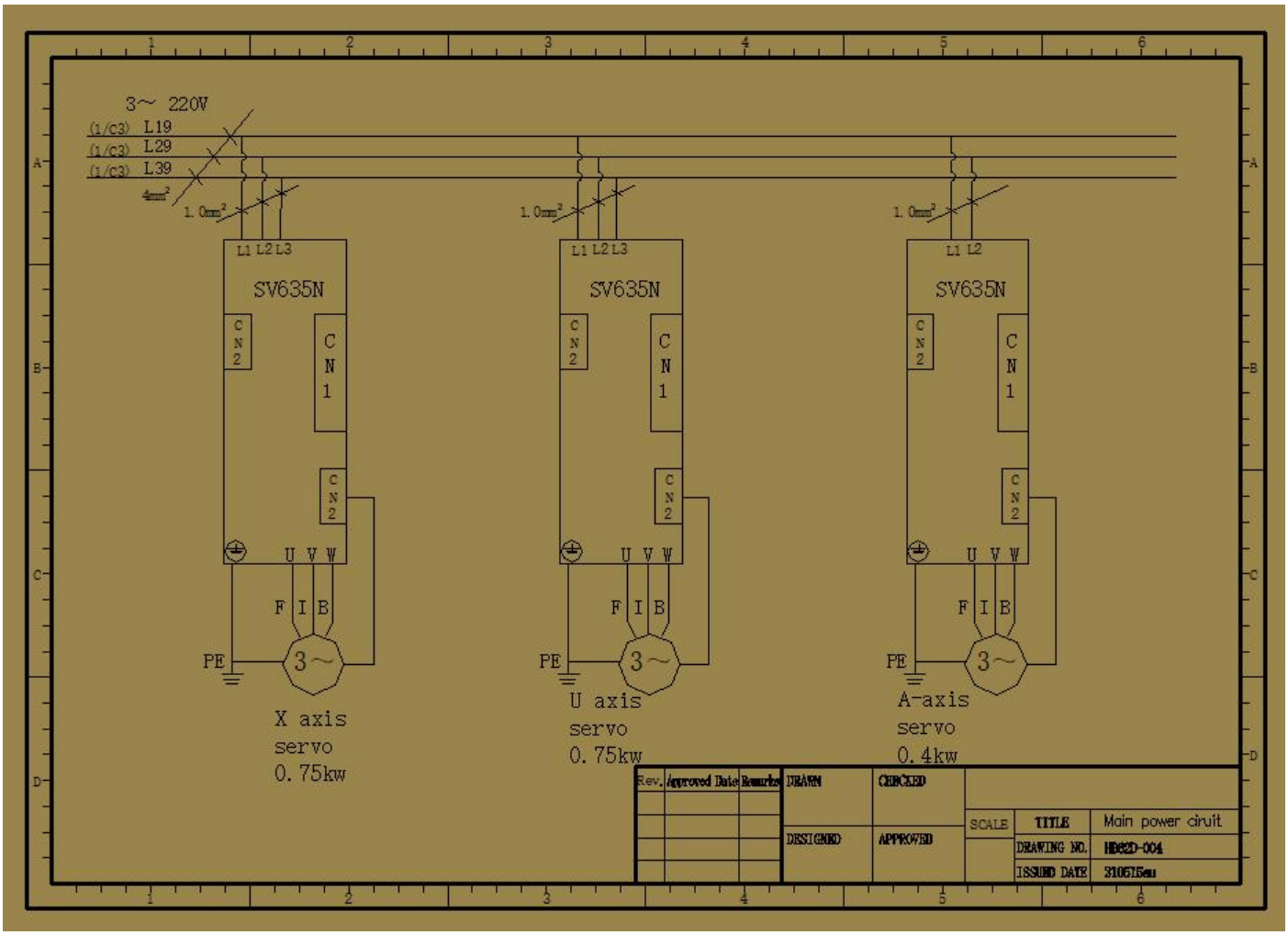
PressSafeDistance1	Safe distance from pressure plate/wheel to paw side
PressSafeDistance2	Safe distance from pressing plate/wheel to side-backer side
PressMinLength	The minimum permitted length of pressure plate pressing plate when processing front-face vertical hole
MainPressWidthInBoard	The minimum permitted width of primary spindle pressing plate. When the value is 0, the pressed material is not permitted to go beyond the side of side-backer. For thicker side-backer, this value should be set to 0.
EnableWheelOutSide	whether pressing wheel is permitted to go beyond the side of side-backer. For thicker side-backer, this value should be set to 0.

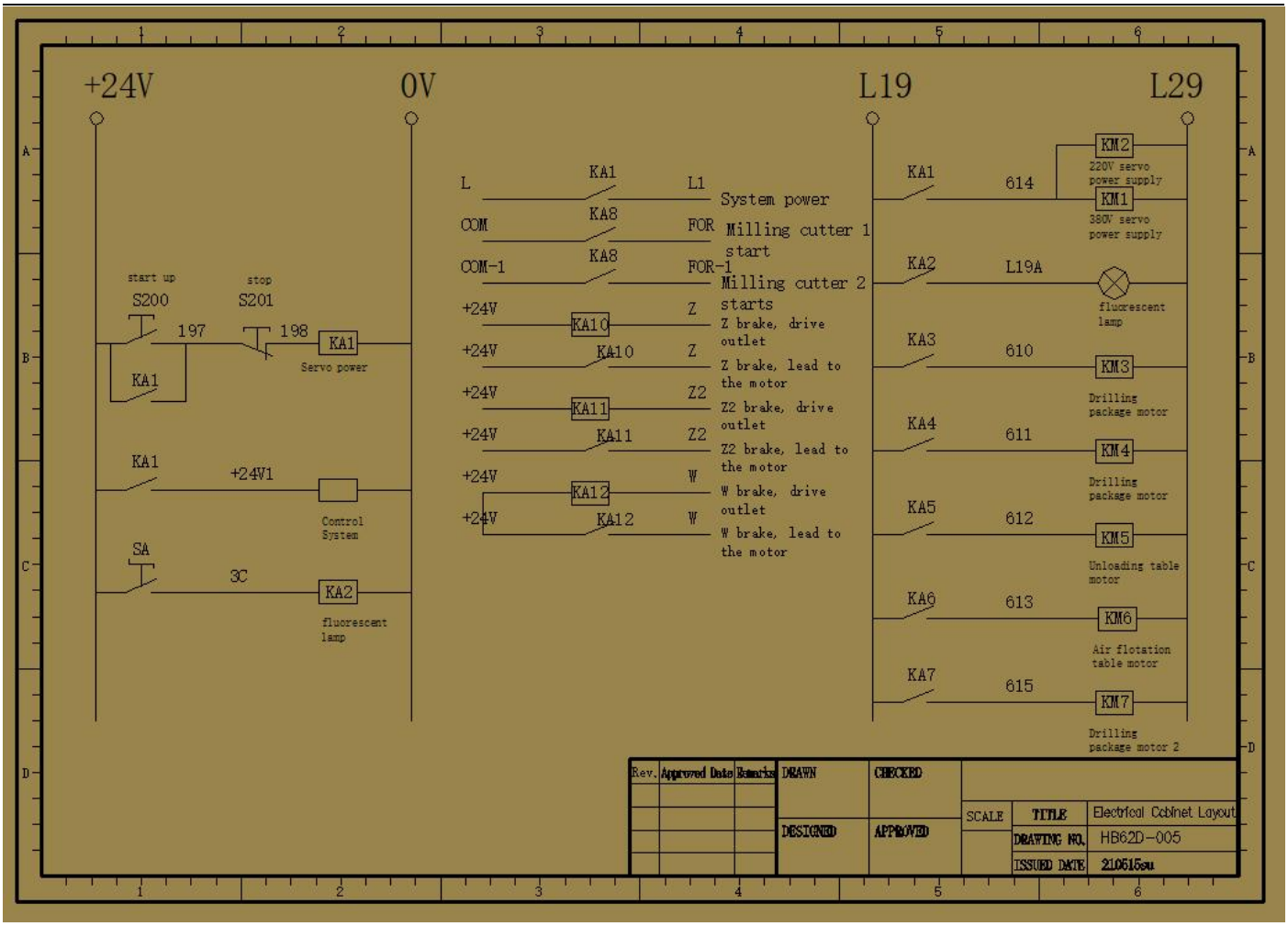
Section IV - Electric Circuit Diagram

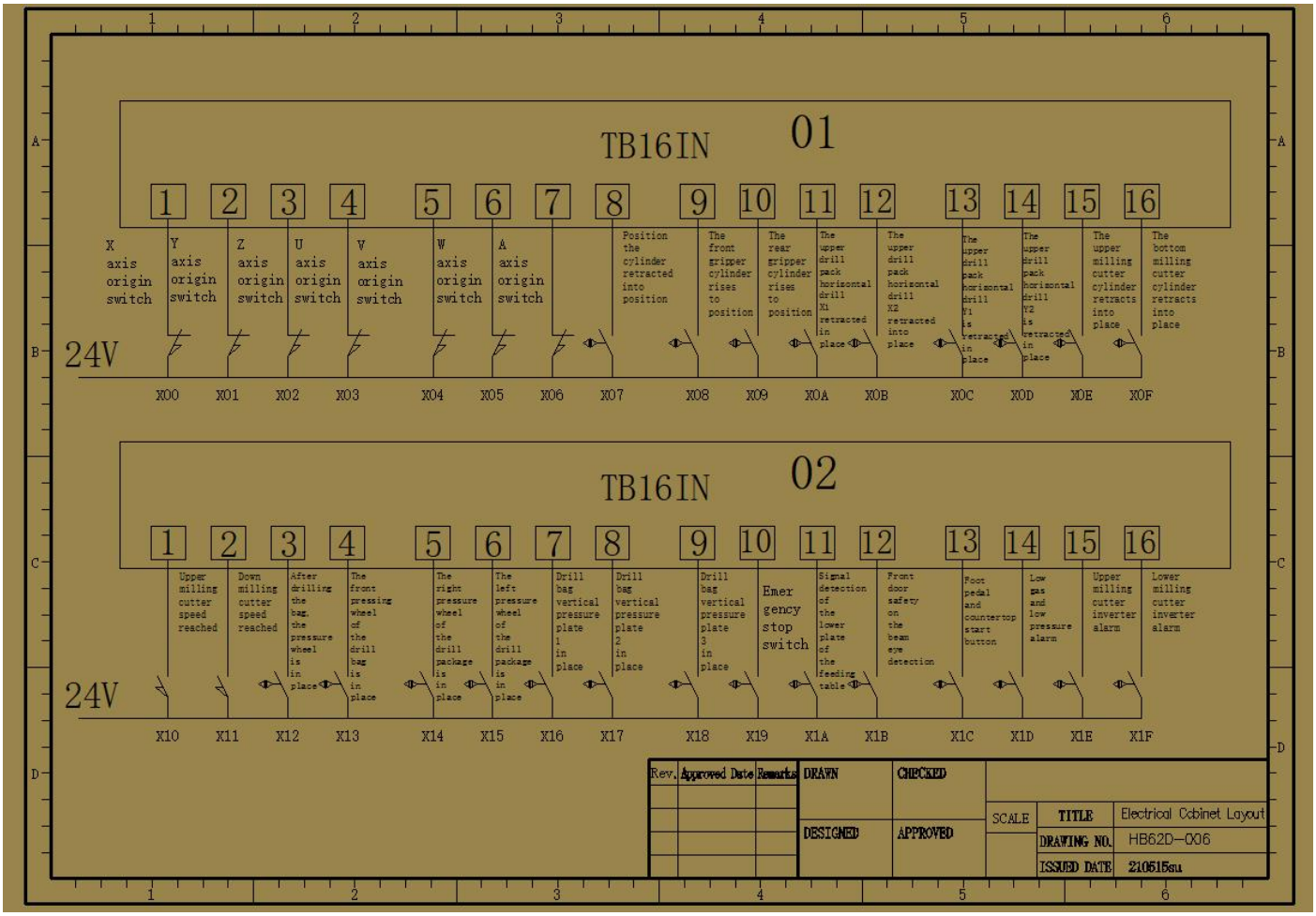


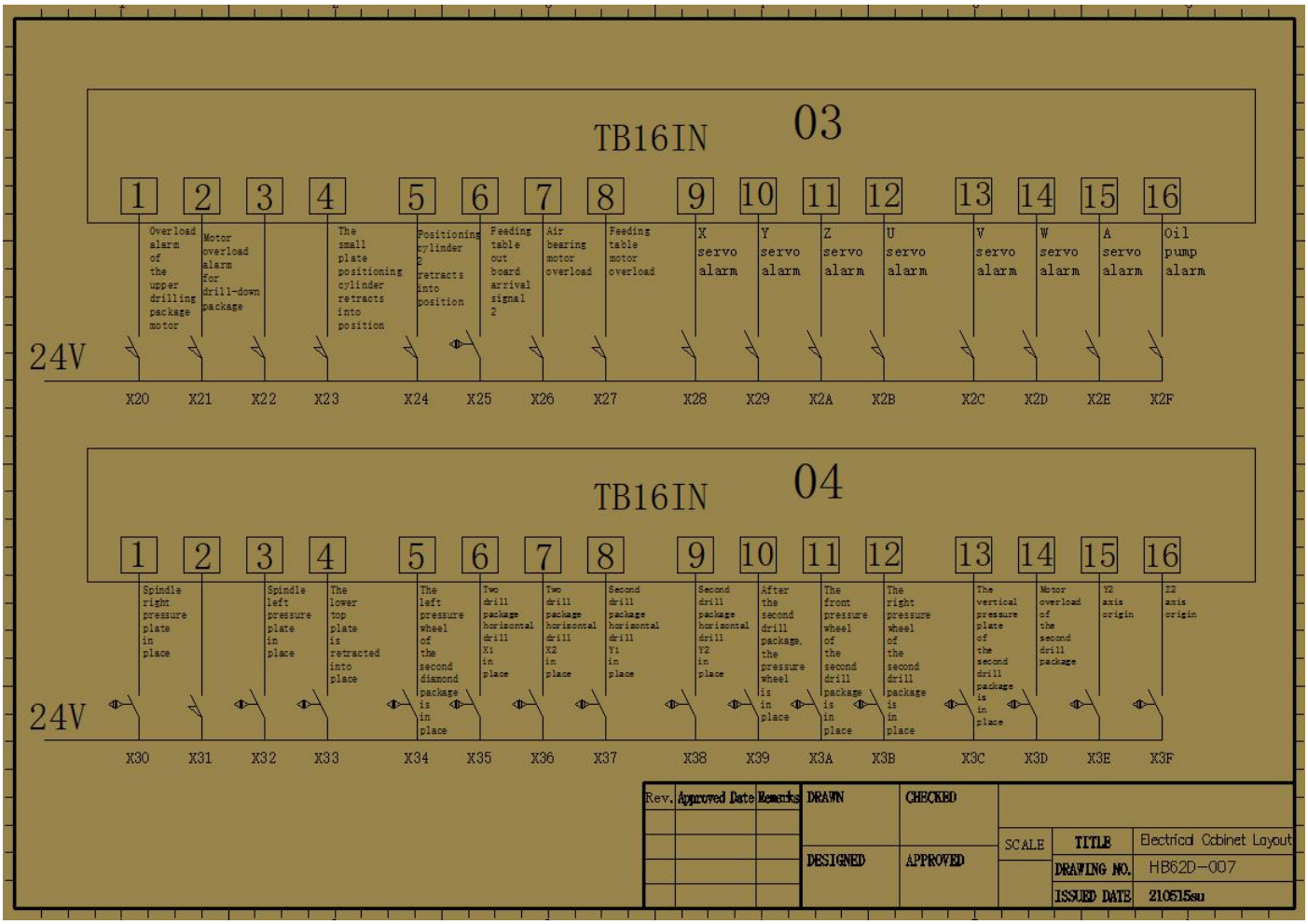

(1/C3) L10
(1/C3) L20
(1/C3) L30
10mm²
4.0mm²
6.0mm²
PE
QF3
QF2
+24V
KA
X10
KB
+BR
-BR
RA
X1E
RC
R S T
COM
FOR
KA8
KA9
HLP-A100
U V W
KM2
KM3
KM4
KM5
KM6
FR1
FR2
FR3
FR4
FR5
M
3~
Upper milling cutter 6.0kw
Down milling cutter 6.0kw
Upper drill package 1 2.2kw
Upper drill package 2 2.2kw
Drill down package 2.2kw
Unloading table 0.75kw
Air floatation table 0.75kw
Rev.
Approved Date
Remarks
DRAWN
CHECKED
DESIGNED
APPROVED
SCALE
TITLE
Main power circuit
DRAWING NO.
ISSUED DATE

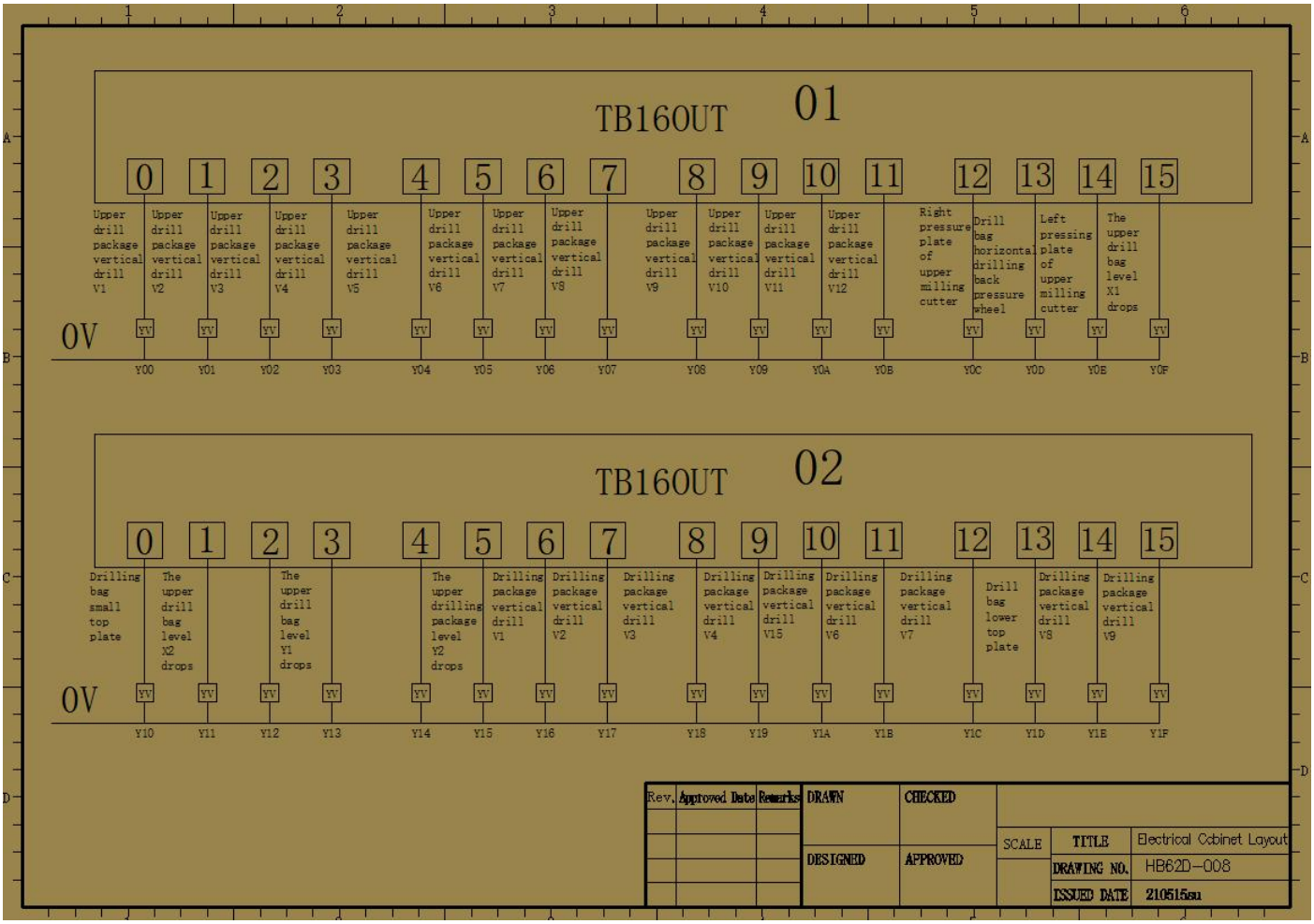

3~ 380V
(1/C2) L18
(1/C2) L28
(1/C2) L38
6.0mm²
1.5mm²
R S T L1C L2C
SV635N
C N 2
C N 1
U V W
F I B
PE
3~
Y axis servo 1.0kw
Z axis servo 1.0kw
Y1 axis servo 1.0kw
Z1 axis servo 1.0kw
V axis servo 1.0kw
W axis servo 1.0kw
Rev.
Approved Date
Remarks
DRAWN
CHECKED
DESIGNED
APPROVED
SCALE
TITLE
Main power ciruit
DRAWING NO.
HBS2D-003
ISSUED DATE
210515eu

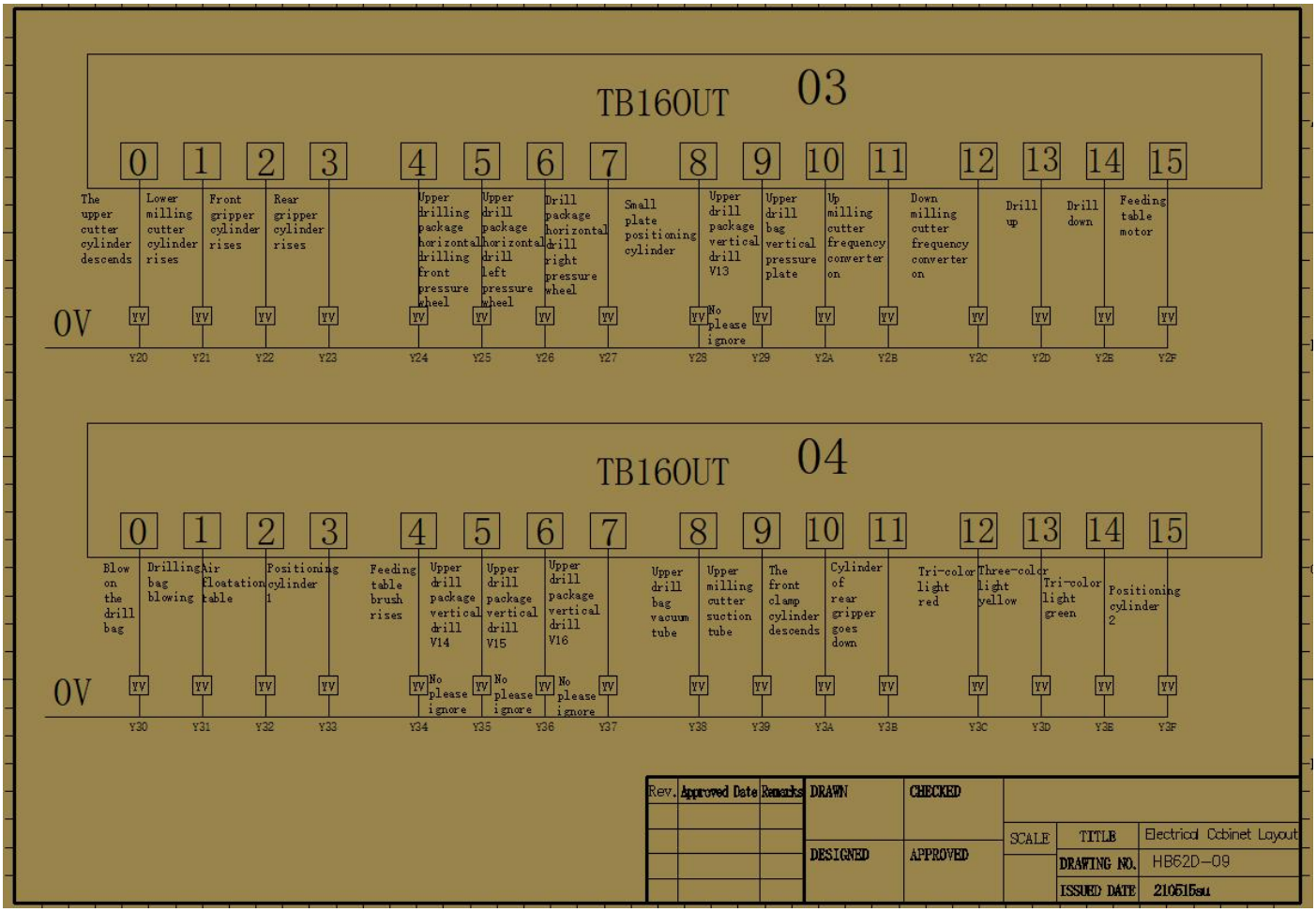

3～ 220V
(1/C3) L19
(1/C3) L29
(1/C3) L39
4mm²
1.0mm²
L1 L2 L3
SV635N
CN2
CN1
U V W
F I B
PE
3～
X axis
servo
0.75kw
U axis
servo
0.75kw
L1 L2
A-axis
servo
0.4kw
Rev.
Approved Date
Remarks
DRAWN
CHECKED
DESIGNED
APPROVED
SCALE
TITLE
Main power ciruit
DRAWING NO.
HB62D-004
ISSUED DATE
210615su


+24V
0V
L19
L29
start up
S200
stop
S201
197
198
KA1
Servo power
KA1
KA1
+24V1
Control System
SA
3C
KA2
fluorescent lamp
L
KA1
L1
System power
COM
KA8
FOR
Milling cutter 1 start
COM-1
KA8
FOR-1
Milling cutter 2 starts
+24V
KA10
Z
Z brake, drive outlet
+24V
KA10
Z
Z brake, lead to the motor
+24V
KA11
Z2
Z2 brake, drive outlet
+24V
KA11
Z2
Z2 brake, lead to the motor
+24V
KA12
W
W brake, drive outlet
+24V
KA12
W
W brake, lead to the motor
KA1
614
KM2
220V servo power supply
KM1
380V servo power supply
KA2
L19A
fluorescent lamp
KA3
610
KM3
Drilling package motor
KA4
611
KM4
Drilling package motor
KA5
612
KM5
Unloading table motor
KA6
613
KM6
Air flotation table motor
KA7
615
KM7
Drilling package motor 2
Rev.
Approved Date
Remarks
DRAWN
CHECKED
DESIGNED
APPROVED
SCALE
TITLE
Electrical Cabinet Layout
DRAWING NO.
HB62D-005
ISSUED DATE
210515su


TB16IN 01
1 X axis origin switch
2 Y axis origin switch
3 Z axis origin switch
4 U axis origin switch
5 V axis origin switch
6 W axis origin switch
7 A axis origin switch
8 Position the cylinder retracted into position
9 The front gripper cylinder rises to position
10 The rear gripper cylinder rises to position
11 The upper drill pack horizontal drill X1 retracted in place
12 The upper drill pack horizontal drill X2 retracted into place
13 The upper drill pack horizontal drill Y1 is retracted in place
14 The upper drill pack horizontal drill Y2 is retracted in place
15 The upper milling cutter cylinder retracts into place
16 The bottom milling cutter cylinder retracts into place
24V
X00 X01 X02 X03 X04 X05 X06 X07 X08 X09 X0A X0B X0C X0D X0E X0F
TB16IN 02
1 Upper milling cutter speed reached
2 Down milling cutter speed reached
3 After drilling the bag, the pressure wheel is in place
4 The front pressing wheel of the drill bag is in place
5 The right pressure wheel of the drill package is in place
6 The left pressure wheel of the drill package is in place
7 Drill bag vertical pressure plate 1 in place
8 Drill bag vertical pressure plate 2 in place
9 Drill bag vertical pressure plate 3 in place
10 Emergency stop switch
11 Signal detection of the lower plate of the feeding table
12 Front door safety on the beam eye detection
13 Foot pedal and countertop start button
14 Low gas and low pressure alarm
15 Upper milling cutter inverter alarm
16 Lower milling cutter inverter alarm
24V
X10 X11 X12 X13 X14 X15 X16 X17 X18 X19 X1A X1B X1C X1D X1E X1F
Rev. Approved Date Remarks
DRAWN CHECKED
DESIGNED APPROVED
SCALE
TITLE Electrical Cabinet Layout
DRAWING NO. HB62D-006
ISSUED DATE 210515su


TB16IN 03
1 Overload alarm of the upper drilling package motor
2 Motor overload alarm for drill-down package
3
4 The small plate positioning cylinder retracts into position
5 Positioning cylinder 2 retracts into position
6 Feeding table out board arrival signal 2
7 Air bearing motor overload
8 Feeding table motor overload
9 X servo alarm
10 Y servo alarm
11 Z servo alarm
12 U servo alarm
13 V servo alarm
14 W servo alarm
15 A servo alarm
16 Oil pump alarm
24V
X20 X21 X22 X23 X24 X25 X26 X27 X28 X29 X2A X2B X2C X2D X2E X2F
TB16IN 04
1 Spindle right pressure plate in place
2
3 Spindle left pressure plate in place
4 The lower top plate is retracted into place
5 The left pressure wheel of the second diamond package is in place
6 Two drill package horizontal drill X1 in place
7 Two drill package horizontal drill X2 in place
8 Second drill package horizontal drill Y1 in place
9 Second drill package horizontal drill Y2 in place
10 After the second drill package, the pressure wheel is in place
11 The front pressure wheel of the second drill package is in place
12 The right pressure wheel of the second drill package is in place
13 The vertical pressure plate of the second drill package is in place
14 Motor overload of the second drill package
15 Y2 axis origin
16 Z2 axis origin
24V
X30 X31 X32 X33 X34 X35 X36 X37 X38 X39 X3A X3B X3C X3D X3E X3F
Rev. Approved Date Remarks
DRAWN CHECKED
DESIGNED APPROVED
SCALE
TITLE Electrical Cabinet Layout
DRAWING NO. HB62D-007
ISSUED DATE 210515su


TB160UT 01
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Upper drill package vertical drill V1
Upper drill package vertical drill V2
Upper drill package vertical drill V3
Upper drill package vertical drill V4
Upper drill package vertical drill V5
Upper drill package vertical drill V6
Upper drill package vertical drill V7
Upper drill package vertical drill V8
Upper drill package vertical drill V9
Upper drill package vertical drill V10
Upper drill package vertical drill V11
Upper drill package vertical drill V12
Right pressure plate of upper milling cutter
Drill bag horizontal drilling back pressure wheel
Left pressing plate of upper milling cutter
The upper drill bag level X1 drops
0V
YV
Y00 Y01 Y02 Y03 Y04 Y05 Y06 Y07 Y08 Y09 Y0A Y0B Y0C Y0D Y0E Y0F
TB160UT 02
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Drilling bag small top plate
The upper drill bag level X2 drops
The upper drill bag level Y1 drops
The upper drilling package level Y2 drops
Drilling package vertical drill V1
Drilling package vertical drill V2
Drilling package vertical drill V3
Drilling package vertical drill V4
Drilling package vertical drill V15
Drilling package vertical drill V6
Drilling package vertical drill V7
Drill bag lower top plate
Drilling package vertical drill V8
Drilling package vertical drill V9
0V
YV
Y10 Y11 Y12 Y13 Y14 Y15 Y16 Y17 Y18 Y19 Y1A Y1B Y1C Y1D Y1E Y1F
Rev. Approved Date Remarks
DRAWN CHECKED
DESIGNED APPROVED
SCALE
TITLE Electrical Cabinet Layout
DRAWING NO. HB62D-008
ISSUED DATE 210515su


TB160UT 03
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
The upper cutter cylinder descends
Lower milling cutter cylinder rises
Front gripper cylinder rises
Rear gripper cylinder rises
Upper drilling package horizontal drilling front pressure wheel
Upper drill package horizontal drill left pressure wheel
Drill package horizontal drill right pressure wheel
Small plate positioning cylinder
Upper drill package vertical drill V13
No please ignore
Upper drill bag vertical pressure plate
Up milling cutter frequency converter on
Down milling cutter frequency converter on
Drill up
Drill down
Feeding table motor
0V
Y20 Y21 Y22 Y23 Y24 Y25 Y26 Y27 Y28 Y29 Y2A Y2B Y2C Y2D Y2E Y2F
TB160UT 04
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Blow on the drill bag
Drilling bag blowing
Air floatation table
Positioning cylinder 1
Feeding table brush rises
Upper drill package vertical drill V14
Upper drill package vertical drill V15
Upper drill package vertical drill V16
No please ignore
Upper drill bag vacuum tube
Upper milling cutter suction tube
The front clamp cylinder descends
Cylinder of rear gripper goes down
Tri-color light red
Three-color light yellow
Tri-color light green
Positioning cylinder 2
0V
Y30 Y31 Y32 Y33 Y34 Y35 Y36 Y37 Y38 Y39 Y3A Y3B Y3C Y3D Y3E Y3F
Rev. Approved Date Remarks
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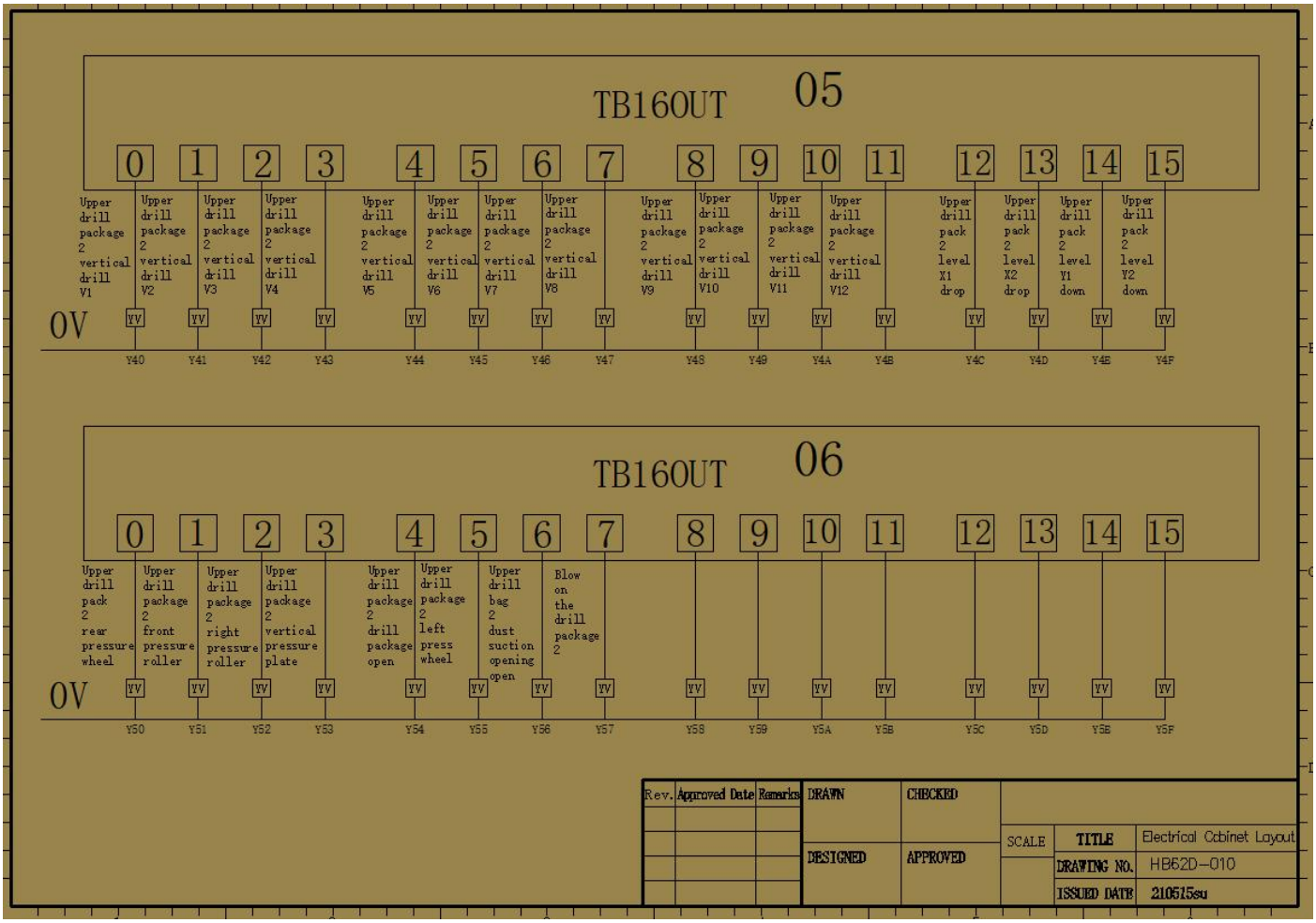
TITLE Electrical Cabinet Layout
DRAWING NO. HB62D-09
ISSUED DATE 210515su


TB160UT 05
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Upper drill package 2 vertical drill V1
Upper drill package 2 vertical drill V2
Upper drill package 2 vertical drill V3
Upper drill package 2 vertical drill V4
Upper drill package 2 vertical drill V5
Upper drill package 2 vertical drill V6
Upper drill package 2 vertical drill V7
Upper drill package 2 vertical drill V8
Upper drill package 2 vertical drill V9
Upper drill package 2 vertical drill V10
Upper drill package 2 vertical drill V11
Upper drill package 2 vertical drill V12
Upper drill pack 2 level X1 drop
Upper drill pack 2 level X2 drop
Upper drill pack 2 level Y1 down
Upper drill pack 2 level Y2 down
0V
Y40 Y41 Y42 Y43 Y44 Y45 Y46 Y47 Y48 Y49 Y4A Y4B Y4C Y4D Y4E Y4F
TB160UT 06
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Upper drill pack 2 rear pressure wheel
Upper drill package 2 front pressure roller
Upper drill package 2 right pressure roller
Upper drill package 2 vertical pressure plate
Upper drill package 2 drill package open
Upper drill package 2 left press wheel
Upper drill bag 2 dust suction opening open
Blow on the drill package 2
0V
Y50 Y51 Y52 Y53 Y54 Y55 Y56 Y57 Y58 Y59 Y5A Y5B Y5C Y5D Y5E Y5F
Rev. Approved Date Remarks
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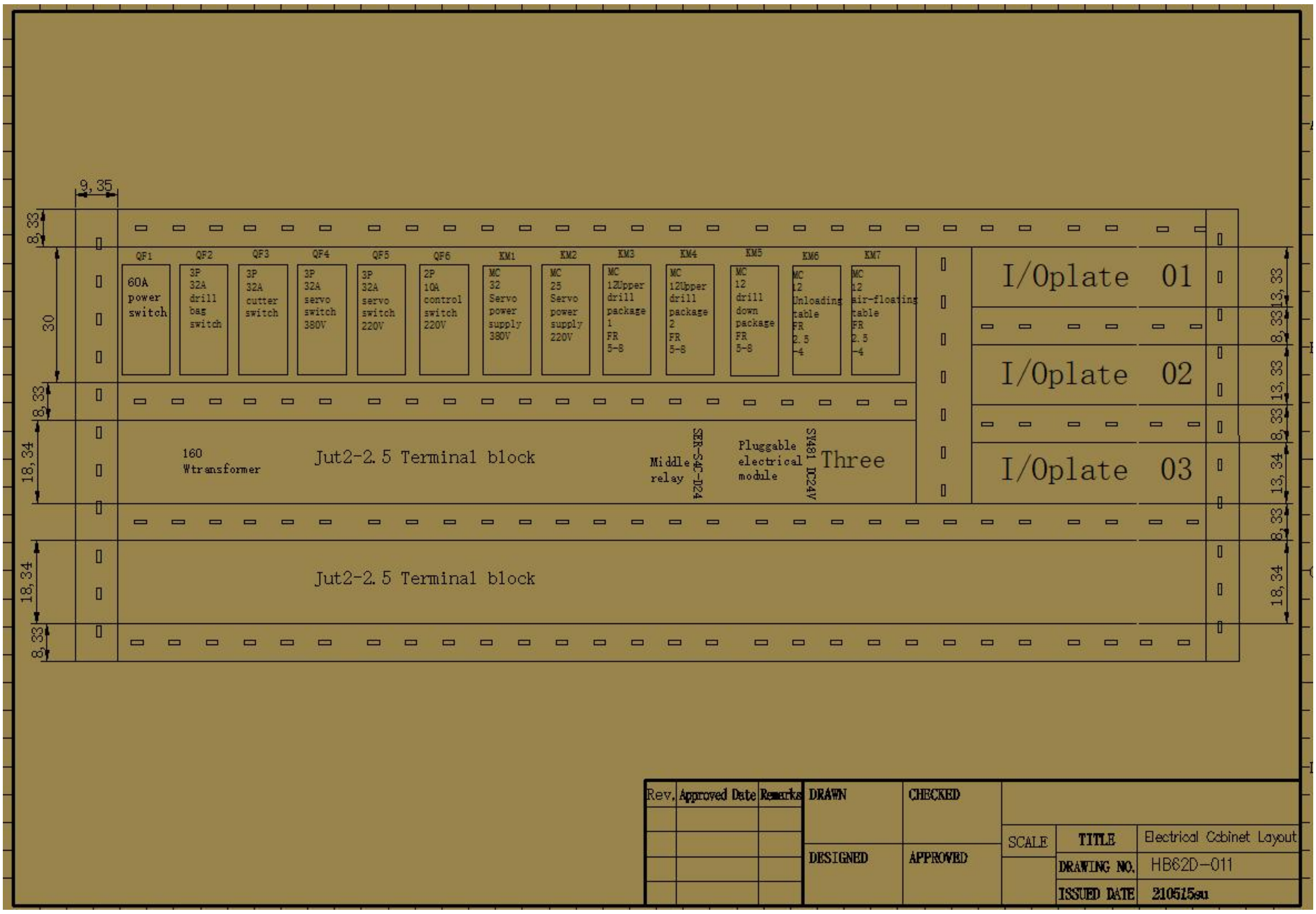
SCALE
TITLE Electrical Cabinet Layout
DRAWING NO. HB62D-010
ISSUED DATE 210515su


9,35
8,33
30
8,33
18,34
18,34
8,33
QF1
60A power switch
QF2
3P 32A drill bag switch
QF3
3P 32A cutter switch
QF4
3P 32A servo switch 380V
QF5
3P 32A servo switch 220V
QF6
2P 10A control switch 220V
KM1
MC 32 Servo power supply 380V
KM2
MC 25 Servo power supply 220V
KM3
MC 12Upper drill package 1 FR 5-8
KM4
MC 12Upper drill package 2 FR 5-8
KM5
MC 12 drill down package FR 5-8
KM6
MC 12 Unloading table FR 2.5 -4
KM7
MC 12 air-floating table FR 2.5 -4
160 Wtransformer
Jut2-2.5 Terminal block
Middle relay
SRR-S4C-DC24
Pluggable electrical module
SY481 DC24V
Three
I/Oplate 01
I/Oplate 02
I/Oplate 03
13,33
8,33
13,33
8,33
13,34
8,33
18,34
Jut2-2.5 Terminal block
Rev.
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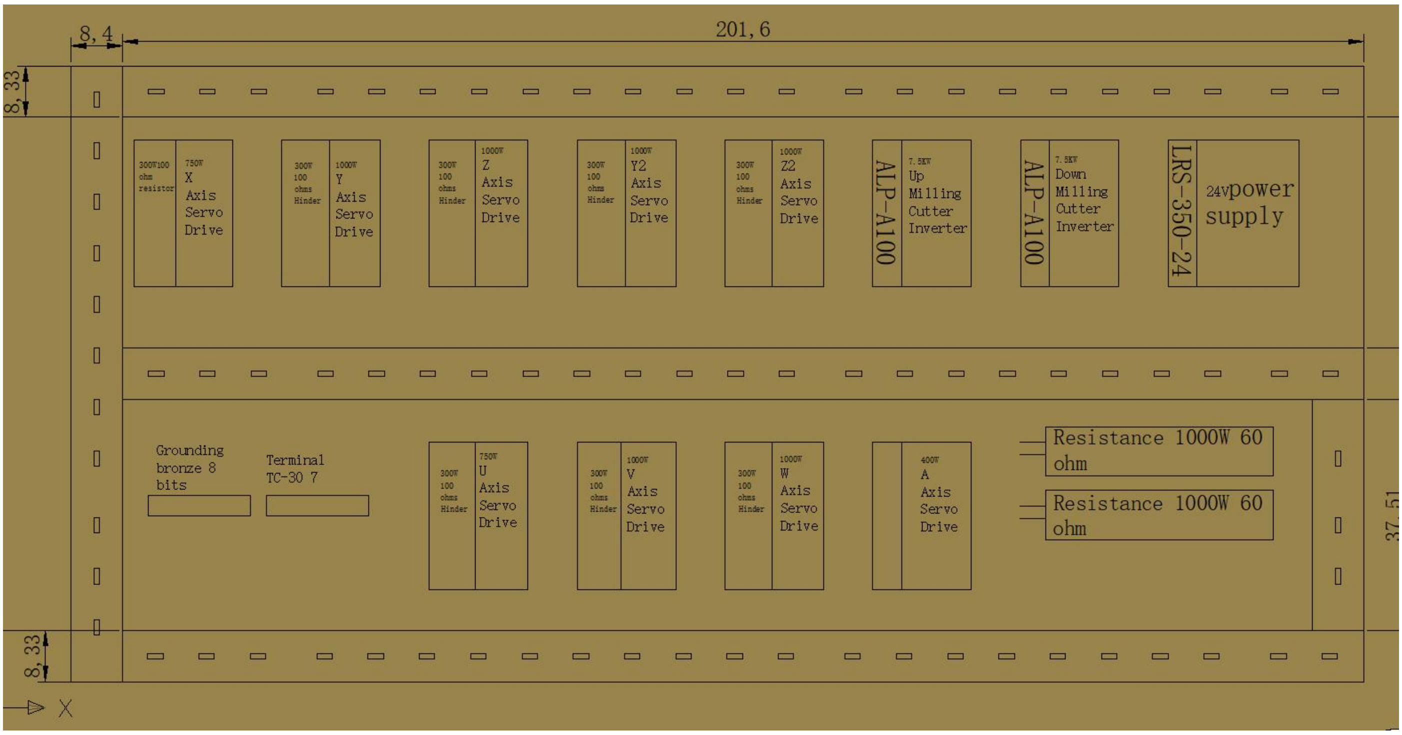
8,4
201,6
8,33
300W100 ohm resistor
750W X Axis Servo Drive
300W 100 ohms Hinder
1000W Y Axis Servo Drive
1000W Z Axis Servo Drive
1000W Y2 Axis Servo Drive
1000W Z2 Axis Servo Drive
ALP-A100
7.5KW Up Milling Cutter Inverter
7.5KW Down Milling Cutter Inverter
LRS-350-24
24Vpower supply
Grounding bronze 8 bits
Terminal TC-30 7
750W U Axis Servo Drive
1000W V Axis Servo Drive
1000W W Axis Servo Drive
400W A Axis Servo Drive
Resistance 1000W 60 ohm
Resistance 1000W 60 ohm
37,51
8,33
X